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# MCQs in Biochemistry



G. Vidya Sagar



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**MCQs  
in  
Biochemistry**

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# **MCQs in Biochemistry**

**G. Vidya Sagar**

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Dedicated to

**PROF. DR. F.V. MANVI**

*Secretary*

*KLE Society, BELGAUM*

*KARNATAKA.*

*"To My First Pharmacy teacher with Love"*

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# FOREWORD

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Competitive Examinations are the order of the day. All Colleges conducting professional courses at PG level are admitting students based on common entrance examination, which is of objective type.

In Pharmacy, M.Pharm admissions are based on qualifying the GATE entrance examination conducted by Govt. of India.

In this book, The author has done good work in preparing several objective questions which help the students to face the subject in the examination with poise and confidence.

The book is well balanced and consists of multiple choice questions from all the important topics like carbohydrate metabolism and other important Biochemical aspects.

The typesetting and quality of printing is good. The author is also well experienced in taking up this type of work.

I recommend this book to all the students preparing for GATE examination and also for Medical and Pharmacy College libraries.

**PROF. B.G. SHIVANANDA**

Principal

AL-AMEEN COLLEGE OF PHARMACY  
BANGALORE.

# PREFACE

---

I have brought out this book basically for students who plan to appear for Biochemistry in the entrance examinations like JIPMER and other Medical, Pharmacy, Physiotherapy, Nursing and other Paramedical PG Entrance Examinations. There is a dearth of good entrance manual of Biochemistry for the above said examinations. Hence, I have prepared an exhaustive Question bank of around 5000 MCQs with answers covering a wide spectrum of basic Biochemical topics of the subject.

Some of the important topics which are given a good coverage include Carbohydrate metabolism, Protein metabolism, Lipid metabolism, Nucleic acids, Enzymes, Vitamins and Mineral metabolism.

The objective questions are prepared based on the background taken from previous question papers of Professional medical and Paramedical competitive entrance examinations.

The book serves as a ready reckoner for Biochemistry as far as objective pattern is concerned. I feel satisfied if the book serves the purpose for which it is intended.

I have tried to minimize typographical errors but still some must have crept in. If they are brought to my notice, I will be rectifying them in the next edition.

Constructive Criticism is always welcome

**G. Vidya Sagar**

# ACKNOWLEDGEMENTS

---

I wish to express my profound gratitude and benevolence to the following who were the inspiring force in making this book a reality

- **Sadhvi Shilapji**  
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Gujarat
- **Prof. J.V.L.N. Sheshagiri Rao**  
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Principal, J.N. Chaturvedi College of Pharmacy  
Nagpur
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Sciences  
Pilani, Rajasthan
- **Prof. Dr. Srinivas Rao**  
Principal, VEL's College of Pharmacy  
Chennai

Finally, I express my gratitude to Mr. Saumya Gupta. MD, New Age International (P) Limited, New Delhi, for his encouragement and support.

**Dr. G.Vidya Sagar**

# SOME VALUABLE COMMENTS

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- This book is very useful for students appearing for GATE Exams. Recommended reading.

**Prof. Dr. Subhas C. Marihal**  
Principal, Goa College of Pharmacy, Goa.

- Biochemistry made simple in the form of multiple choice questions. Strongly recommended.

**Prof. Dr. Vijaykumar Ishwar Hukkeri**  
Principal, KLE College of Pharmacy, Hubli

- Dr. Vidya Sagar can be applauded for his untiring efforts in bringing out such a good book.  
Recommended for students and Library

**Dr. G. Devala Rao**  
Principal, Sidhartha College of Pharmaceutical Sciences  
Vijaywada, A.P.

- This book will be very useful companion for students appearing for PG Medical, Pharmacy, Nursing and Physiotherapy competitive exams.

**Prof. Dr. T.K. Ravi**  
Principal, Sri Ramakrishna Institute of Pharmaceutical Science  
Coimbatore.

- MCQs are well framed, mostly from previous entrance examinations. Commendable work.

**Prof. Madhukar R. Tajne**  
Deptt. of Pharmaceutical Sciences,  
Nagpur University, Nagpur

# CONTENTS

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<i>Preface</i>	(x)
<b>Chapter 1</b> <b>INTRODUCTION TO BIOCHEMISTRY</b>	<b>1</b>
<b>CHAPTER 2</b> <b>CARBOHYDRATES AND CARBOHYDRATE METABOLISM</b>	<b>5</b>
<b>CHAPTER 3</b> <b>PROTEINS &amp; PROTEIN METABOLISM</b>	<b>27</b>
<b>CHAPTER 4</b> <b>FATS &amp; FATTY ACID METABOLISM</b>	<b>75</b>
<b>CHAPTER 5</b> <b>VITAMINS</b>	<b>113</b>
<b>CHAPTER 6</b> <b>ENZYMES</b>	<b>141</b>
<b>CHAPTER 7</b> <b>MINERAL METABOLISM</b>	<b>183</b>
<b>CHAPTER 8</b> <b>HORMONE METABOLISM</b>	<b>209</b>
<b>CHAPTER 9</b> <b>NUCLEIC ACIDS</b>	<b>237</b>
<b>CHAPTER 10</b> <b>WATER &amp; ELECTROLYTE BALANCE</b>	<b>281</b>

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## CHAPTER 1

# INTRODUCTION TO BIOCHEMISTRY

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- 1. A drug which prevents uric acid synthesis by inhibiting the enzyme xanthine oxidase is**  
(A) Aspirin                      (B) Allopurinol  
(C) Colchicine                (D) Probenecid
- 2. Which of the following is required for crystallization and storage of the hormone insulin?**  
(A)  $Mn^{++}$                       (B)  $Mg^{++}$   
(C)  $Ca^{++}$                       (D)  $Zn^{++}$
- 3. Oxidation of which substance in the body yields the most calories**  
(A) Glucose                      (B) Glycogen  
(C) Protein                      (D) Lipids
- 4. Milk is deficient in which vitamins?**  
(A) Vitamin C                      (B) Vitamin A  
(C) Vitamin B<sub>2</sub>                (D) Vitamin K
- 5. Milk is deficient of which mineral?**  
(A) Phosphorus                (B) Sodium  
(C) Iron                          (D) Potassium
- 6. Synthesis of prostaglandins is inhibited by**  
(A) Aspirin                      (B) Arsenic  
(C) Fluoride                      (D) Cyanide
- 7. HDL is synthesized and secreted from**  
(A) Pancreas                      (B) Liver  
(C) Kidney                      (D) Muscle
- 8. Which are the cholesterol esters that enter cells through the receptor-mediated endocytosis of lipoproteins hydrolyzed?**  
(A) Endoplasmic reticulum  
(B) Lysosomes  
(C) Plasma membrane receptor  
(D) Mitochondria
- 9. Which of the following phospholipids is localized to a greater extent in the outer leaflet of the membrane lipid bilayer?**  
(A) Choline phosphoglycerides  
(B) Ethanolamine phosphoglycerides  
(C) Inositol phosphoglycerides  
(D) Serine phosphoglycerides
- 10. All the following processes occur rapidly in the membrane lipid bilayer except**  
(A) Flexing of fatty acyl chains  
(B) Lateral diffusion of phospholipids  
(C) Transbilayer diffusion of phospholipids  
(D) Rotation of phospholipids around their long axes
- 11. Which of the following statement is correct about membrane cholesterol?**  
(A) The hydroxyl group is located near the centre of the lipid layer  
(B) Most of the cholesterol is in the form of a cholesterol ester  
(C) The steroid nucleus form forms a rigid, planar structure

- (D) The hydrocarbon chain of cholesterol projects into the extracellular fluid
- 12. Which one is the heaviest particulate component of the cell?**  
 (A) Nucleus (B) Mitochondria  
 (C) Cytoplasm (D) Golgi apparatus
- 13. Which one is the largest particulate of the cytoplasm?**  
 (A) Lysosomes  
 (B) Mitochondria  
 (C) Golgi apparatus  
 (D) Entoplasmic reticulum
- 14. The degradative Processes are categorized under the heading of**  
 (A) Anabolism (B) Catabolism  
 (C) Metabolism (D) None of the above
- 15. The exchange of material takes place**  
 (A) Only by diffusion  
 (B) Only by active transport  
 (C) Only by pinocytosis  
 (D) All of these
- 16. The average pH of Urine is**  
 (A) 7.0 (B) 6.0  
 (C) 8.0 (D) 0.0
- 17. The pH of blood is 7.4 when the ratio between  $H_2CO_3$  and  $NaHCO_3$  is**  
 (A) 1 : 10 (B) 1 : 20  
 (C) 1 : 25 (D) 1 : 30
- 18. The phenomenon of osmosis is opposite to that of**  
 (A) Diffusion (B) Effusion  
 (C) Effusion (D) Coagulation
- 19. The surface tension in intestinal lumen between fat droplets and aqueous medium is decreased by**  
 (A) Bile Salts (B) Bile acids  
 (C) Conc.  $H_2SO_4$  (D) Acetic acid
- 20. Which of the following is located in the mitochondria?**  
 (A) Cytochrome oxidase  
 (B) Succinate dehydrogenase  
 (C) Dihydrolipoyl dehydrogenase  
 (C) All of these
- 21. The most active site of protein synthesis is the**  
 (A) Nucleus (B) Ribosome  
 (C) Mitochondrion (D) Cell sap
- 22. The fatty acids can be transported into and out of mitochondria through**  
 (A) Active transport  
 (B) Facilitated transfer  
 (C) Non-facilitated transfer  
 (D) None of these
- 23. Mitochondrial DNA is**  
 (A) Circular double stranded  
 (B) Circular single stranded  
 (C) Linear double helix  
 (D) None of these
- 24. The absorption of intact protein from the gut in the foetal and newborn animals takes place by**  
 (A) Pinocytosis (B) Passive diffusion  
 (C) Simple diffusion (D) Active transport
- 25. The cellular organelles called "suicide bags" are**  
 (A) Lysosomes (B) Ribosomes  
 (C) Nucleolus (D) Golgi's bodies
- 26. From the biological viewpoint, solutions can be grouped into**  
 (A) Isotonic solution  
 (B) Hypotonic solutions  
 (C) Hypertonic solution  
 (D) All of these
- 27. Bulk transport across cell membrane is accomplished by**  
 (A) Phagocytosis (B) Pinocytosis  
 (C) Extrusion (D) All of these
- 28. The ability of the cell membrane to act as a selective barrier depends upon**  
 (A) The lipid composition of the membrane  
 (B) The pores which allows small molecules  
 (C) The special mediated transport systems  
 (D) All of these

**29. Carrier protein can**

- (A) Transport only one substance
- (B) Transport more than one substance
- (C) Exchange one substance to another
- (D) Perform all of these functions

**30. A lipid bilayer is permeable to**

- (A) Urea (B) Fructose
- (C) Glucose (D) Potassium

**31. The Golgi complex**

- (A) Synthesizes proteins
- (B) Produces ATP
- (C) Provides a pathway for transporting chemicals
- (D) Forms glycoproteins

**32. The following points about microfilaments are true except**

- (A) They form cytoskeleton with microtubules
- (B) They provide support and shape
- (C) They form intracellular conducting channels
- (D) They are involved in muscle cell contraction

**33. The following substances are cell inclusions except**

- (A) Melanin (B) Glycogen
- (C) Lipids (D) Centrosome

**34. Fatty acids can be transported into and out of cell membrane by**

- (A) Active transport (B) Facilitated transport
- (C) Diffusion (D) Osmosis

**35. Enzymes catalyzing electron transport are present mainly in the**

- (A) Ribosomes
- (B) Endoplasmic reticulum
- (C) Lysosomes
- (D) Inner mitochondrial membrane

**36. Mature erythrocytes do not contain**

- (A) Glycolytic enzymes (B) HMP shunt enzymes
- (C) Pyridine nucleotide (D) ATP

**37. In mammalian cells rRNA is produced mainly in the**

- (A) Endoplasmic reticulum
- (B) Ribosome
- (C) Nucleolus
- (D) Nucleus

**38. Genetic information of nuclear DNA is transmitted to the site of protein synthesis by**

- (A) rRNA (B) mRNA
- (C) tRNA (D) Polysomes

**39. The power house of the cell is**

- (A) Nucleus (B) Cell membrane
- (C) Mitochondria (D) Lysosomes

**40. The digestive enzymes of cellular compounds are confined to**

- (A) Lysosomes (B) Ribosomes
- (C) Peroxisomes (D) Polysomes

**ANSWERS**

- |       |       |       |       |       |       |
|-------|-------|-------|-------|-------|-------|
| 1. B  | 2. D  | 3. D  | 4. A  | 5. C  | 6. A  |
| 7. B  | 8. B  | 9. A  | 10. C | 11. C | 12. A |
| 13. B | 14. B | 15. D | 16. B | 17. B | 18. A |
| 19. A | 20. D | 21. B | 22. B | 23. A | 24. A |
| 25. A | 26. D | 27. D | 28. D | 29. D | 30. A |
| 31. D | 32. C | 33. D | 34. B | 35. D | 36. C |
| 37. C | 38. D | 39. C | 40. A |       |       |

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## CHAPTER 2

# CARBOHYDRATES AND CARBOHYDRATE METABOLISM

- The general formula of monosaccharides is**  
(A)  $C_nH_{2n}O_n$  (B)  $C_{2n}H_2O_n$   
(C)  $C_nH_2O_{2n}$  (D)  $C_nH_{2n}O_{2n}$
- The general formula of polysaccharides is**  
(A)  $(C_6H_{10}O_5)_n$  (B)  $(C_6H_{12}O_5)_n$   
(C)  $(C_6H_{10}O_6)_n$  (D)  $(C_6H_{10}O_6)_n$
- The aldose sugar is**  
(A) Glycerose (B) Ribulose  
(C) Erythrulose (D) Dihydroxyacetone
- A triose sugar is**  
(A) Glycerose (B) Ribose  
(C) Erythrose (D) Fructose
- A pentose sugar is**  
(A) Dihydroxyacetone (B) Ribulose  
(C) Erythrose (D) Glucose
- The pentose sugar present mainly in the heart muscle is**  
(A) Lyxose (B) Ribose  
(C) Arabinose (D) Xylose
- Polysaccharides are**  
(A) Polymers (B) Acids  
(C) Proteins (D) Oils
- The number of isomers of glucose is**  
(A) 2 (B) 4  
(C) 8 (D) 16
- Two sugars which differ from one another only in configuration around a single carbon atom are termed**  
(A) Epimers (B) Anomers  
(C) Optical isomers (D) Stereoisomers
- Isomers differing as a result of variations in configuration of the —OH and —H on carbon atoms 2, 3 and 4 of glucose are known as**  
(A) Epimers (B) Anomers  
(C) Optical isomers (D) Stereoisomers
- The most important epimer of glucose is**  
(A) Galactose (B) Fructose  
(C) Arabinose (D) Xylose
- $\alpha$ -D-glucose and  $\beta$ -D-glucose are**  
(A) Stereoisomers (B) Epimers  
(C) Anomers (D) Keto-aldo pairs
- $\alpha$ -D-glucose +  $112^\circ \rightarrow + 52.5^\circ \leftarrow + 19^\circ \beta$ -D-glucose for glucose above represents**  
(A) Optical isomerism (B) Mutarotation  
(C) Epimerisation (D) D and L isomerism
- Compounds having the same structural formula but differing in spatial configuration are known as**  
(A) Stereoisomers (B) Anomers  
(C) Optical isomers (D) Epimers

- 15. In glucose the orientation of the —H and —OH groups around the carbon atom 5 adjacent to the terminal primary alcohol carbon determines**
- (A) D or L series  
(B) Dextro or levorotatory  
(C)  $\alpha$  and  $\beta$  anomers  
(D) Epimers
- 16. The carbohydrate of the blood group substances is**
- (A) Sucrose (B) Fucose  
(C) Arabinose (D) Maltose
- 17. Erythromycin contains**
- (A) Dimethyl amino sugar  
(B) Trimethyl amino sugar  
(C) Sterol and sugar  
(D) Glycerol and sugar
- 18. A sugar alcohol is**
- (A) Mannitol (B) Trehalose  
(C) Xylulose (D) Arabinose
- 19. The major sugar of insect hemolymph is**
- (A) Glycogen (B) Pectin  
(C) Trehalose (D) Sucrose
- 20. The sugar found in DNA is**
- (A) Xylose (B) Ribose  
(C) Deoxyribose (D) Ribulose
- 21. The sugar found in RNA is**
- (A) Ribose (B) Deoxyribose  
(C) Ribulose (D) Erythrose
- 22. The sugar found in milk is**
- (A) Galactose (B) Glucose  
(C) Fructose (D) Lactose
- 23. Invert sugar is**
- (A) Lactose (B) Sucrose  
(C) Hydrolytic products of sucrose  
(D) Fructose
- 24. Sucrose consists of**
- (A) Glucose + glucose  
(B) Glucose + fructose  
(C) Glucose + galactose  
(D) Glucose + mannose
- 25. The monosaccharide units are linked by 1  $\rightarrow$  4 glycosidic linkage in**
- (A) Maltose (B) Sucrose  
(C) Cellulose (D) Cellobiose
- 26. Which of the following is a non-reducing sugar?**
- (A) Isomaltose (B) Maltose  
(C) Lactose (D) Trehalose
- 27. Which of the following is a reducing sugar?**
- (A) Sucrose (B) Trehalose  
(C) Isomaltose (D) Agar
- 28. A disaccharide formed by 1,1-glycosidic linkage between their monosaccharide units is**
- (A) Lactose (B) Maltose  
(C) Trehalose (D) Sucrose
- 29. A disaccharide formed by 1,1-glycosidic linkage between their monosaccharide units is**
- (A) Lactose (B) Maltose  
(C) Trehalose (D) Sucrose
- 30. Mutarotation refers to change in**
- (A) pH (B) Optical rotation  
(C) Conductance (D) Chemical properties
- 31. A polysacchharide which is often called animal starch is**
- (A) Glycogen (B) Starch  
(C) Inulin (D) Dextrin
- 32. The homopolysaccharide used for intravenous infusion as plasma substitute is**
- (A) Agar (B) Inulin  
(C) Pectin (D) Starch
- 33. The polysaccharide used in assessing the glomerular fittration rate (GFR) is**
- (A) Glycogen (B) Agar  
(C) Inulin (D) Hyaluronic acid

- 34. The constituent unit of inulin is**  
(A) Glucose (B) Fructose  
(C) Mannose (D) Galactose
- 35. The polysaccharide found in the exoskeleton of invertebrates is**  
(A) Pectin (B) Chitin  
(C) Cellulose (D) Chondroitin sulphate
- 36. Which of the following is a heteroglycan?**  
(A) Dextrins (B) Agar  
(C) Inulin (D) Chitin
- 37. The glycosaminoglycan which does not contain uronic acid is**  
(A) Dermatan sulphate  
(B) Chondroitin sulphate  
(C) Keratan sulphate  
(D) Heparan sulphate
- 38. The glycosaminoglycan which does not contain uronic acid is**  
(A) Hyaluronic acid  
(B) Heparin  
(C) Chondroitin sulphate  
(D) Dermatan sulphate
- 39. Keratan sulphate is found in abundance in**  
(A) Heart muscle (B) Liver  
(C) Adrenal cortex (D) Cornea
- 40. Repeating units of hyaluronic acid are**  
(A) N-acetyl glucosamine and D-glucuronic acid  
(B) N-acetyl galactosamine and D-glucuronic acid  
(C) N-acetyl glucosamine and galactose  
(D) N-acetyl galactosamine and L-iduronic acid
- 41. The approximate number of branches in amylopectin is**  
(A) 10 (B) 20  
(C) 40 (D) 80
- 42. In amylopectin the intervals of glucose units of each branch is**  
(A) 10–20 (B) 24–30  
(C) 30–40 (D) 40–50
- 43. A polymer of glucose synthesized by the action of *Leuconostoc mesenteroides* in a sucrose medium is**  
(A) Dextrans (B) Dextrin  
(C) Limit dextrin (D) Inulin
- 44. Glucose on reduction with sodium amalgam forms**  
(A) Dulcitol (B) Sorbitol  
(C) Mannitol (D) Mannitol and sorbitol
- 45. Glucose on oxidation does not give**  
(A) Glycoside (B) Glucosaccharic acid  
(C) Gluconic acid (D) Glucuronic acid
- 46. Oxidation of galactose with conc  $\text{HNO}_3$  yields**  
(A) Mucic acid (B) Glucuronic acid  
(C) Saccharic acid (D) Gluconic acid
- 47. A positive Benedict's test is not given by**  
(A) Sucrose (B) Lactose  
(C) Maltose (D) Glucose
- 48. Starch is a**  
(A) Polysaccharide (B) Monosaccharide  
(C) Disaccharide (D) None of these
- 49. A positive Seliwanoff's test is obtained with**  
(A) Glucose (B) Fructose  
(C) Lactose (D) Maltose
- 50. Osazones are not formed with the**  
(A) Glucose (B) Fructose  
(C) Sucrose (D) Lactose
- 51. The most abundant carbohydrate found in nature is**  
(A) Starch (B) Glycogen  
(C) Cellulose (D) Chitin
- 52. Impaired renal function is indicated when the amount of PSP excreted in the first 15 minutes is**  
(A) 20% (B) 35%  
(C) 40% (D) 45%
- 53. An early feature of renal disease is**  
(A) Impairment of the capacity of the tubule to perform osmotic work

- (B) Decrease in maximal tubular excretory capacity  
(C) Decrease in filtration factor  
(D) Decrease in renal plasma flow
- 54. ADH test is based on the measurement of**  
(A) Specific gravity of urine  
(B) Concentration of urea in urine  
(C) Concentration of urea in blood  
(D) Volume of urine in ml/minute
- 55. The specific gravity of urine normally ranges from**  
(A) 0.900–0.999 (B) 1.003–1.030  
(C) 1.000–1.001 (D) 1.101–1.120
- 56. Specific gravity of urine increases in**  
(A) Diabetes mellitus  
(B) Chronic glomerulonephritis  
(C) Compulsive polydypsia  
(D) Hypercalcemia
- 57. Fixation of specific gravity of urine to 1.010 is found in**  
(A) Diabetes insipidus  
(B) Compulsive polydypsia  
(C) Cystinosis  
(D) Chronic glomerulonephritis
- 58. Addis test is the measure of**  
(A) Impairment of the capacity of the tubule to perform osmotic work  
(B) Secretory function of liver  
(C) Excretory function of liver  
(D) Activity of parenchymal cells of liver
- 59. Number of stereoisomers of glucose is**  
(A) 4 (B) 8  
(C) 16 (D) None of these
- 60. Maltose can be formed by hydrolysis of**  
(A) Starch (B) Dextrin  
(C) Glycogen (D) All of these
- 61.  $\alpha$ -D-Glucuronic acid is present in**  
(A) Hyaluronic acid (B) Chondroitin sulphate  
(C) Heparin (D) All of these
- 62. Fructose is present in hydrolysate of**  
(A) Sucrose (B) Inulin  
(C) Both of the above (D) None of these
- 63. A carbohydrate found in DNA is**  
(A) Ribose (B) Deoxyribose  
(C) Ribulose (D) All of these
- 64. Ribulose is a these**  
(A) Ketotetrose (B) Aldotetrose  
(C) Ketopentose (D) Aldopentose
- 65. A carbohydrate, commonly known as dextrose is**  
(A) Dextrin (B) D-Fructose  
(C) D-Glucose (D) Glycogen
- 66. A carbohydrate found only in milk is**  
(A) Glucose (B) Galactose  
(C) Lactose (D) Maltose
- 67. A carbohydrate, known commonly as invert sugar, is**  
(A) Fructose (B) Sucrose  
(C) Glucose (D) Lactose
- 68. A heteropolysaccharide among the following is**  
(A) Inulin (B) Cellulose  
(C) Heparin (D) Dextrin
- 69. The predominant form of glucose in solution is**  
(A) Acyclic form  
(B) Hydrated acyclic form  
(C) Glucofuranose  
(D) Glucopyranose
- 70. An L-isomer of monosaccharide formed in human body is**  
(A) L-fructose (B) L-Erythrose  
(C) L-Xylose (D) L-Xylulose
- 71. Hyaluronic acid is found in**  
(A) Joints (B) Brain  
(C) Abdomen (D) Mouth
- 72. The carbon atom which becomes asymmetric when the straight chain form of monosaccharide changes into ring form is known as**

- (A) Anomeric carbon atom  
(B) Epimeric carbon atom  
(C) Isomeric carbon atom  
(D) None of these
- 73. The smallest monosaccharide having furanose ring structure is**  
(A) Erythrose (B) Ribose  
(C) Glucose (D) Fructose
- 74. Which of the following is an epimeric pair?**  
(A) Glucose and fructose  
(B) Glucose and galactose  
(C) Galactose and mannose  
(D) Lactose and maltose
- 75.  $\alpha$ -Glycosidic bond is present in**  
(A) Lactose (B) Maltose  
(C) Sucrose (D) All of these
- 76. Branching occurs in glycogen approximately after every**  
(A) Five glucose units  
(B) Ten glucose units  
(C) Fifteen glucose units  
(D) Twenty glucose units
- 77. N-Acetylglucosamine is present in**  
(A) Hyaluronic acid (B) Chondroitin sulphate  
(C) Heparin (D) All of these
- 78. Iodine gives a red colour with**  
(A) Starch (B) Dextrin  
(C) Glycogen (D) Inulin
- 79. Amylose is a constituent of**  
(A) Starch (B) Cellulose  
(C) Glycogen (D) None of these
- 80. Synovial fluid contains**  
(A) Heparin  
(B) Hyaluronic acid  
(C) Chondroitin sulphate  
(D) Keratin sulphate
- 81. Gluconeogenesis is decreased by**  
(A) Glucagon (B) Epinephrine  
(C) Glucocorticoids (D) Insulin
- 82. Lactate formed in muscles can be utilised through**  
(A) Rapoport-Luebeling cycle  
(B) Glucose-alanine cycle  
(C) Cori's cycle  
(D) Citric acid cycle
- 83. Glucose-6-phosphatase is not present in**  
(A) Liver and kidneys  
(B) Kidneys and muscles  
(C) Kidneys and adipose tissue  
(D) Muscles and adipose tissue
- 84. Pyruvate carboxylase is regulated by**  
(A) Induction (B) Repression  
(C) Allosteric regulation (D) All of these
- 85. Fructose-2, 6-biphosphate is formed by the action of**  
(A) Phosphofructokinase-1  
(B) Phosphofructokinase-2  
(C) Fructose biphosphate isomerase  
(D) Fructose-1, 6-biphosphatase
- 86. The highest concentrations of fructose are found in**  
(A) Aqueous humor (B) Vitreous humor  
(C) Synovial fluid (D) Seminal fluid
- 87. Glucose uptake by liver cells is**  
(A) Energy-consuming (B) A saturable process  
(C) Insulin-dependent (D) Insulin-independent
- 88. Renal threshold for glucose is decreased in**  
(A) Diabetes mellitus (B) Insulinoma  
(C) Renal glycosuria (D) Alimentary glycosuria
- 89. Active uptake of glucose is inhibited by**  
(A) Ouabain (B) Phlorrizin  
(C) Digoxin (D) Alloxan
- 90. Glucose-6-phosphatase is absent or deficient in**  
(A) Von Gierke's disease  
(B) Pompe's disease  
(C) Cori's disease  
(D) McArdle's disease

- 91. Debranching enzyme is absent in**  
 (A) Cori's disease  
 (B) Andersen's disease  
 (C) Von Gierke's disease  
 (D) Her's disease
- 92. McArdle's disease is due to the deficiency of**  
 (A) Glucose-6-phosphatase  
 (B) Phosphofructokinase  
 (C) Liver phosphorylase  
 (D) muscle phosphorylase
- 93. Tautomerisation is**  
 (A) Shift of hydrogen (B) Shift of carbon  
 (C) Shift of both (D) None of these
- 94. In essential pentosuria, urine contains**  
 (A) D-Ribose (B) D-Xylulose  
 (C) L-Xylulose (D) D-Xylose
- 95. Action of salivary amylase on starch leads to the formation of**  
 (A) Maltose (B) Maltotriose  
 (C) Both of the above (D) Neither of these
- 96. Congenital galactosaemia can lead to**  
 (A) Mental retardation  
 (B) Premature cataract  
 (C) Death  
 (D) All of the above
- 97. Uridine diphosphate glucose (UDPG) is**  
 (A) Required for metabolism of galactose  
 (B) Required for synthesis of glucuronic acid  
 (C) A substrate for glycogen synthetase  
 (D) All of the above
- 98. Catalytic activity of salivary amylase requires the presence of**  
 (A) Chloride ions (B) Bromide ions  
 (C) Iodide ions (D) All of these
- 99. The following is actively absorbed in the intestine:**  
 (A) Fructose (B) Mannose  
 (C) Galactose (D) None of these
- 100. An amphibolic pathway among the following is**  
 (A) HMP shunt (B) Glycolysis  
 (C) Citric acid cycle (D) Gluconeogenesis
- 101. Cori's cycle transfers**  
 (A) Glucose from muscles to liver  
 (B) Lactate from muscles to liver  
 (C) Lactate from liver to muscles  
 (D) Pyruvate from liver to muscles
- 102. Excessive intake of ethanol increases the ratio:**  
 (A) NADH : NAD<sup>+</sup> (B) NAD<sup>+</sup> : NADH  
 (C) FADH<sub>2</sub> : FAD (D) FAD : FADH<sub>2</sub>
- 103. Ethanol decreases gluconeogenesis by**  
 (A) Inhibiting glucose-6-phosphatase  
 (B) Inhibiting PEP carboxykinase  
 (C) Converting NAD<sup>+</sup> into NADH and decreasing the availability of pyruvate  
 (D) Converting NAD<sup>+</sup> into NADH and decreasing the availability of lactate
- 104. Glycogenin is**  
 (A) Uncoupler of oxidative phosphorylation  
 (B) Polymer of glycogen molecules  
 (C) Protein primer for glycogen synthesis  
 (D) Intermediate in glycogen breakdown
- 105. During starvation, ketone bodies are used as a fuel by**  
 (A) Erythrocytes (B) Brain  
 (C) Liver (D) All of these
- 106. Animal fat is in general**  
 (A) Poor in saturated and rich in polyunsaturated fatty acids  
 (B) Rich in saturated and poor in polyunsaturated fatty acids  
 (C) Rich in saturated and polyunsaturated fatty acids  
 (D) Poor in saturated and polyunsaturated fatty acids
- 107. In the diet of a diabetic patient, the recommended carbohydrate intake should preferably be in the form of**

- (A) Monosaccharides (B) Dissaccharides  
(C) Polysaccharides (D) All of these

**108. Obesity increases the risk of**

- (A) Hypertension  
(B) Diabetes mellitus  
(C) Cardiovascular disease  
(D) All of these

**109. Worldwide, the most common vitamin deficiency is that of**

- (A) Ascorbic acid (B) Folic acid  
(C) Vitamin A (D) Vitamin D

**110. Consumption of iodised salt is recommended for prevention of**

- (A) Hypertension (B) Hyperthyroidism  
(C) Endemic goitre (D) None of these

**111. Restriction of salt intake is generally recommended in**

- (A) Diabetes mellitus (B) Hypertension  
(C) Cirrhosis of liver (D) Peptic ulcer

**112. Polyuria can occur in**

- (A) Diabetes mellitus  
(B) Diarrhoea  
(C) Acute glomerulonephritis  
(D) High fever

**113. Normal specific gravity of urine is**

- (A) 1.000–1.010 (B) 1.012–1.024  
(C) 1.025–1.034 (D) 1.035–1.045

**114. Specific gravity of urine is raised in all of the following except**

- (A) Diabetes mellitus  
(B) Diabetes insipidus  
(C) Dehydration  
(D) Acute glomerulonephritis

**115. Specific gravity of urine is decreased in**

- (A) Diabetes mellitus  
(B) Acute glomerulonephritis  
(C) Diarrhoea  
(D) Chronic glomerulonephritis

**116. Heavy proteinuria occurs in**

- (A) Acute glomerulonephritis  
(B) Acute pyelonephritis  
(C) Nephrosclerosis  
(D) Nephrotic syndrome

**117. Mucopolysaccharides are**

- (A) Homopolysaccharides  
(B) Heteropolysaccharides  
(C) Proteins  
(D) Amino acids

**118. Bence-Jones protein precipitates at**

- (A) 20°–40° C (B) 40–60° C  
(C) 60°–80° C (D) 80°–100° C

**119. Serum cholesterol is decreased in**

- (A) Endemic goitre (B) Thyrotoxicosis  
(C) Myxoedema (D) Cretinism

**120. The heptose ketose sugar formed as a result of chemical reaction in HMP shunt:**

- (A) Sedoheptulose (B) Galactoheptose  
(C) Glucoheptose (D) Mannoheptose

**121. The general formula for polysaccharide is**

- (A)  $(C_6H_{12}O_6)_n$  (B)  $(C_6H_{10}O_5)_n$   
(C)  $(C_6H_{12}O_5)_n$  (D)  $(C_6H_{19}O_6)_n$

**122. The number of isomers of glucose is**

- (A) 4 (B) 8  
(C) 12 (D) 16

**123. The epimers of glucose is**

- (A) Fructose (B) Galactose  
(C) Ribose (D) Deoxyribose

**124. The intermediate in hexose monophosphate shunt is**

- (A) D-Ribulose (B) D-Arobinose  
(C) D-xylose (D) D-lyxose

**125. Honey contains the hydrolytic product of**

- (A) Lactose (B) Maltose  
(C) Inulin (D) Starch

**126. On boiling Benedict's solution is not reduced by**

- (A) Sucrose (B) Lactose  
(C) Maltose (D) Fructose

- 127. Glycosides are found in many**  
 (A) Vitamins (B) Drugs  
 (C) Minerals (D) Nucleoproteins
- 128. Galactose on oxidation with conc.  $\text{HNO}_3$  produces**  
 (A) Gluconic acid (B) Saccharic acid  
 (C) Saccharo Lactone (D) Mucic acid
- 129. The distinguishing test between mono-saccharides and disaccharides is**  
 (A) Bial's test (B) Selwanoff's test  
 (C) Barfoed's test (D) Hydrolysis test
- 130. Cellulose is made up of the molecules of**  
 (A)  $\alpha$ -glucose (B)  $\beta$ -glucose  
 (C) Both of the above (D) None of these
- 131. Iodine solution produces no color with**  
 (A) Cellulose (B) Starch  
 (C) Dextrin (D) Glycogen
- 132. Glycogen structure includes a branch in between-glucose units:**  
 (A) 6-12 (B) 8-14  
 (C) 6-10 (D) 12-18
- 133. Amylose contains glucose units**  
 (A) 100-200 (B) 200-300  
 (C) 300-400 (D) 500-600
- 134. Each branch of amylopectin is at an interval of glucose units:**  
 (A) 14-20 (B) 24-30  
 (C) 34-40 (D) 44-50
- 135. N-acetylneuraminic acid is an example of**  
 (A) Sialic acid (B) Mucic acid  
 (C) Glucuronic acid (D) Hippuric acid
- 136. In place of glucuronic acid chondroitin sulphate B contains**  
 (A) Gluconic acid (B) Gulonic acid  
 (C) Induronic acid (D) Sulphonic acid
- 137. Blood group substances consist of**  
 (A) Lactose (B) Maltose  
 (C) Fructose (D) Mucose
- 138. The component of cartilage and cornea is**  
 (A) Keratosulphate  
 (B) Chondroitin sulphate  
 (C) Cadmium sulphate  
 (D) Antimony sulphate
- 139. Benedict's test is less likely to give weakly positive results with concentrated urine due to the action of**  
 (A) Urea (B) Uric acid  
 (C) Ammonium salts (D) Phosphates
- 140. Active transport of sugar is depressed by the agent:**  
 (A) Oxaloacetate (B) Fumarate  
 (C) Malonate (D) Succinate
- 141. The general test for detection of carbohydrates is**  
 (A) Iodine test (B) Molisch test  
 (C) Barfoed test (D) Osazone test
- 142. Glucose absorption may be decreased in**  
 (A) Oedema (B) Nephritis  
 (C) Rickets (D) Osteomalitis
- 143. Glycogen synthetase activity is depressed by**  
 (A) Glucose (B) Insulin  
 (C) Cyclic AMP (D) Fructokinase
- 144. The branching enzyme acts on the glycogen when the glycogen chain has been lengthened to between glucose units:**  
 (A) 1 and 6 (B) 2 and 7  
 (C) 3 and 9 (D) 6 and 11
- 145. Cyclic AMP is formed from ATP by the enzyme adenylate cyclase which is activated by the hormone:**  
 (A) Insulin (B) Epinephrine  
 (C) Testosterone (D) Progesterone
- 146. Hexokinase has a high affinity for glucose than**  
 (A) Fructokinase (B) Galactokinase  
 (C) Glucokinase (D) All of the above
- 147. Dihydroxyacetone phosphate and glyceraldehyde-3-phosphate are interconverted by**

- (A) Triose isomerase  
(B) Phosphotriose isomerase  
(C) Diphosphotriose isomerase  
(D) Dihydroxyacetone phosphorylase
- 148. Citrate is converted to isocitrate by aconitase which contains**  
(A)  $\text{Ca}^{++}$  (B)  $\text{Fe}^{++}$   
(C)  $\text{Zn}^{++}$  (D)  $\text{Mg}^{++}$
- 149. The reaction succinyl COA to succinate requires**  
(A) CDP (B) ADP  
(C) GDP (D)  $\text{NADP}^+$
- 150. The carrier of the citric acid cycle is**  
(A) Succinate (B) Fumarate  
(C) Malate (D) Oxaloacetate
- 151. UDPG is oxidized to UDP glucuronic acid by UDP dehydrogenase in presence of**  
(A)  $\text{FAD}^+$  (B)  $\text{NAD}^+$   
(C)  $\text{NADP}^+$  (D)  $\text{ADP}^+$
- 152. Galactose is phosphorylated by galactokinase to form**  
(A) Galactose-6-phosphate  
(B) Galactose-1, 6 diphosphate  
(C) Galactose-1-phosphate  
(D) All of these
- 153. The conversion of alanine to glucose is termed**  
(A) Glycolysis  
(B) Oxidative decarboxylation  
(C) Specific dynamic action  
(D) Gluconeogenesis
- 154. The blood sugar raising action of the hormones of suprarenal cortex is due to**  
(A) Gluconeogenesis  
(B) Glycogenolysis  
(C) Glucagon-like activity  
(D) Due to inhibition of glomerular filtration
- 155. Under anaerobic conditions the glycolysis one mole of glucose yields \_\_\_ moles of ATP.**  
(A) One (B) Two  
(C) Eight (D) Thirty
- 156. Which of the following metabolite integrates glucose and fatty acid metabolism?**  
(A) Acetyl CoA (B) Pyruvate  
(C) Citrate (D) Lactate
- 157. Cerebrosides consist of mostly of this sugar:**  
(A) Glucose (B) Fructose  
(C) Galactose (D) Arabinose
- 158. Glucose will be converted into fatty acids if the diet has excess of**  
(A) Carbohydrates (B) Proteins  
(C) Fat (D) Vitamins
- 159. The purple ring of Molisch reaction is due to**  
(A) Furfural  
(B) Furfural +  $\alpha$  Naphthol  
(C)  $^{\circ}\text{C}$  Naphthol  
(D) Furfural +  $\text{H}_2\text{SO}_4$  +  $\alpha$ -Naphthol
- 160. One of the following enzymes does not change glycogen synthase a to b.**  
(A) Glycogen synthase kinases 3, 4, 5  
(B)  $\text{Ca}^{2+}$  calmodulin phosphorylase kinase  
(C)  $\text{Ca}^{2+}$  calmodulin dependent protein kinase  
(D) Glycogen phosphorylase a
- 161. In EM pathway-2-phosphoglycerate is converted to**  
(A) Phospho enol pyruvate  
(B) Enol pyruvate  
(C) Di hydroxy acetone phosphate (DHAP)  
(D) 1,3 bisphosphoglycerate
- 162. An aneploretic reaction which sustains the availability of oxaloacetate is the carboxylation of**  
(A) Glutamate (B) Pyruvate  
(C) Citrate (D) Succinate
- 163. Specific test for ketohexoses:**  
(A) Seliwanoff's test (B) Osazone test  
(C) Molisch test (D) None of these
- 164. Two important byproducts of HMP shunt are**  
(A) NADH and pentose sugars  
(B) NADPH and pentose sugars

- (C) Pentose sugars and 4 membered sugars  
(D) Pentose sugars and sedoheptulose
- 165. Pyruvate dehydrogenase complex and  $\alpha$ -ketoglutarate dehydrogenase complex require the following for their oxidative decarboxylation:**
- (A) COASH and Lipoic acid  
(B) NAD<sup>+</sup> and FAD  
(C) COASH and TPP  
(D) COASH, TPP, NAD<sup>+</sup>, FAD, Lipoate
- 166. The four membered aldose sugar phosphate formed in HMP shunt pathway is**
- (A) Xylulose P                      (B) Erythrulose P  
(C) Erythrose P                    (D) Ribulose P
- 167. Cane sugar (Sucrose) injected into blood is**
- (A) changed to fructose  
(B) changed to glucose  
(C) undergoes no significant change  
(D) changed to glucose and fructose
- 168. Pentose production is increased in**
- (A) HMP shunt  
(B) Uronic acid pathway  
(C) EM pathway  
(D) TCA cycle
- 169. Conversion of Alanine to carbohydrate is termed:**
- (A) Glycogenesis                  (B) Gluconeogenesis  
(C) Glycogenolysis                (D) Photosynthesis
- 170. The following is an enzyme required for glycolysis:**
- (A) Pyruvate kinase  
(B) Pyruvate carboxylase  
(C) Glucose-6-phosphatase  
(D) Glycerokinase
- 171. Our body can get pentoses from**
- (A) Glycolytic pathway  
(B) Uronic acid pathway  
(C) TCA cycle  
(D) HMP shunt
- 172. Conversion of glucose to glucose-6-phosphate in human liver is by**
- (A) Hexokinase only  
(B) Glucokinase only  
(C) Hexokinase and glucokinase  
(D) Glucose-6-phosphate dehydrogenase
- 173. The following is an enzyme required for glycolysis:**
- (A) Pyruvate kinase  
(B) Pyruvate carboxylase  
(C) Glucose-6-phosphatase  
(D) Glycerokinase
- 174. The normal glucose tolerance curve reaches peak is**
- (A) 15 min                              (B) 1 hr  
(C) 2 hrs                                 (D) 2 ½ hrs
- 175. Oxidative decarboxylation of pyruvate requires**
- (A) NADP<sup>+</sup>  
(B) Cytichromes  
(C) pyridoxal phosphate  
(D) COASH
- 176. Glucose tolerance is increased in**
- (A) Diabetes mellitus    (B) Adrenalectomy  
(C) Acromegaly            (D) Thyrotoxicosis
- 177. Glucose tolerance is decreased in**
- (A) Diabetes mellitus    (B) Hypopituitarism  
(C) Addison's disease   (D) Hypothyroidism
- 178. During glycolysis, Fructose 1,6 diphosphate is decomposed by the enzyme:**
- (A) Enolase a  
(B) Fructokinase  
(C) Aldolase  
(D) Diphosphofructophosphatase
- 179. The following enzyme is required for the hexose monophosphate shunt pathway:**
- (A) Glucose-6-phosphatase  
(B) Phosphorylase  
(C) Aldolase  
(D) Glucose-6-phosphate dehydrogenase

- 180. Dehydrogenase enzymes of the hexose monophosphate shunt are**  
(A) NAD<sup>+</sup> specific (B) NADP<sup>+</sup> specific  
(C) FAD specific (D) FMN specific
- 181. Under anaerobic conditions the glycolysis of one mole of glucose yields \_\_\_\_\_ moles of ATP.**  
(A) One (B) Two  
(C) Eight (D) Thirty
- 182. Glycogen is converted to glucose-1-phosphate by**  
(A) UDPG transferase (B) Branching enzyme  
(C) Phosphorylase (D) Phosphatase
- 183. Which of the following is not an enzyme involved in glycolysis?**  
(A) Evulase (B) Aldolase  
(C) Hexokinase (D) Glucose oxidase
- 184. Tricarboxylic acid cycle to be continuous requires the regeneration of**  
(A) Pyruvic acid (B) oxaloacetic acid  
(C)  $\alpha$ -oxoglutaric acid (D) Malic acid
- 185. Dehydrogenation of succinic acid to fumaric acid requires the following hydrogen carrier:**  
(A) NAD<sup>+</sup> (B) NADP<sup>+</sup>  
(C) flavoprotein (D) Glutathione
- 186. The tissues with the highest total glycogen content are**  
(A) Muscle and kidneys  
(B) Kidneys and liver  
(C) Liver and muscle  
(D) Brain and Liver
- 187. Rothera test is not given by**  
(A)  $\beta$ -hydroxy butyrate (B) bile salts  
(C) Glucose (D) None of these
- 188. Gluconeogenesis is increased in the following condition:**  
(A) Diabetes insipidus (B) Diabetes Mellitus  
(C) Hypothyroidism (D) Liver diseases
- 189. The oxidation of lactic acid to pyruvic acid requires the following vitamin derivative as the hydrogen carrier.**  
(A) Lithium pyrophosphate  
(B) Coenzyme A  
(C) NAD<sup>+</sup>  
(D) FMN
- 190. Physiological glycosuria is met with in**  
(A) Renal glycosuria  
(B) Alimentary glycosuria  
(C) Diabetes Mellitus  
(D) Alloxan diabetes
- 191. Two examples of substrate level phosphorylation in EM pathway of glucose metabolism are in the reactions of**  
(A) 1,3 bisphosphoglycerate and phosphoenolpyruvate  
(B) Glucose-6 phosphate and Fructo-6-phosphate  
(C) 3 phosphoglyceraldehyde and phosphoenolpyruvate  
(D) 1,3 diphosphoglycerate and 2-phosphoglycerate
- 192. The number of molecules of ATP produced by the total oxidation of acetyl CoA in TCA cycle is**  
(A) 6 (B) 8  
(C) 10 (D) 12
- 193. Substrate level phosphorylation in TCA cycle is in step:**  
(A) Isocitrate dehydrogenase  
(B) Malate dehydrogenase  
(C) Aconitase  
(D) Succinate thiokinase
- 194. Fatty acids cannot be converted into carbohydrates in the body as the following reaction is not possible.**  
(A) Conversion of glucose-6-phosphate into glucose  
(B) Fructose 1,6-bisphosphate to fructose-6-phosphate  
(C) Transformation of acetyl CoA to pyruvate  
(D) Formation of acetyl CoA from fatty acids

- 195. Tissues form lactic acid from glucose. This phenomenon is termed as**  
 (A) Aerobic glycolysis  
 (B) Oxidation  
 (C) Oxidative phosphorylation  
 (D) Anaerobic glycolysis
- 196. One molecule of glucose gives \_\_\_\_\_ molecules of CO<sub>2</sub> in EM-TCA cycle.**  
 (A) 6 (B) 3  
 (C) 1 (D) 2
- 197. One molecule of glucose gives \_\_\_\_\_ molecules of CO<sub>2</sub> in one round of HMP shunt.**  
 (A) 6 (B) 1  
 (C) 2 (D) 3
- 198. The 4 rate limiting enzymes of gluconeogenesis are**  
 (A) Glucokinase, Pyruvate carboxylase, phosphoenol pyruvate carboxykinase and glucose-6-phosphatase  
 (B) Pyruvate carboxylase, phosphoenol pyruvate carboxykinase, fructose 1,6 diphosphatase and glucose-6-phosphatase  
 (C) Pyruvate kinase, pyruvate carboxylase, phosphoenol pyruvate carboxykinase and glucose-6-phosphatase  
 (D) Phospho fructokinase, pyruvate carboxylase, phosphoenol pyruvate carboxykinase and fructose 1, 6 diphosphatase
- 199. For glycogenesis, Glucose should be converted to**  
 (A) Glucuronic acid (B) Pyruvic acid  
 (C) UDP glucose (D) Sorbitol
- 200. Fluoride inhibits \_\_\_\_\_ and arrests glycolysis.**  
 (A) Glyceraldehyde-3-phosphate dehydrogenase  
 (B) Aconitase  
 (C) Enolase  
 (D) Succinate dehydrogenase
- 201. One of the following statement is correct:**  
 (A) Glycogen synthase 'a' is the phosphorylated  
 (B) cAMP converts glycogen synthase b to 'a'  
 (C) Insulin converts glycogen synthase b to a  
 (D) UDP glucose molecules interact and grow into a Glycogen tree
- 202. Amylo 1, 6 glucosidase is called**  
 (A) Branching enzyme  
 (B) debranching enzyme  
 (C) Glucantransferase  
 (D) Phosphorylase
- 203. Glucose enters the cells by**  
 (A) insulin independent transport  
 (B) insulin dependent transport  
 (C) enzyme mediated transport  
 (D) Both (A) and (B)
- 204. Glycogen while being acted upon by active phosphorylase is converted first to**  
 (A) Glucose  
 (B) Glucose 1-phosphate and Glycogen with 1 carbon less  
 (C) Glucose-6-phosphate and Glycogen with 1 carbon less  
 (D) 6-Phosphogluconic acid
- 205. When O<sub>2</sub> supply is inadequate, pyruvate is converted to**  
 (A) Phosphopyruvate (B) Acetyl CoA  
 (C) Lactate (D) Alanine
- 206. Reactivation of inactive liver phosphorylase is normally favoured by**  
 (A) Insulin (B) Epinephrine  
 (C) ACTH (D) Glucagon
- 207. Before pyruvic acid enters the TCA cycle it must be converted to**  
 (A) Acetyl CoA (B) Lactate  
 (C) α-ketoglutarate (D) Citrate
- 208. The hydrolysis of Glucose-6-phosphate is catalysed by a specific phosphatase which is found only in**  
 (A) Liver, intestines and kidneys  
 (B) Brain, spleen and adrenals  
 (C) Striated muscle  
 (D) Plasma
- 209. The formation of citrate from oxaloacetate and acetyl CoA is**  
 (A) Oxidation (B) Reduction  
 (C) Condensation (D) Hydrolysis

- 210. Which one of the following is a rate limiting enzyme of gluconeogenesis?**  
 (A) Hexokinase  
 (B) Phosphofructokinase  
 (C) Pyruvate carboxylase  
 (D) Pyruvate kinase
- 211. The number of ATP produced in the succinate dehydrogenase step is**  
 (A) 1 (B) 2  
 (C) 3 (D) 4
- 212. Which of the following reaction gives lactose?**  
 (A) UDP galactose and glucose  
 (B) UDP glucose and galactose  
 (C) Glucose and Galactose  
 (D) Glucose, Galactose and UTP
- 213. UDP Glucuronic acid is required for the biosynthesis of**  
 (A) Chondroitin sulphates  
 (B) Glycogen  
 (C) Lactose  
 (D) Starch
- 214. Which one of the following can convert glucose to vitamin C?**  
 (A) Albino rats (B) Humans  
 (C) Monkeys (D) Guinea pigs
- 215. Which one of the following cannot convert glucose to Vitamin C?**  
 (A) Albino rats (B) Dogs  
 (C) Monkeys (D) Cows
- 216. Transketolase has the coenzyme:**  
 (A) NAD<sup>+</sup> (B) FP  
 (C) TPP (D) Pyridoxol phosphate
- 217. Two conditions in which gluconeogenesis is increased are**  
 (A) Diabetes mellitus and atherosclerosis  
 (B) Fed condition and thyrotoxicosis  
 (C) Diabetes mellitus and Starvation  
 (D) Alcohol intake and cigarette smoking
- 218. Acetyl CoA is not used for the synthesis of**  
 (A) Fatty acid (B) Cholesterol  
 (C) Pyruvic acid (D) Citric acid
- 219. The total glycogen content of the body is about \_\_\_\_\_ gms.**  
 (A) 100 (B) 200  
 (C) 300 (D) 500
- 220. The total Glucose in the body is \_\_\_\_\_ gms.**  
 (A) 10–15 (B) 20–30  
 (C) 40–50 (D) 60–80
- 221. Pyruvate kinase requires \_\_\_\_\_ ions for maximum activity.**  
 (A) Na<sup>+</sup> (B) K<sup>+</sup>  
 (C) Ca<sup>2+</sup> (D) Mg<sup>2+</sup>
- 222. ATP is 'wasted' in Rapoport-Luebering cycle in RBCs as otherwise it will inhibit**  
 (A) Phosphoglucomutase  
 (B) Phosphohexo isomerase  
 (C) Phosphofructo kinase  
 (D) Phosphoenol pyruvate carboxy kinase
- 223. The following co-enzyme is needed for the oxidative decarboxylation of ketoacids:**  
 (A) NADP<sup>+</sup> (B) TPP  
 (C) Folate coenzyme (D) Biotin coenzyme
- 224. Synthesis of Glucose from amino acids is termed as**  
 (A) Glycolysis (B) Gluconeogenesis  
 (C) Glycogenesis (D) Lipogenesis
- 225. The following examples are important heteropolysaccharides except**  
 (A) Amylopectin (B) Heparin  
 (C) Peptidoglycan (D) Hyaluronic acid
- 226. Which of the following features are common to monosaccharides?**  
 (A) Contain asymmetric centres  
 (B) Are of 2 types – aldoses and ketoses  
 (C) Tend to exist as ring structures in solution  
 (D) Include glucose, galactose and raffinose

- 227. Polysaccharides**
- (A) Contain many monosaccharide units which may or may not be of the same kind
  - (B) Function mainly a storage or structural compounds
  - (C) Are present in large amounts in connective tissue
  - (D) All of these
- 228. The absorption of glucose in the digestive tract**
- (A) Occurs in the small intestine
  - (B) Is stimulated by the hormone Glucagon
  - (C) Occurs more rapidly than the absorption of any other sugar
  - (D) Is impaired in cases of diabetes mellitus
- 229. UDP-Glucose is converted to UDP-Glucuronic acid by**
- (A) ATP
  - (B) GTP
  - (C) NADP<sup>+</sup>
  - (D) NAD<sup>+</sup>
- 230. The enzymes involved in Phosphorylation of glucose to glucose 6- phosphate are**
- (A) Hexokinase
  - (B) Glucokinase
  - (C) Phosphofructokinase
  - (D) Both (A) and (B)
- 231. In conversion of Lactic acid to Glucose, three reactions of Glycolytic pathway are circumvented, which of the following enzymes do not participate?**
- (A) Pyruvate Carboxylase
  - (B) Phosphoenol pyruvate carboxy kinase
  - (C) Pyruvate kinase
  - (D) Glucose-6-phosphatase
- 232. The normal resting state of humans, most of the blood glucose burnt as "fuel" is consumed by**
- (A) Liver
  - (B) Brain
  - (C) Kidneys
  - (D) Adipose tissue
- 233. A regulator of the enzyme Glycogen synthase is**
- (A) Citric acid
  - (B) 2, 3 bisphosphoglycerate
  - (C) Pyruvate
  - (D) GTP
- 234. Which of the following compound is a positive allosteric modifier of the enzyme pyruvate carboxylase?**
- (A) Biotin
  - (B) Acetyl CoA
  - (C) Oxaloacetate
  - (D) ATP
- 235. A specific inhibitor for succinate dehydrogenase is**
- (A) Arsinite
  - (B) Melouate
  - (C) Citrate
  - (D) Cyanide
- 236. Most of the metabolic pathways are either anabolic or catabolic. Which of the following pathways is considered as "amphibolic" in nature?**
- (A) Glycogenesis
  - (B) Glycolytic pathway
  - (C) Lipolysis
  - (D) TCA cycle
- 237. Transketolase activity is affected in**
- (A) Biotin deficiency
  - (B) Pyridoxine deficiency
  - (C) PABA deficiency
  - (D) Thiamine deficiency
- 238. The following metabolic abnormalities occur in Diabetes mellitus except**
- (A) Increased plasma FFA
  - (B) Increased pyruvate carboxylase activate
  - (C) Decreased lipogenesis
  - (D) Decreased gluconeogenesis
- 239. A substance that is not an intermediate in the formation of D-glucuronic acid from glucose is**
- (A) Glucosyl-1-p
  - (B) 6-Phosphogluconate
  - (C) Glucose-6-p
  - (D) UDP-Glucose
- 240. The hydrolysis of Glucose-6-P is catalysed by a phosphatase that is not formed in which of the following?**
- (A) Liver
  - (B) Kidney
  - (C) Muscle
  - (D) Small intestine
- 241. An essential for converting Glucose to Glycogen in Liver is**
- (A) Lactic acid
  - (B) GTP
  - (C) CTP
  - (D) UTP

- 242. Which of the following is a substrate for aldolase activity in Glycolytic pathway?**
- (A) Glyceraldehyde-3-p  
(B) Glucose-6-p  
(C) Fructose-6-p  
(D) Fructose 1, 6-bisphosphate
- 243. The ratio that approximates the number of net molecule of ATP formed per mole of Glucose oxidized in presence of O<sub>2</sub> to the net number formed in absence of O<sub>2</sub> is**
- (A) 4 : 1                      (B) 10 : 2  
(C) 12 : 1                     (D) 18 : 1
- 244. The "Primaquin sensitivity types of haemolytic anaemia has been found to relate to reduced R.B.C activity of which enzyme?**
- (A) Pyruvate kinase deficiency  
(B) Glucose-6-phosphatase deficiency  
(C) Glucose-6-p dehydrogenase deficiency  
(D) Hexokinase deficiency
- 245. Which of the following hormones is not involved in carbohydrate metabolism?**
- (A) Cortisol                    (B) ACTH  
(C) Glucogen                 (D) Vasopressin
- 246. Dehydrogenases involved in HMP shunt are specific for**
- (A) NADP<sup>+</sup>                    (B) NAD<sup>+</sup>  
(C) FAD                        (D) FMN
- 247. Which of the following enzymes in Glycolytic pathway is inhibited by fluoride?**
- (A) Glyceraldehyde-3-p dehydrogenase  
(B) Phosphoglycerate kinase  
(C) Pyruvate kinase  
(D) Enolase
- 248. Out of 24 mols of ATP formed in TCA cycle, 2 molecules of ATP can be formed at "substrate level" by which of the following reaction ?**
- (A) Citric acid → Isocitric acid  
(B) Isocitrate → Oxaloacetate  
(C) Succinic acid → Fumarate  
(D) Succinylcat → Succinic acid
- 249. Which of the following statements regarding T.C.A cycle is true?**
- (A) It is an anaerobic process  
(B) It occurs in cytosol  
(C) It contains no intermediates for Gluconeogenesis  
(D) It is amphibolic in nature
- 250. An allosteric enzyme responsible for controlling the rate of T.C.A cycle is**
- (A) Malate dehydrogenase  
(B) Isocitrate dehydrogenase  
(C) Fumarase  
(D) Aconitase
- 251. The glycolysis is regulated by**
- (A) Hexokinase                (B) Phosphofructokinase  
(C) Pyruvate kinase        (D) All of these
- 252. How many ATP molecules will be required for conversion of 2-molecules of Lactic acid to Glucose?**
- (A) 2                            (B) 4  
(C) 8                            (D) 6
- 253. Which of the following enzyme is not involved in HMP shunt?**
- (A) Glyceraldehyde-3-p dehydrogenase  
(B) Glucose-6-p-dehydrogenase  
(C) Transketolase  
(D) Phosphogluconate dehydrogenase
- 254. In presence of the following cofactor, pyruvate carboxylase converts pyruvate to oxaloacetate:**
- (A) ATP, Protein and CO<sub>2</sub>  
(B) CO<sub>2</sub> and ATP  
(C) CO<sub>2</sub>  
(D) Protein
- 255. For conversion of oxaloacetate to phosphoenol pyruvate, high energy molecule is required in the form of**
- (A) GTP only                    (B) ITP only  
(C) GTP (or) ITP              (D) None of these
- 256. If the more negative standard reduction potential of a redox pair, the greater the tendency to**

- (A) To lose electrons  
 (B) To gain electrons  
 (C) To lose/gain electrons  
 (D) To lose and gain electrons
- 257. Electron transport and phosphorylation can be uncoupled by compounds that increase the permeability of the inner mitochondrial membrane to**  
 (A) Electrons (B) Protons  
 (C) Uncouplers (D) All of these
- 258. The more positive the  $E_0$ , the greater the tendency of the oxidant member of that pair to**  
 (A) Lose electrons  
 (B) Gain electrons  
 (C) Lose (or) gain electrons  
 (D) Lose and gain electrons
- 259. The standard free energy of hydrolysis of terminal phosphate group of ATP is**  
 (A)  $-7,300$  cal/mol (B)  $-8,300$  cal/mol  
 (C)  $10,000$  cal/mol (D)  $+7,300$  cal/mol
- 260. The transport of a pair of electrons from NADH to  $O_2$  via the electron transport chain produces**  
 (A)  $-52,580$  cal (B)  $-50,580$  cal  
 (C)  $21,900$  cal (D)  $+52,580$  cal
- 261. Sufficient energy required to produce 3 ATP from 3 ADP and 3 pi is**  
 (A)  $-21,900$  cal (B)  $29,900$  cal  
 (C)  $31,900$  cal (D)  $39,900$  cal
- 262. The free energy change, AG**  
 (A) Is directly proportional to the standard free energy change, AG  
 (B) Is equal to zero at equilibrium  
 (C) Can only be calculated when the reactants and products are present at 1 mol/l concentrations  
 (D) Is equal to  $-RT$  in  $k_{eq}$
- 263. Under standard conditions**  
 (A) The free energy change  $\Delta G^\circ$ , is equal to 0  
 (B) The standard free energy change  $\Delta G$ , is equal to 0  
 (C) The free energy change,  $\Delta G^\circ$ , is equal to the standard free energy change,  $\Delta G^\circ$   
 (D)  $K_{eq}$  is equal to 1
- 264. An uncoupler of oxidative phosphorylation such as dinitrophenol**  
 (A) Inhibits electron transport and ATP synthesis  
 (B) Allow electron transport to proceed without ATP synthesis  
 (C) Inhibits electron transport without impairment of ATP synthesis  
 (D) Specially inhibits cytochrome b
- 265. All of the following statements about the enzymic complex that carries out the synthesis of ATP during oxidative phosphorylation are correct except**  
 (A) It is located on the matrix side of the inner mitochondrial membrane  
 (B) It is inhibited by oligomycin  
 (C) It can exhibit ATPase activity  
 (D) It can bind molecular  $O_2$
- 266. Glucokinase**  
 (A) Is widely distributed and occurs in most mammalian tissues  
 (B) Has a high  $k_m$  for glucose and hence is important in the phosphorylation of glucose primarily after ingestion of a carbohydrate rich meal  
 (C) Is widely distributed in Prokaryotes  
 (D) None of these
- 267. The reaction catalysed by phosphofructokinase**  
 (A) Is activated by high concentrations of ATP and citrate  
 (B) Uses fructose-1-phosphate as substrate  
 (C) Is the rate-limiting reaction of the glycolytic pathway  
 (D) Is inhibited by fructose 2, 6-bisphosphate
- 268. Compared to the resting state, vigorously contracting muscle shows**  
 (A) An increased conversion of pyruvate to lactate  
 (B) Decreased oxidation of pyruvate of  $CO_2$  and water  
 (C) A decreased NADH/NAD<sup>+</sup> ratio  
 (D) Decreased concentration of AMP

- 269. Which one of the following would be expected in pyruvate kinase deficiency?**
- (A) Increased levels of lactate in the R.B.C
  - (B) Hemolytic anemia
  - (C) Decreased ratio of ADP to ATP in R.B.C
  - (D) Increased phosphorylation of Glucose to Glucose-6-phosphate
- 270. Which one of the following statements concerning glucose metabolism is correct?**
- (A) The conversion of Glucose to lactate occurs only in the R.B.C
  - (B) Glucose enters most cells by a mechanism in which  $\text{Na}^+$  and glucose are co-transported
  - (C) Pyruvate kinase catalyses an irreversible reaction
  - (D) An elevated level of insulin leads to a decreased level of fructose 2, 6-bisphosphate in hepatocyte
- 271. Which one of the following compounds cannot give rise to the net synthesis of Glucose?**
- (A) Lactate
  - (B) Glycerol
  - (C)  $\alpha$ -ketoglutarate
  - (D) Acetyl CoA
- 272. Which of the following reactions is unique to gluconeogenesis?**
- (A) Lactate Pyruvate
  - (B) Phosphoenol pyruvate pyruvate
  - (C) Oxaloacetate phosphoenol pyruvate
  - (D) Glucose-6-phosphate Fructose-6-phosphate
- 273. The synthesis of glucose from pyruvate by gluconeogenesis**
- (A) Requires the participation of biotin
  - (B) Occurs exclusively in the cytosol
  - (C) Is inhibited by elevated level of insulin
  - (D) Requires oxidation/reduction of FAD
- 274. The conversion of pyruvate to acetyl CoA and  $\text{CO}_2$**
- (A) Is reversible
  - (B) Involves the participation of lipoic acid
  - (C) Depends on the coenzyme biotin
  - (D) Occurs in the cytosol
- 275. Pasteur effect is**
- (A) Inhibition of glycolysis
  - (B) Oxygen is involved
  - (C) Inhibition of enzyme phosphofructokinase
  - (D) All of these
- 276. How many ATPs are produced in the conversion of phosphoenol pyruvate to citrate?**
- (A) 1
  - (B) 2
  - (C) 4
  - (D) 6
- 277. Reduced glutathione functions in R.B.Cs to**
- (A) Produce NADPH
  - (B) Reduce methemoglobin to hemoglobin
  - (C) Produce NADH
  - (D) Reduce oxidizing agents such as  $\text{H}_2\text{O}_2$
- 278. Phenylalanine is the precursor of**
- (A) L-DOPA
  - (B) Histamine
  - (C) Tyrosine
  - (D) Throxine
- 279. D-Mannose is present in some plant products like**
- (A) Resins
  - (B) Pectins
  - (C) Mucilage
  - (D) Gums
- 280. Galactose is a main constituent of**
- (A) Milk sugar
  - (B) Honey
  - (C) Cane sugar
  - (D) Chitin
- 281. Glucosamine is an important constituent of**
- (A) Homopolysaccharide
  - (B) Heteropolysaccharide
  - (C) Mucopolysaccharide
  - (D) Dextran
- 282. Glycogen is present in all body tissues except**
- (A) Liver
  - (B) Brain
  - (C) Kidney
  - (D) Stomach
- 283. Iodine test is positive for starch, dextrin and**
- (A) Mucoproteins
  - (B) Agar
  - (C) Glycogen
  - (D) Cellulose

- 284. The general formula for polysaccharide is**  
 (A)  $(C_6H_{10}O_5)_n$  (B)  $(C_6H_{12}O_6)_n$   
 (C)  $(C_6H_{12}O_5)_n$  (D)  $(C_5H_{10}O_5)_n$
- 285. Epimers of glucose is**  
 (A) Fructose (B) Galactose  
 (C) Ribose (D) Deoxyribose
- 286. Human heart muscle contains**  
 (A) D-Arabinose (B) D-Ribose  
 (C) D-Xylose (D) L-Xylose
- 287. The intermediate n hexose monophosphate shunt is**  
 (A) D-Ribulose (B) D-Arabinose  
 (C) D-xylose (D) D-Lyxose
- 288. On boiling Benedict's solution is not reduced by**  
 (A) Sucrose (B) Lactose  
 (C) Maltose (D) Fructose
- 289. The distinguishing test between monosaccharides and disaccharide is**  
 (A) Bial's test (B) Seliwanoff's test  
 (C) Barfoed's test (D) Hydrolysis test
- 290. Barfoed's solution is not reduced by**  
 (A) Glucose (B) Mannose  
 (C) Sucrose (D) Ribose
- 291. Cori cycle is**  
 (A) Synthesis of glucose  
 (B) reuse of glucose  
 (C) uptake of glycose  
 (D) Both (A) & (B)
- 292. Cane sugar is known as**  
 (A) Galactose (B) Sucrose  
 (C) Fructose (D) Maltose
- 293. Which of the following is not reducing sugar?**  
 (A) Lactose (B) Maltose  
 (C) Sucrose (D) Fructose
- 294.  $\alpha$ -D-Glucose and  $\beta$ -D-glucose are related by**  
 (A) Epimers (B) Anomers  
 (C) Multirotation (D) Ketoenol pair
- 295. The stable ring formation in D-Glucose involves**  
 (A) C-1 and C-4 (B) C-1 and C-2  
 (C) C-1 and C-5 (D) C-2 and C-5
- 296. Reduction of Glucose with  $Ca^{++}$  in water produces**  
 (A) Sorbitol (B) Dulcitol  
 (C) Mannitol (D) Glucuronic acid
- 297. Starch and glycogen are polymers of**  
 (A) Fructose (B) Mannose  
 (C)  $\alpha$ -D-Glucose (D) Galactose
- 298. Reducing ability of carbohydrates is due to**  
 (A) Carboxyl group (B) Hydroxyl group  
 (C) Eneiol formation (D) Ring structure
- 299. Which of the following is not a polymer of glucose?**  
 (A) Amylose (B) Inulin  
 (C) Cellulose (D) Dextrin
- 300. Invert sugar is**  
 (A) Lactose  
 (B) Mannose  
 (C) Fructose  
 (D) Hydrolytic product of sucrose
- 301. The carbohydrate reserved in human body is**  
 (A) Starch (B) Glucose  
 (C) Glycogen (D) Inulin
- 302. A disaccharide linked by  $\alpha$ -1-4 Glycosidic linkages is**  
 (A) Lactose (B) Sucrose  
 (C) Cellulose (D) Maltose

**ANSWERS**

1. A	2. A	3. A	4. A	5. B	6. A
7. A	8. D	9. A	10. A	11. A	12. C
13. B	14. A	15. A	16. B	17. A	18. A
19. C	20. C	21. A	22. D	23. C	24. B
25. A	26. D	27. C	28. C	29. B	30. B
31. D	32. A	33. C	34. B	35. B	36. B
37. C	38. B	39. D	40. A	41. D	42. B
43. A	44. B	45. A	46. A	47. A	48. A
49. B	50. C	51. C	52. A	53. A	54. A
55. B	56. A	57. D	58. A	59. C	60. D
61. C	62. C	63. B	64. C	65. C	66. C
67. B	68. C	69. D	70. D	71. A	72. A
73. B	74. B	75. B	76. B	77. A	78. C
79. A	80. B	81. D	82. C	83. D	84. D
85. B	86. D	87. D	88. C	89. B	90. A
91. A	92. D	93. A	94. C	95. C	96. D
97. D	98. A	99. C	100. C	101. B	102. A
103. C	104. C	105. B	106. B	107. C	108. D
109. B	110. C	111. B	112. B	113. B	114. D
115. B	116. B	117. A	118. B	119. B	120. A
121. B	122. D	123. B	124. A	125. C	126. A
127. B	128. D	129. C	130. A	131. A	132. D
133. C	134. B	135. C	136. C	137. C	138. A
139. B	140. C	141. B	142. A	143. C	144. D
145. B	146. C	147. B	148. B	149. B	150. D
151. B	152. C	153. D	154. A	155. B	156. A
157. C	158. A	159. B	160. D	161. A	162. B
163. A	164. B	165. D	166. C	167. C	168. A
169. B	170. A	171. D	172. C	173. A	174. B
175. D	176. B	177. A	178. C	179. D	180. B
181. B	182. C	183. D	184. B	185. C	186. C
187. A	188. B	189. C	190. B	191. A	192. D
193. D	194. C	195. D	196. A	197. B	198. B
199. C	200. C	201. C	202. B	203. D	204. C
205. C	206. D	207. A	208. A	209. C	210. C
211. B	212. A	213. A	214. A	215. C	216. C
217. C	218. C	219. C	220. B	221. B	222. C
223. B	224. B	225. A	226. C	227. D	228. A
229. B	230. D	231. C	232. B	233. C	234. A
235. B	236. D	237. B	238. B	239. B	240. C
241. D	242. D	243. B	244. C	245. D	246. A
247. D	248. D	249. D	250. B	251. D	252. D

253. A	254. A	255. C	256. A	257. B	258. B
259. A	260. D	261. A	262. B	263. C	264. B
265. D	266. B	267. C	268. A	269. B	270. C
271. B	272. C	273. A	274. B	275. D	276. C
277. D	278. C	279. D	280. A	281. C	282. B
283. C	284. A	285. B	286. C	287. A	288. A
289. C	290. C	291. D	292. B	293. C	294. B
295. C	296. A	297. C	298. A	299. B	300. D
301. C	302. D				

### EXPLANATIONS FOR THE ANSWERS

7. A Polysaccharides are polymers of monosaccharides. They are of two types— homopolysaccharides that contain a single type of monosaccharide (e.g., starch, insulin, cellulose) and heteropolysaccharides with two or more different types of monosaccharides (e.g., heparin, chondroitin sulfate).
30. B Mutarotation refers to the change in the specific optical rotation representing the interconversion of  $\alpha$ - and  $\beta$ - anomers of D-glucose to an equilibrium.
48. A Starch is a polysaccharide composed of D-glucose units held together by  $\alpha$ -glycosidic bonds, ( $\alpha$  1 $\rightarrow$  4 linkages; at branching points  $\alpha$  1 $\rightarrow$  6 linkages).
71. A Hyaluronic acid is the ground substance of synovial fluid of joints. It serves as lubricants and shock absorbant in joints.
93. A The process of shifting a hydrogen atom from one carbon to another to produce enediols is referred to as tautomerization.
117. A Mucopolysaccharides (commonly known as glycosaminoglycans) are heteropolysaccharides composed of sugar derivatives (mainly amino sugars and uronic acids). The important mucopolysaccharides include hyaluronic acid, heparin, chondroitin sulfate, dermatan sulfate and keratan sulfate.
141. B *Molisch test*: It is a general test for the detection of carbohydrates. The strong  $H_2SO_4$  hydrolyses carbohydrates (poly- and disaccharides) to liberate monosaccharides. The monosaccharides get dehydrated to form furfural (from pentoses) or hydroxy methylfurfural (from hexoses) which condense with  $\alpha$ -naphthol to form a violet coloured complex.
163. A *Seliwanoff's test*: this is a specific test for ketohexoses. Concentrated hydrochloric acid dehydrates ketohexoses to form furfural derivatives which condense with resorcinol to give a cherry red complex.
187. A *Rothera's test*: Nitroprusside in alkaline medium reacts with keto group of ketone bodies (acetone and acetoacetate) to form a purple ring. This test is not given by  $\beta$ -hydroxybutyrate.
203. D Two specific transport systems are recognized for the entry of glucose into the cells.
- (a) *Insulin-independent transport*: This is a carrier mediated uptake of glucose which is not dependent on the hormone insulin. This operates in hepatocytes, erythrocytes and brain.
- (b) *Insulin-dependent transport*: This occurs in muscle and adipose tissue.
230. D Hexokinase and glucokinase are involved in the phosphorylation of glucose to glucose 6-phosphate. The enzyme hexokinase, present in almost all the tissues, catalyses the phosphorylation of other hexose also (fructose, mannose). It has low  $K_m$  for substrates (about 0.1 mM) and is inhibited by glucose 6-phosphate. In contrast, glucokinase is present in liver, catalyses the phosphorylation of only glucose, has high  $K_m$  for glucose (10 mM)

- and is not inhibited by glucose 6-phosphate.
251. D The three enzymes namely hexokinase (or glucokinase), phosphofructokinase and pyruvate kinase, catalyzing the irreversible reactions regulate glycolysis. Among these, phosphofructokinase is the most regulatory. It is an allosteric enzyme inhibited by ATP, citrate and activated by AMP and Pi.
275. D The inhibition of glycolysis by oxygen is referred to as Pasteur effect. This is due to inhibition of the enzyme phosphofructokinase by ATP and citrate (formed in the presence of  $O_2$ )
291. D The cycle involving the synthesis of glucose in liver from the skeletal muscle lactate and the reuse of glucose thus synthesized by the muscle for energy purposes is known as Cori Cycle.

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## PROTEINS AND PROTEIN METABOLISM

- All proteins contain the**
  - Same 20 amino acids
  - Different amino acids
  - 300 Amino acids occurring in nature
  - Only a few amino acids
- Proteins contain**
  - Only L- $\alpha$ -amino acids
  - Only D-amino acids
  - DL-Amino acids
  - Both (A) and (B)
- The optically inactive amino acid is**
  - Glycine
  - Serine
  - Threonine
  - Valine
- At neutral pH, a mixture of amino acids in solution would be predominantly:**
  - Dipolar ions
  - Nonpolar molecules
  - Positive and monovalent
  - Hydrophobic
- The true statement about solutions of amino acids at physiological pH is**
  - All amino acids contain both positive and negative charges
  - All amino acids contain positively charged side chains
  - Some amino acids contain only positive charge
  - All amino acids contain negatively charged side chains
- pH (isoelectric pH) of alanine is**
  - 6.02
  - 6.6
  - 6.8
  - 7.2
- Since the pK values for aspartic acid are 2.0, 3.9 and 10.0, it follows that the isoelectric (pH) is**
  - 3.0
  - 3.9
  - 5.9
  - 6.0
- Sulphur containing amino acid is**
  - Methionine
  - Leucine
  - Valine
  - Asparagine
- An example of sulphur containing amino acid is**
  - 2-Amino-3-mercaptopropanoic acid
  - 2-Amino-3-methylbutanoic acid
  - 2-Amino-3-hydroxypropanoic acid
  - Amino acetic acid
- All the following are sulphur containing amino acids found in proteins except**
  - Cysteine
  - Cystine
  - Methionine
  - Threonine
- An aromatic amino acid is**
  - Lysine
  - Tyrosine
  - Taurine
  - Arginine

- 12. The functions of plasma albumin are**  
 (A) Osmosis (B) Transport  
 (C) Immunity (D) both (A) and (B)
- 13. Amino acid with side chain containing basic groups is**  
 (A) 2-Amino 5-guanidovaleic acid  
 (B) 2-Pyrrolidine carboxylic acid  
 (C) 2-Amino 3-mercaptopropanoic acid  
 (D) 2-Amino propanoic acid
- 14. An example of  $\alpha$ -amino acid not present in proteins but essential in mammalian metabolism is**  
 (A) 3-Amino 3-hydroxypropanoic acid  
 (B) 2-Amino 3-hydroxybutanoic acid  
 (C) 2-Amino 4-mercaptobutanoic acid  
 (D) 2-Amino 3-mercaptopropanoic acid
- 15. An essential amino acid in man is**  
 (A) Aspartate (B) Tyrosine  
 (C) Methionine (D) Serine
- 16. Non essential amino acids**  
 (A) Are not components of tissue proteins  
 (B) May be synthesized in the body from essential amino acids  
 (C) Have no role in the metabolism  
 (D) May be synthesized in the body in diseased states
- 17. Which one of the following is semi-essential amino acid for humans?**  
 (A) Valine (B) Arginine  
 (C) Lysine (D) Tyrosine
- 18. An example of polar amino acid is**  
 (A) Alanine (B) Leucine  
 (C) Arginine (D) Valine
- 19. The amino acid with a nonpolar side chain is**  
 (A) Serine (B) Valine  
 (C) Asparagine (D) Threonine
- 20. A ketogenic amino acid is**  
 (A) Valine (B) Cysteine  
 (C) Leucine (D) Threonine
- 21. An amino acid that does not form an  $\alpha$ -helix is**  
 (A) Valine (B) Proline  
 (C) Tyrosine (D) Tryptophan
- 22. An amino acid not found in proteins is**  
 (A)  $\beta$ -Alanine (B) Proline  
 (C) Lysine (D) Histidine
- 23. In mammalian tissues serine can be a biosynthetic precursor of**  
 (A) Methionine (B) Glycine  
 (C) Tryptophan (D) Phenylalanine
- 24. A vasodilating compound is produced by the decarboxylation of the amino acid:**  
 (A) Arginine (B) Aspartic acid  
 (C) Glutamine (D) Histidine
- 25. Biuret reaction is specific for**  
 (A)  $-\text{CONH}$ -linkages (B)  $-\text{CSNH}_2$  group  
 (C)  $-(\text{NH})\text{NH}_2$  group (D) All of these
- 26. Sakaguchi's reaction is specific for**  
 (A) Tyrosine (B) Proline  
 (C) Arginine (D) Cysteine
- 27. Million-Nasse's reaction is specific for the amino acid:**  
 (A) Tryptophan (B) Tyrosine  
 (C) Phenylalanine (D) Arginine
- 28. Ninhydrin with evolution of  $\text{CO}_2$  forms a blue complex with**  
 (A) Peptide bond (B)  $\alpha$ -Amino acids  
 (C) Serotonin (D) Histamine
- 29. The most of the ultraviolet absorption of proteins above 240 nm is due to their content of**  
 (A) Tryptophan (B) Aspartate  
 (C) Glutamate (D) Alanine
- 30. Which of the following is a dipeptide?**  
 (A) Anserine (B) Glutathione  
 (C) Glucagon (D)  $\beta$ -Lipoprotein
- 31. Which of the following is a tripeptide?**  
 (A) Anserine (B) Oxytocin  
 (C) Glutathione (D) Kallidin

- 32. A peptide which acts as potent smooth muscle hypotensive agent is**  
(A) Glutathione (B) Bradykinin  
(C) Tryocidine (D) Gramicidin-s
- 33. A tripeptide functioning as an important reducing agent in the tissues is**  
(A) Bradykinin (B) Kallidin  
(C) Tyrocidin (D) Glutathione
- 34. An example of metalloprotein is**  
(A) Casein (B) Ceruloplasmin  
(C) Gelatin (D) Salmine
- 35. Carbonic anhydrase is an example of**  
(A) Lipoprotein (B) Phosphoprotein  
(C) Metalloprotein (D) Chromoprotein
- 36. An example of chromoprotein is**  
(A) Hemoglobin (B) Sturine  
(C) Nuclein (D) Gliadin
- 37. An example of scleroprotein is**  
(A) Zein (B) Keratin  
(C) Glutenin (D) Ovoglobulin
- 38. Casein, the milk protein is**  
(A) Nucleoprotein (B) Chromoprotein  
(C) Phosphoprotein (D) Glycoprotein
- 39. An example of phosphoprotein present in egg yolk is**  
(A) Ovoalbumin (B) Ovoglobulin  
(C) Ovovitellin (D) Avidin
- 40. A simple protein found in the nucleoproteins of the sperm is**  
(A) Prolamine (B) Protamine  
(C) Glutelin (D) Globulin
- 41. Histones are**  
(A) Identical to protamine  
(B) Proteins rich in lysine and arginine  
(C) Proteins with high molecular weight  
(D) Insoluble in water and very dilute acids
- 42. The protein present in hair is**  
(A) Keratin (B) Elastin  
(C) Myosin (D) Tropocollagen
- 43. The amino acid from which synthesis of the protein of hair keratin takes place is**  
(A) Alanine (B) Methionine  
(C) Proline (D) Hydroxyproline
- 44. In one molecule of albumin the number of amino acids is**  
(A) 510 (B) 590  
(C) 610 (D) 650
- 45. Plasma proteins which contain more than 4% hexosamine are**  
(A) Microglobulins (B) Glycoproteins  
(C) Mucoproteins (D) Orosomucoids
- 46. After releasing O<sub>2</sub> at the tissues, hemoglobin transports**  
(A) CO<sub>2</sub> and protons to the lungs  
(B) O<sub>2</sub> to the lungs  
(C) CO<sub>2</sub> and protons to the tissue  
(D) Nutrients
- 47. Ehlers-Danlos syndrome characterized by hypermobile joints and skin abnormalities is due to**  
(A) Abnormality in gene for procollagen  
(B) Deficiency of lysyl oxidase  
(C) Deficiency of prolyl hydroxylase  
(D) Deficiency of lysyl hydroxylase
- 48. Proteins are soluble in**  
(A) Anhydrous acetone (B) Aqueous alcohol  
(C) Anhydrous alcohol (D) Benzene
- 49. A cereal protein soluble in 70% alcohol but insoluble in water or salt solution is**  
(A) Glutelin (B) Protamine  
(C) Albumin (D) Gliadin
- 50. Many globular proteins are stable in solution inspite they lack in**  
(A) Disulphide bonds (B) Hydrogen bonds  
(C) Salt bonds (D) Non polar bonds
- 51. The hydrogen bonds between peptide linkages of a protein molecules are interfered by**  
(A) Guanidine (B) Uric acid  
(C) Oxalic acid (D) Salicylic acid

- 52. Globular proteins have completely folded, coiled polypeptide chain and the axial ratio (ratio of length to breadth) is**
- (A) Less than 10 and generally not greater than 3–4  
 (B) Generally 10  
 (C) Greater than 10 and generally 20  
 (D) Greater than 10
- 53. Fibrous proteins have axial ratio**
- (A) Less than 10  
 (B) Less than 10 and generally not greater than 3–4  
 (C) Generally 10  
 (D) Greater than 10
- 54. Each turn of  $\alpha$ -helix contains the amino acid residues (number):**
- (A) 3.6 (B) 3.0  
 (C) 4.2 (D) 4.5
- 55. Distance traveled per turn of  $\alpha$ -helix in nm is**
- (A) 0.53 (B) 0.54  
 (C) 0.44 (D) 0.48
- 56. Along the  $\alpha$ -helix each amino acid residue advances in nm by**
- (A) 0.15 (B) 0.10  
 (C) 0.12 (D) 0.20
- 57. The number of helices present in a collagen molecule is**
- (A) 1 (B) 2  
 (C) 3 (D) 4
- 58. In proteins the  $\alpha$ -helix and  $\beta$ -pleated sheet are examples of**
- (A) Primary structure (B) Secondary structure  
 (C) Tertiary structure (D) Quaternary structure
- 59. The  $\alpha$ -helix of proteins is**
- (A) A pleated structure  
 (B) Made periodic by disulphide bridges  
 (C) A non-periodic structure  
 (D) Stabilised by hydrogen bonds between NH and CO groups of the main chain
- 60. At the lowest energy level  $\alpha$ -helix of polypeptide chain is stabilised**
- (A) By hydrogen bonds formed between the H of peptide N and the carbonyl O of the residue  
 (B) Disulphide bonds  
 (C) Non polar bonds  
 (D) Ester bonds
- 61. Both  $\alpha$ -helix and  $\beta$ -pleated sheet conformation of proteins were proposed by**
- (A) Watson and Crick  
 (B) Pauling and Corey  
 (C) Waugh and King  
 (D) Y.S.Rao
- 62. The primary structure of fibroin, the principal protein of silk worm fibres consists almost entirely of**
- (A) Glycine (B) Aspartate  
 (C) Keratin (D) Tryptophan
- 63. Tertiary structure of a protein describes**
- (A) The order of amino acids  
 (B) Location of disulphide bonds  
 (C) Loop regions of proteins  
 (D) The ways of protein folding
- 64. In a protein molecule the disulphide bond is not broken by**
- (A) Reduction  
 (B) Oxidation  
 (C) Denaturation  
 (D) X-ray diffraction
- 65. The technique for purification of proteins that can be made specific for a given protein is**
- (A) Gel filtration chromatography  
 (B) Ion exchange chromatography  
 (C) Electrophoresis  
 (D) Affinity chromatography
- 66. Denaturation of proteins results in**
- (A) Disruption of primary structure  
 (B) Breakdown of peptide bonds  
 (C) Destruction of hydrogen bonds  
 (D) Irreversible changes in the molecule

- 67. Ceruloplasmin is**  
(A)  $\alpha_1$ -globulin (B)  $\alpha_2$ -globulin  
(C)  $\beta$ -globulin (D) None of these
- 68. The lipoprotein with the fastest electrophoretic mobility and the lowest triglyceride content is**  
(A) Chylomicron (B) VLDL  
(C) IDL (D) HDL
- 69. The lipoprotein associated with activation of LCAT is**  
(A) HDL (B) LDL  
(C) VLDL (D) IDL
- 70. The apolipoprotein which acts as activator of LCAT is**  
(A) A-I (B) A-IV  
(C) C-II (D) D
- 71. The apolipoprotein which acts as activator of extrahepatic lipoprotein is**  
(A) Apo-A (B) Apo-B  
(C) Apo-C (D) Apo-D
- 72. The apolipoprotein which forms the integral component of chylomicron is**  
(A) B-100 (B) B-48  
(C) C (D) D
- 73. The apolipoprotein which from the integral component of VLDL is**  
(A) B-100 (B) B-48  
(C) A (D) D
- 74. The apolipoprotein which acts as ligand for LDL receptor is**  
(A) B-48 (B) B-100  
(C) A (D) C
- 75. Serum LDL has been found to be increased in**  
(A) Obstructive jaundice  
(B) Hepatic jaundice  
(C) Hemolytic jaundice  
(D) Malabsorption syndrome
- 76. A lipoprotein associated with high incidence of coronary atherosclerosis is**  
(A) LDL (B) VLDL  
(C) IDL (D) HDL
- 77. A lipoprotein inversely related to the incidence of coronary atherosclerosis is**  
(A) VLDL (B) IDL  
(C) LDL (D) HDL
- 78. The primary biochemical lesion in homozygote with familial hypercholesterolemia (type IIa) is**  
(A) Loss of feed back inhibition of HMG reductase  
(B) Loss of apolipoprotein B  
(C) Increased production of LDL from VLDL  
(D) Functional deficiency of plasma membrane receptors for LDL
- 79. In abetalipoproteinemia, the biochemical defect is in**  
(A) Apo-B synthesis  
(B) Lipoprotein lipase activity  
(C) Cholesterol ester hydrolase  
(D) LCAT activity
- 80. Familial hypertriglyceridemia is associated with**  
(A) Over production of VLDL  
(B) Increased LDL concentration  
(C) Increased HDL concentration  
(D) Slow clearance of chylomicrons
- 81. For synthesis of prostaglandins, the essential fatty acids give rise to a fatty acid containing**  
(A) 12 carbon atoms (B) 16 carbon atoms  
(C) 20 carbon atoms (D) 24 carbon atoms
- 82. All active prostaglandins have at least one double bond between positions**  
(A) 7 and 8 (B) 10 and 11  
(C) 13 and 14 (D) 16 and 17
- 83. Normal range of plasma total phospholipids is**  
(A) 0.2–0.6 mmol/L (B) 0.9–2.0 mmol/L  
(C) 1.8–5.8 mmol/L (D) 2.8–5.3 mmol/L
- 84. HDL<sub>2</sub> have the density in the range of**  
(A) 1.006–1.019 (B) 1.019–1.032  
(C) 1.032–1.063 (D) 1.063–1.125

- 85.  $\beta$ -lipoproteins have the density in the range of**  
 (A) 0.95–1.006 (B) 1.006–1.019  
 (C) 1.019–1.063 (D) 1.063–1.125
- 86. IDL have the density in the range of**  
 (A) 0.95–1.006 (B) 1.006–1.019  
 (C) 1.019–1.032 (D) 1.032–1.163
- 87. Aspirin inhibits the activity of the enzyme:**  
 (A) Lipoxygenase (B) Cyclooxygenase  
 (C) Phospholipase A<sub>1</sub> (D) Phospholipase A<sub>2</sub>
- 88. A 'suicide enzyme' is**  
 (A) Cyclooxygenase (B) Lipoxygenase  
 (C) Phospholipase A<sub>1</sub> (D) Phospholipase A<sub>2</sub>
- 89. In adipose tissue prostaglandins decrease**  
 (A) Lipogenesis (B) Lipolysis  
 (C) Gluconeogenesis (D) Glycogenolysis
- 90. The optimal pH for the enzyme pepsin is**  
 (A) 1.0–2.0 (B) 4.0–5.0  
 (C) 5.2–6.0 (D) 5.8–6.2
- 91. Pepsinogen is converted to active pepsin by**  
 (A) HCl (B) Bile salts  
 (C) Ca<sup>++</sup> (D) Enterokinase
- 92. The optimal pH for the enzyme rennin is**  
 (A) 2.0 (B) 4.0  
 (C) 8.0 (D) 6.0
- 93. The optimal pH for the enzyme trypsin is**  
 (A) 1.0–2.0 (B) 2.0–4.0  
 (C) 5.2–6.2 (D) 5.8–6.2
- 94. The optimal pH for the enzyme chymotrypsin is**  
 (A) 2.0 (B) 4.0  
 (C) 6.0 (D) 8.0
- 95. Trypsinogen is converted to active trypsin by**  
 (A) Enterokinase (B) Bile salts  
 (C) HCl (D) Mg<sup>++</sup>
- 96. Pepsin acts on denatured proteins to produce**  
 (A) Proteoses and peptones  
 (B) Polypeptides  
 (C) Peptides  
 (D) Dipeptides
- 97. Renin converts casein to paracasein in presence of**  
 (A) Ca<sup>++</sup> (B) Mg<sup>++</sup>  
 (C) Na<sup>+</sup> (D) K<sup>+</sup>
- 98. An expopeptidase is**  
 (A) Trypsin (B) Chymotrypsin  
 (C) Elastase (D) Elastase
- 99. The enzyme trypsin is specific for peptide bonds of**  
 (A) Basic amino acids  
 (B) Acidic amino acids  
 (C) Aromatic amino acids  
 (D) Next to small amino acid residues
- 100. Chymotrypsin is specific for peptide bonds containing**  
 (A) Uncharged amino acid residues  
 (B) Acidic amino acids  
 (C) Basic amino acid  
 (D) Small amino acid residues
- 101. The end product of protein digestion in G.I.T. is**  
 (A) Dipeptide (B) Tripeptide  
 (C) Polypeptide (D) Amino acid
- 102. Natural L-isomers of amino acids are absorbed from intestine by**  
 (A) Passive diffusion (B) Simple diffusion  
 (C) Facilitated diffusion (D) Active process
- 103. Abnormalities of blood clotting are**  
 (A) Haemophilia (B) Christmas disease  
 (C) Gout (D) Both (A) and (B)
- 104. An important reaction for the synthesis of amino acid from carbohydrate intermediates is transamination which requires the cofactor:**  
 (A) Thiamin (B) Riboflavin  
 (C) Niacin (D) Pyridoxal phosphate

- 105. The main sites for oxidative deamination are**  
 (A) Liver and kidney  
 (B) Skin and pancreas  
 (C) Intestine and mammary gland  
 (D) Lung and spleen
- 106. A positive nitrogen balance occurs**  
 (A) In growing infant  
 (B) Following surgery  
 (C) In advanced cancer  
 (D) In kwashiorkor
- 107. The main site of urea synthesis in mammals is**  
 (A) Liver (B) Skin  
 (C) Intestine (D) Kidney
- 108. The enzymes of urea synthesis are found in**  
 (A) Mitochondria only  
 (B) Cytosol only  
 (C) Both mitochondria and cytosol  
 (D) Nucleus
- 109. The number of ATP required for urea synthesis is**  
 (A) 0 (B) 1  
 (C) 2 (D) 3
- 110. Most of the ammonia released from L- $\alpha$ -amino acids reflects the coupled action of transaminase and**  
 (A) L-glutamate dehydrogenase  
 (B) L-amino acid oxidase  
 (C) Histidase  
 (D) Serine dehydratase
- 111. In urea synthesis, the amino acid functioning solely as an enzyme activator:**  
 (A) N-acetyl glutamate (B) Ornithine  
 (C) Citrulline (D) Arginine
- 112. The enzyme carbamoyl phosphate synthetase requires**  
 (A)  $Mg^{++}$  (B)  $Ca^{++}$   
 (C)  $Na^+$  (D)  $K^+$
- 113. Control of urea cycle involves the enzyme:**  
 (A) Carbamoyl phosphate synthetase  
 (B) Ornithine transcarbamoylase  
 (C) Argininosuccinase  
 (D) Arginase
- 114. Transfer of the carbamoyl moiety of carbamoyl phosphate to ornithine is catalysed by a liver mitochondrial enzyme:**  
 (A) Carbamoyl phosphate synthetase  
 (B) Ornithine transcarbamoylase  
 (C) N-acetyl glutamate synthetase  
 (D) N-acetyl glutamate hydrolase
- 115. A compound serving a link between citric acid cycle and urea cycle is**  
 (A) Malate (B) Citrate  
 (C) Succinate (D) Fumarate
- 116. The 2 nitrogen atoms in urea are contributed by**  
 (A) Ammonia and glutamate  
 (B) Glutamine and glutamate  
 (C) Ammonia and aspartate  
 (D) Ammonia and alanine
- 117. In carcinoid syndrome the argentaffin tissue of the abdominal cavity over-produce**  
 (A) Serotonin (B) Histamine  
 (C) Tryptamine (D) Tyrosine
- 118. Tryptophan could be considered as precursor of**  
 (A) Melanotonin (B) Thyroid hormones  
 (C) Melanin (D) Epinephrine
- 119. Conversion of tyrosine to dihydroxyphenylalanine is catalysed by tyrosine hydroxylase which requires**  
 (A) NAD (B) FAD  
 (C) ATP (D) Tetrahydrobiopterin
- 120. The rate limiting step in the biosynthesis of catecholamines is**  
 (A) Decarboxylation of dihydroxyphenylalanine  
 (B) Hydroxylation of phenylalanine  
 (C) Hydroxylation of tyrosine  
 (D) Oxidation of dopamine

- 121. The enzyme dopamine  $\beta$ -oxidase which catalyses conversion of dopamine to norepinephrine requires**  
 (A) Vitamin A (B) Vitamin C  
 (C) Vitamin E (D) Vitamin B<sub>12</sub>
- 122. In humans the sulphur of methionine and cysteine is excreted mainly as**  
 (A) Etheral sulphate  
 (B) Inorganic sulphate  
 (C) Sulphites  
 (D) Thioorganic compound
- 123. Small amount of urinary oxalates is contributed by the amino acid:**  
 (A) Glycine (B) Tyrosine  
 (C) Alanine (D) Serine
- 124. The amino acid which detoxicated benzoic acid to form hippuric acid is**  
 (A) Glycine (B) Alanine  
 (C) Serine (D) Glutamic acid
- 125. The amino acids involved in the synthesis of creatin are**  
 (A) Arginine, glycine, active methionine  
 (B) Arginine, alanine, glycine  
 (C) Glycine, lysine, methionine  
 (D) Arginine, lysine, methionine
- 126. Chemical score of egg proteins is considered to be**  
 (A) 100 (B) 60  
 (C) 50 (D) 40
- 127. Chemical score of milk proteins is**  
 (A) 70 (B) 65  
 (C) 60 (D) 40
- 128. Chemical score of proteins of bengal gram is**  
 (A) 70 (B) 60  
 (C) 44 (D) 42
- 129. Chemical score of protein gelatin is**  
 (A) 0 (B) 44  
 (C) 57 (D) 60
- 130. Chemical score of protein zein is**  
 (A) 0 (B) 57  
 (C) 60 (D) 70
- 131. Biological value of egg white protein is**  
 (A) 94 (B) 83  
 (C) 85 (D) 77
- 132. Net protein utilisation of egg protein is**  
 (A) 75% (B) 80%  
 (C) 91% (D) 72%
- 133. Net protein utilization of milk protein is**  
 (A) 75% (B) 80%  
 (C) 86% (D) 91%
- 134. A limiting amino acid is an essential amino acid**  
 (A) That is most deficient in proteins  
 (B) That is most excess in proteins  
 (C) That which increases the growth  
 (D) That which increases the weight gain
- 135. The limiting amino acid of rice is**  
 (A) Lysine (B) Tryptophan  
 (C) Phenylalanine (D) Tyrosine
- 136. The limiting amino acid of fish proteins is**  
 (A) Tryptophan (B) Cysteine  
 (C) Lysine (D) Threonine
- 137. Pulses are deficient in**  
 (A) Lysine (B) Threonine  
 (C) Methionine (D) Tryptophan
- 138. A trace element deficient in the milk is**  
 (A) Magnesium (B) Copper  
 (C) Zinc (D) Chloride
- 139. A conjugated protein present in the egg yolk is**  
 (A) Vitellin (B) Livetin  
 (C) Albuminoids (D) Ovo-mucoid
- 140. The chief protein of cow's milk is**  
 (A) Albumin (B) Vitellin  
 (C) Livetin (D) Casein

- 141. A water soluble vitamin deficient in egg is**  
 (A) Thiamin (B) Ribofalvin  
 (C) Ascorbic acid (D) Cobalamin
- 142. Pulses are rich in**  
 (A) Lysine (B) Methionine  
 (C) Tryptophan (D) Phenylalanine
- 143. Milk is deficient in**  
 (A) Vitamin B<sub>1</sub> (B) Vitamin B<sub>2</sub>  
 (C) Sodium (D) Potassium
- 144. Milk is deficient in**  
 (A) Calcium (B) Iron  
 (C) Sodium (D) Potassium
- 145. When net protein utilization (NPU) is low, the requirements for proteins are**  
 (A) High (B) Moderate  
 (C) Low (D) Supplementary
- 146. Protein content of human milk is about**  
 (A) 1.4% (B) 2.4%  
 (C) 3.4% (D) 4.4%
- 147. Protein content of cow's milk is about**  
 (A) 2.5% (B) 3.5%  
 (C) 4.5% (D) 5.5%
- 148. Protein content of soyabean is about**  
 (A) 30% (B) 40%  
 (C) 50% (D) 60%
- 149. Lipid content of egg white is**  
 (A) 12% (B) 33%  
 (C) 10–11% (D) Traces
- 150. The recommended daily allowance (RDA) of proteins for an adult man is**  
 (A) 70 gms (B) 50 gms  
 (C) 40 gms (D) 30 gms
- 151. The basic amino acids are**  
 (A) Lysine (B) Bile acids  
 (C) Glycine (D) Alanine
- 152. The daily caloric requirement for the normal adult female is about**  
 (A) 1500 (B) 2100  
 (C) 2500 (D) 2900
- 153. In the total proteins, the percentage of albumin is about**  
 (A) 20–40 (B) 30–45  
 (C) 50–70 (D) 80–90
- 154. In the total proteins percentage of  $\alpha_1$  globulin is about**  
 (A) 0.2–1.2% (B) 1.2–2.0%  
 (C) 2.4–4.4% (D) 5.0–10.0%
- 155. In the total proteins the percentage of  $\gamma$  globulin is about**  
 (A) 2.4–4.4% (B) 10.0–21.0%  
 (C) 6.1–10.1% (D) 1.2–2.0%
- 156. Most frequently the normal albumin globulin ratio (A : G) is**  
 (A) 1.0 : 0.8 (B) 1.5 : 1.0  
 (C) 2.0 : 1.0 (D) 2.4 : 1.0
- 157. In Thymol turbidity test the protein involved is mainly**  
 (A) Albumin (B)  $\alpha_1$ -Globulin  
 (C)  $\alpha_2$ -Globulin (D)  $\beta$  Globulin
- 158. In quaternary structure, subunits are linked by**  
 (A) Peptide bonds (B) Disulphide bonds  
 (C) Covalent bonds (D) Non-covalent bonds
- 159. Molecular weight of human albumin is about**  
 (A) 156,000 (B) 90,000  
 (C) 69,000 (D) 54,000
- 160. At isoelectric pH, an amino acid exists as**  
 (A) Anion (B) Cation  
 (C) Zwitterion (D) None of these
- 161. A disulphide bond can be formed between**  
 (A) Two methionine residues  
 (B) Two cysteine residues  
 (C) A methionine and a cysteine residue  
 (D) All of these
- 162. A coagulated protein is**  
 (A) Insoluble  
 (B) Biologically non-functional  
 (C) Unfolded  
 (D) All of the above

- 163. At a pH below the isoelectric point, an amino acid exists as**  
(A) Cation  
(B) Anion  
(C) Zwitterion  
(D) Undissociated molecule
- 164. An amino acid having a hydrophilic side chain is**  
(A) Alanine (B) Proline  
(C) Methionine (D) Serine
- 165. An amino acid that does not take part in  $\alpha$  helix formation is**  
(A) Histidine (B) Tyrosine  
(C) Proline (D) Tryptophan
- 166. A protein rich in cysteine is**  
(A) Collagen (B) Keratin  
(C) Haemoglobin (D) Gelatin
- 167. Primary structure of proteins can be determined by the use of**  
(A) Electrophoresis (B) Chromatography  
(C) Ninhydrin (D) Sanger's reagent
- 168. Electrostatic bonds can be formed between the side chains of**  
(A) Alanine and leucine  
(B) Leucine and valine  
(C) Aspartate and glutamate  
(D) Lysine and aspartate
- 169. Sanger's reagent contains**  
(A) Phenylisothiocyanate  
(B) Dansyl chloride  
(C) 1-Fluoro-2, 4-dinitrobenzene  
(D) Ninhydrin
- 170. The most abundant protein in mammals is**  
(A) Albumin (B) Haemoglobin  
(C) Collagen (D) Elastin
- 171. Folding of newly synthesized proteins is accelerated by**  
(A) Protein disulphide isomerase  
(B) Prolyl cis-trans isomerase  
(C) Chaperonins  
(D) All of these
- 172. Primary structure of a protein is formed by**  
(A) Hydrogen bonds (B) Peptide bonds  
(C) Disulphide bonds (D) All of these
- 173.  $\alpha$ -Helix is formed by**  
(A) Hydrogen bonds  
(B) Hydrophobic bonds  
(C) Electrostatic bonds  
(D) Disulphide bonds
- 174. Glutelins are present in**  
(A) Milk (B) Eggs  
(C) Meat (D) Cereals
- 175. Aromatic amino acids can be detected by**  
(A) Sakaguchi reaction  
(B) Millon-Nasse reaction  
(C) Hopkins-Cole reaction  
(D) Xanthoproteic reaction
- 176. Two amino groups are present in**  
(A) Leucine (B) Glutamate  
(C) Lysine (D) Threonine
- 177. During denaturation of proteins, all of the following are disrupted except**  
(A) Primary structure (B) Secondary structure  
(C) Tertiary structure (D) Quaternary structure
- 178. All the following are branched chain amino acids except**  
(A) Isoleucine (B) Alanine  
(C) Leucine (D) Valine
- 179. An -OH group is present in the side chain of**  
(A) Serine (B) Arginine  
(C) Lysine (D) Proline
- 180. Edman's reagent contains**  
(A) Phenylisothiocyanate  
(B) 1-Fluoro-2, 4-dinitrobenzene  
(C) Dansyl Chloride  
(D) tBOC azide

**181. Edman's reaction can be used to**

- (A) Determine the number of tyrosine residues in a protein
- (B) Determine the number of aromatic amino acid residues in a protein
- (C) Determine the amino acid sequence of a protein
- (D) Hydrolyse the peptide bonds in a protein

**182. Inherited deficiency of  $\beta$ -glucosidase causes**

- (A) Tay-Sachs disease
- (B) Metachromatic leukodystrophy
- (C) Gaucher's disease
- (D) Multiple sclerosis

**183. Tay-Sachs disease results from inherited deficiency of**

- (A) Arylsulphatase A
- (B) Hexosaminidase A
- (C) Sphingomyelinase
- (D) Ceramidase

**184. The largest apolipoprotein is**

- (A) Apo E
- (B) Apo B-48
- (C) Apo B-100
- (D) Apo A-I

**185. Apolipoprotein B-100 is synthesised in**

- (A) Adipose tissue
- (B) Liver
- (C) Intestine
- (D) Liver and intestine

**186. Apolipoprotein B-48 is synthesized in**

- (A) Adipose tissue
- (B) Liver
- (C) Intestine
- (D) Liver and intestine

**187. Apolipoproteins A-I and A-II are present in**

- (A) LDL only
- (B) LDL and VLDL
- (C) HDL only
- (D) HDL and chylomicrons

**188. Apolipoprotein B-48 is present in**

- (A) Chylomicrons
- (B) VLDL
- (C) LDL
- (D) HDL

**189. Apolipoprotein B-100 is present in**

- (A) Chylomicrons
- (B) VLDL only
- (C) LDL only
- (D) VLDL and LDL

**190. Apolipoproteins C-I, C-II and C-III are present in**

- (A) Chylomicrons
- (B) VLDL
- (C) HDL
- (D) All of these

**191. Apolipoproteins C-I, C-II and C-III are present in all of the following except**

- (A) Chylomicrons
- (B) VLDL
- (C) LDL
- (D) HDL

**192. Apolipoprotein A-I acts as**

- (A) Enzyme activator
- (B) Ligand for receptor
- (C) Both (A) and (B)
- (D) None of these

**193. Apolipoprotein B-100 acts as**

- (A) Enzyme activator
- (B) Ligand for receptor
- (C) Both (A) and (B)
- (D) None of these

**194. Apolipoprotein C-II is an activator of**

- (A) Lecithin cholesterol acyl transferase
- (B) Phospholipase C
- (C) Extrahepatic lipoprotein lipase
- (D) Hepatic lipoprotein lipase

**195. Nascent chylomicron receives apolipoproteins C and E from**

- (A) VLDL remnant
- (B) VLDL
- (C) LDL
- (D) HDL

**196. Terminal transferase**

- (A) Removes nucleotides from 3' end
- (B) Adds nucleotides at 3' end
- (C) Removes nucleotides from 3' end
- (D) Adds nucleotides at 3' end

**197. S1 nuclease hydrolyses**

- (A) DNA of somatic cells
- (B) DNA of sperms
- (C) Any double stranded DNA
- (D) Any single stranded DNA

**198. Positive nitrogen balance is seen in**

- (A) Starvation
- (B) Wasting diseases
- (C) Growing age
- (D) Intestinal malabsorption

- 199. Alanine can be synthesized from**  
(A) Glutamate and  $\alpha$ -ketoglutarate  
(B) Pyruvate and glutamate  
(C) Pyruvate and  $\alpha$ -ketoglutarate  
(D) Aspartate and  $\alpha$ -ketoglutarate
- 200. All of the following are required for synthesis of alanine except**  
(A) Pyruvate (B)  $\alpha$ -ketoglutarate  
(C) Glutamate (D) Pyridoxal phosphate
- 201. All of the following statements about aspartate are true except**  
(A) It is non-essential amino acid  
(B) It is a dicarboxylic amino acid  
(C) It can be synthesized from pyruvate and glutamate  
(D) It can be converted into asparagine
- 202. Glycine can be synthesized from**  
(A) Serine (B) Choline  
(C) Betaine (D) All of these
- 203. All of the following are required for synthesis of glutamine except**  
(A) Glutamate  
(B) Ammonia  
(C) Pyridoxal phosphate  
(D) ATP
- 204. A coenzyme required for the synthesis of glycine from serine is**  
(A) ATP  
(B) Pyridoxal phosphate  
(C) Tetrahydrofolate  
(D) NAD
- 205. All of the following statements about proline are true except**  
(A) It is an imino acid  
(B) It can be synthesized from glutamate  
(C) It can be catabolised to glutamate  
(D) Free proline can be hydroxylated to hydroxyproline
- 206. A protein rich in hydroxyproline is**  
(A) Prolamin (B) Procollagen  
(C) Collagen (D) Proinsulin
- 207. All the following statement about hydroxyproline are true except**  
(A) There is no codon for hydroxyproline  
(B) It is present in large amounts in collagen  
(C) Free proline *cannot* be hydroxylated to hydroxyproline  
(D) Hydroxylation of proline residues is catalysed by a dioxygenase
- 208. All of the following are required for hydroxylation of proline residues except**  
(A) Ascorbic acid (B) Glutamate  
(C) Ferrous ions (D) Molecular oxygen
- 209. Cysteine can be synthesized from methionine and**  
(A) Serine (B) Homoserine  
(C) Homocysteine (D) Threonine
- 210. Methionine is synthesized in human body from**  
(A) Cysteine and homoserine  
(B) Homocysteine and serine  
(C) Cysteine and serine  
(D) None of these
- 211. Hydroxylation of phenylalanine requires all of the following except**  
(A) Phenylalanine hydroxylase  
(B) Tetrahydrobiopterin  
(C) NADH  
(D) Molecular oxygen
- 212. Non-Protein amino acids are**  
(A) Ornithine  
(B)  $\beta$ -alanine  
(C)  $\gamma$ -amino butyric acid  
(D) All of these
- 213. The amino acid that undergoes oxidative deamination at significant rate is**  
(A) Alanine (B) Aspartate  
(C) Glutamate (D) Glutamine
- 214. Allosteric inhibitor of glutamate dehydrogenase is**  
(A) ATP (B) ADP  
(C) AMP (D) GMP

- 215. Allosteric activator of glutamate dehydrogenase is**  
 (A) ATP (B) GTP  
 (C) ADP and GDP (D) AMP and GMP
- 216. Free ammonia is released during**  
 (A) Oxidative deamination of glutamate  
 (B) Catabolism of purines  
 (C) Catabolism of pyrimidines  
 (D) All of these
- 217. An organ which is extremely sensitive to ammonia toxicity is**  
 (A) Liver (B) Brain  
 (C) Kidney (D) Heart
- 218. Ammonia is transported from muscles to liver mainly in the form of**  
 (A) Free ammonia (B) Glutamine  
 (C) Asparagine (D) Alanine
- 219. The major site of urea synthesis is**  
 (A) Brain (B) Kidneys  
 (C) Liver (D) Muscles
- 220. Carbamoyl phosphate required for urea synthesis is formed in**  
 (A) Cytosol (B) Mitochondria  
 (C) Both (A) and (B) (D) None of these
- 221. Cytosolic and mitochondrial carbamoyl phosphate synthetase have the following similarity:**  
 (A) Both use ammonia as a substance  
 (B) Both provide carbamoyl phosphate for urea synthesis  
 (C) Both require N-acetylglutamate as an activator  
 (D) Both are allosteric enzymes
- 222. The following enzyme of urea cycle is present in cytosol:**  
 (A) Argininosuccinic acid synthetase  
 (B) Argininosuccinase  
 (C) Arginase  
 (D) All of these
- 223. ATP is required in following reactions of urea cycle:**  
 (A) Synthesis of carbamoyl phosphate and citrulline  
 (B) Synthesis of citrulline and argininosuccinate  
 (C) Synthesis of argininosuccinate and arginine  
 (D) Synthesis of carbamoyl phosphate and argininosuccinate
- 224. Daily excretion of nitrogen by an adult man is about**  
 (A) 15–20 mg (B) 1.5–2 gm  
 (C) 5–10 gm (D) 15–20 gm
- 225. Maple syrup urine diseases is an inborn error of metabolism of**  
 (A) Sulphur-containing amino acids  
 (B) Aromatic amino acids  
 (C) Branched chain amino acids  
 (D) Dicarboxylic amino acids
- 226. Cystinuria results from inability to**  
 (A) Metabolise cysteine  
 (B) Convert cystine into cysteine  
 (C) Incorporate cysteine into proteins  
 (D) Reabsorb cystine in renal tubules
- 227. The defective enzyme in histidinemia is**  
 (A) Histidine carboxylase  
 (B) Histidine decarboxylase  
 (C) Histidase  
 (D) Histidine oxidase
- 228. All the following statements about phenylketonuria are correct except**  
 (A) Phenylalanine cannot be converted into tyrosine  
 (B) Urinary excretion of phenylpyruvate and phenyllactate is increased  
 (C) It can be controlled by giving a low-phenylalanine diet  
 (D) It leads to decreased synthesis of thyroid hormones, catecholamines and melanin
- 229. All the following statements about albinism are correct except**  
 (A) Tyrosine hydroxylase (tyrosinase) is absent or deficient in melanocytes  
 (B) Skin is hypopigmented  
 (C) It results in mental retardation  
 (D) Eyes are hypopigmented

- 230. Glycine is not required for the formation of**  
 (A) Taurocholic acid (B) Creatine  
 (C) Purines (D) Pyrimidines
- 231. Histamine is formed from histidine by**  
 (A) Deamination (B) Dehydrogenation  
 (C) Decarboxylation (D) Carboxylation
- 232. DOPA is an intermediate in the synthesis of**  
 (A) Thyroid hormones  
 (B) Catecholamines  
 (C) Melanin  
 (D) Catecholamines and melanin
- 233. All the following statements about pepsin are correct except**  
 (A) It is smaller than pepsinogen  
 (B) It is formed by the action of HCl on its precursor  
 (C) Its optimum pH is 1.0–2.0  
 (D) It hydrolyses the C-terminal and N-terminal peptide bonds of proteins
- 234. Pancreatic juice contains the precursors of all of the following except**  
 (A) Trypsin (B) Chymotrypsin  
 (C) Carboxypeptidase (D) Aminopeptidase
- 235. The only correct statement about chymotrypsin is**  
 (A) It is formed from trypsin  
 (B) Carboxypeptidase converts trypsin into chymotrypsin  
 (C) Its optimum pH is around 7  
 (D) It hydrolyses peptide bonds involving basic amino acids
- 236. The portion of the antigen molecule which is recognized by antibody is known as**  
 (A) Hapten (B) Epitope  
 (C) Complement (D) Variable region
- 237. All the following statements about haptens are true except**  
 (A) They have high molecular weights  
 (B) They cannot elicit an immune response by themselves  
 (C) When combined with some other large molecule, they can elicit an immune response  
 (D) Once an immune response develops, the free hapten can be recognized by the antibody
- 238. Antigens and haptens have the following similarity:**  
 (A) They have high molecular weights  
 (B) They can elicit immune response by themselves  
 (C) They can elicit an immune response only in association with some other large molecule  
 (D) Once an immune response develops, free antigen and free hapten can be recognized by the antibody
- 239. The minimum number of polypeptide chains in an immunoglobulin is**  
 (A) Two (B) Four  
 (C) Five (D) Six
- 240. Light chains of immunoglobulins are of following types:**  
 (A) Alpha and kappa (B) Alpha and gamma  
 (C) Lambda and delta (D) Kappa and lambda
- 241. Immunoglobulins are classified on the basis of**  
 (A) Type of light chains  
 (B) Type of heavy chains  
 (C) Types of light and heavy chains  
 (D) Molecular weight
- 242. The molecular weight of light chains is**  
 (A) 10,000–15,000 (B) 20,000–25,000  
 (C) 25,000–50,000 (D) 50,000–75,000
- 243. The molecular weight of heavy chains is**  
 (A) 20,000–25,000 (B) 25,000–50,000  
 (C) 50,000–70,000 (D) 70,000–1,00,000
- 244. Secretory component is present in**  
 (A) IgA (B) IgG  
 (C) IgM (D) All of these
- 245. The variable region of light chains is the**  
 (A) N-terminal quarter (B) N-terminal half  
 (C) C-terminal quarter (D) C-terminal half

- 246. The variable region of light chain is the**  
(A) N-terminal quarter  
(B) N-terminal half  
(C) C-terminal quarter  
(D) C-terminal half
- 247. The variable region of light chains has**  
(A) One hypervariable region  
(B) Two hypervariable regions  
(C) Three hypervariable regions  
(D) Four hypervariable regions
- 248. The variable region of heavy chains has**  
(A) One hypervariable region  
(B) Two hypervariable regions  
(C) Three hypervariable regions  
(D) Four hypervariable regions
- 249. The most abundant immunoglobulin in plasma is**  
(A) IgA (B) IgG  
(C) IgM (D) IgD
- 250. The largest immunoglobulin is**  
(A) IgA (B) IgG  
(C) IgM (D) IgD
- 251. The plasma concentration of IgA is**  
(A) 1–5 mg/dl (B) 40–200 mg/dl  
(C) 60–500 mg/dl (D) 700–1,500 mg/dl
- 252. An immunoglobulin found in exocrine secretions is**  
(A) IgA (B) IgG  
(C) IgM (D) IgE
- 253. Allergic reactions are mediated by**  
(A) IgA (B) IgG  
(C) IgD (D) IgE
- 254. An immunoglobulin which can cross the placental barrier is**  
(A) IgA (B) IgM  
(C) IgD (D) None of these
- 255. IgM possesses**  
(A) Two light chains and two heavy chains  
(B) Four light chains and four heavy chains  
(C) Six light chains and six heavy chains  
(D) Ten light chains and ten heavy chains
- 256. The immunoglobulin having the longest half-life is**  
(A) IgA (B) IgG  
(C) IgM (D) IgE
- 257. The half-life of IgG is**  
(A) 2–3 days (B) 5–6 days  
(C) 8–10 days (D) 20–25 days
- 258. Recognition of antigen is the function of**  
(A) Variable region of light chains  
(B) Variable regions of light and heavy chains  
(C) Constant region of heavy chains  
(D) Constant regions of light and heavy chains
- 259. The effector function of antibody is performed by**  
(A) Variable region of light chains  
(B) Constant region of heavy chains  
(C) Variable regions of light and heavy chains  
(D) Constant regions of light and heavy chains
- 260. Complement system can be activated by binding of antigen to**  
(A) IgA (B) IgD  
(C) IgE (D) IgM
- 261. C1 component of classical complement pathway is made up of**  
(A) Complements 1q and 1r  
(B) Complements 1q and 1s  
(C) Complements 1r and 1s  
(D) Complements 1q, 1r and 1s
- 262. The components of complement system are activated by**  
(A) Microsomal hydroxylation  
(B) Phosphorylation  
(C) Glycosylation  
(D) Proteolysis
- 263. The component system forms a membrane attack complex made up of**  
(A) Complements 1q, 1r and 1s  
(B) Complements 1, 2, 3 and 4  
(C) Complements 5b, 6, 7 and 8  
(D) Factors B and D

- 264. Factors B and D are required in**  
 (A) The classical pathway of complement fixation  
 (B) The alternate complement pathway  
 (C) Both (A) and (B)  
 (D) None of these
- 265. The alternate complement pathway doesn't involve**  
 (A) Antigen-antibody complex  
 (B) Complement 3  
 (C) Factors B and D  
 (D) Membrane attack unit
- 266. Antibody diversity arises from**  
 (A) Gene amplification  
 (B) Gene re-arrangement  
 (C) Alternative splicing  
 (D) All of these
- 267. A light chain gene is constructed from the following segments:**  
 (A) Variable and constant segments  
 (B) Variable, joining and constant segments  
 (C) Variable, diversity and constant segments  
 (D) Variable, joining, diversity and constant segments
- 268. In metabolic point of view, amino acids are classified as**  
 (A) Glycogenic  
 (B) Ketogenic  
 (C) Glycogenic or Ketogenic  
 (D) All of these
- 269. Diversity segments are present in**  
 (A) Light chain genes  
 (B) Heavy chain genes  
 (C) Light and heavy chain genes  
 (D) None of these
- 270. Constant segments of heavy chains are of**  
 (A) Five types (B) Six types  
 (C) Seven types (D) Eight types
- 271. Gamma heavy chains are of**  
 (A) Two types (B) Three types  
 (C) Four types (D) Five types
- 272. Gamma heavy chains are present in**  
 (A) IgA (B) IgG  
 (C) IgM (D) IgD
- 273. Heavy chains in IgD are of following type:**  
 (A) Alpha (B) Gamma  
 (C) Delta (D) Epsilon
- 274. On exposure to any antigen, the first antibody to be formed is of the following class:**  
 (A) IgA (B) IgG  
 (C) IgM (D) IgE
- 275. Constant segment genes of heavy chains are present in a cluster in which the first gene on side is**  
 (A) Alpha (B) Gamma  
 (C) Delta (D) None of these
- 276. Cell-mediated immunity is the function of**  
 (A) B lymphocytes (B) T lymphocytes  
 (C) Plasma cells (D) Basophils
- 277. The most abundant T cells are**  
 (A) Cytotoxic T cells (B) Helper T cells  
 (C) Suppressor T cells (D) Memory T cells
- 278. T cells can recognise**  
 (A) Free antigens  
 (B) Antigens bound to cells  
 (C) Antigens bound to antibodies  
 (D) Antigens bound to MHC proteins
- 279. MHC proteins are unique to**  
 (A) Each cell (B) Each organ  
 (C) Each individual (D) Each species
- 280. MHC class I proteins are present on the surface of**  
 (A) B cells only (B) T cells only  
 (C) Macrophages only (D) All cells
- 281. MHC class I proteins, in conjunction with antigens are recognised by**  
 (A) Cytotoxic T cells (B) Helper T cells  
 (C) Suppressor T cells (D) Memory T cells

- 282. MHC class II proteins are present on the surface of**  
 (A) All cells  
 (B) B lymphocytes only  
 (C) Macrophages only  
 (D) Macrophages and B lymphocytes
- 283. MHC Class II proteins, in conjunction with antigens, are recognised by**  
 (A) Cytotoxic T cells  
 (B) Helper T cells  
 (C) Suppressor T cells  
 (D) Memory T cells
- 284. CD 8 is a transmembrane glycoprotein present in**  
 (A) Cytotoxic T cells  
 (B) Helper T cells  
 (C) Suppressor T cells  
 (D) Memory T cells
- 285. CD 4 is a transmembrane glycoprotein present in**  
 (A) Cytotoxic T cells (B) Helper T cells  
 (C) Suppressor T cells (D) Memory T cells
- 286. CD 3 complex and p 56<sup>lck</sup> proteins are present in**  
 (A) Cytotoxic T cells (B) Helper T cells  
 (C) Both (A) and (B) (D) None of these
- 287. Cytotoxic T cells release**  
 (A) Perforins  
 (B) Interleukins  
 (C) Colony stimulating factors  
 (D) Tumour necrosis factor
- 288. Helper T cells release**  
 (A) Interleukins  
 (B) Colony stimulating factors  
 (C) Tumour necrosis factor  
 (D) All of these
- 289. MHC Class III proteins include**  
 (A) Immunoglobulins  
 (B) Components of complement system  
 (C) T cells receptors  
 (D) CD4 and CD8 proteins
- 290. Human immunodeficiency virus destroys**  
 (A) Cytotoxic T cells (B) Helper T cells  
 (C) B cells (D) Plasma cells
- 291. In allergic diseases, the concentration of the following is increased in plasma:**  
 (A) IgA (B) IgG  
 (C) IgD (D) IgE
- 292. IgE has a tendency to attach to**  
 (A) Basophils (B) Mast cells  
 (C) Both (A) and (B) (D) None of these
- 293. Reaginic antibody is**  
 (A) IgA (B) IgG  
 (C) IgD (D) IgE
- 294. Active immunity can be produced by administration of**  
 (A) Killed bacteria or viruses  
 (B) Live attenuated bacteria or viruses  
 (C) Toxoids  
 (D) All of these
- 295. Passive immunity can be produced by administration of**  
 (A) Pure antigens  
 (B) Immunoglobulins  
 (C) Toxoids  
 (D) Killed bacteria or viruses
- 296. Helper T cells release all the following except**  
 (A) Interleukins  
 (B) Colony stimulating factors  
 (C) Perforins  
 (D) Tumour necrosis factor
- 297. IgG cleaved by papain into**  
 (A) Two light and two heavy chains  
 (B) Two F<sub>ab</sub> and one F<sub>c</sub> fragments  
 (C) Two pairs of one light and one heavy chain each  
 (D) One F<sub>ab</sub> and two F<sub>c</sub> fragments
- 298. Bence-Jones protein is**  
 (A) An immunoglobulin  
 (B) A dimer of heavy chains  
 (C) A dimer of light chains  
 (D) A dimer of one heavy and one light chains

- 299. Bence-Jones proteins possess all the following properties except**
- (A) They are dimers of light chains
  - (B) Their amino acids sequences are identical
  - (C) Their N-terminal halves have variable amino acid sequences
  - (D) Their C-terminal halves have constant amino acid sequences
- 300. A Zwitterion is**
- (A) Positive ion            (B) Negative ion
  - (C) Both (A) and (C)    (D) None of these
- 301. After accounting for SDA, the net gain of energy from 25 gm of proteins is about**
- (A) 70 kcal                    (B) 100 kcal
  - (C) 130 kcal                 (D) 200 kcal
- 302. After accounting for SDA, the net gain of energy from 25 gm of carbohydrates is about**
- (A) 70 kcal                    (B) 95 kcal
  - (C) 100 kcal                 (D) 105 kcal
- 303. After accounting for SDA, the net gain of energy from 100 gm of fat is about**
- (A) 600 kcal                 (B) 780 kcal
  - (C) 900 kcal                 (D) 1020 kcal
- 304. If proteins, carbohydrates and fats are consumed together:**
- (A) The total SDA is the sum of individual SDAs of proteins, carbohydrates and fats
  - (B) The total SDA is more than the sum of individual SDAs of proteins, carbohydrates and fats
  - (C) Carbohydrates and fats lower the SDA of proteins
  - (D) Proteins raise the SDA of carbohydrates and fats
- 305. After calculating the energy requirement of a person:**
- (A) 10% kcal are subtracted on account of SDA
  - (B) 10% kcal are added on account of SDA
  - (C) 20% kcal are subtracted on account of SDA
  - (D) 20% kcal are subtracted on account of SDA
- 306. The recommended energy intake for an adult sedentary Indian man is**
- (A) 1,900 kcal/day    (B) 2,400 kcal/day
  - (C) 2,700 kcal/day    (D) 3,000 kcal/day
- 307. The recommended energy intake for an adult sedentary Indian woman is**
- (A) 1,900 kcal/day    (B) 2,200 kcal/day
  - (C) 2,400 kcal/day    (D) 2,700 kcal/day
- 308. During pregnancy, the following should be added to the calculated energy requirement:**
- (A) 300 kcal/day        (B) 500 kcal/day
  - (C) 700 kcal/day        (D) 900 kcal/day
- 309. During first six months of lactation, the following increment in energy intake is recommended:**
- (A) 200 kcal/day        (B) 300 kcal/day
  - (C) 550 kcal/day        (D) 1,000 kcal/day
- 310. The proximate principles of diet are**
- (A) Vitamins and minerals
  - (B) Proteins
  - (C) Carbohydrates and fats
  - (D) Carbohydrates, fats and proteins
- 311. The limiting amino acid in wheat is**
- (A) Leucine                 (B) Lysine
  - (C) Cysteine                (D) Methionine
- 312. The limiting amino acid in pulses is**
- (A) Leucine                 (B) Lysine
  - (C) Tryptophan             (D) Methionine
- 313. Maize is poor in**
- (A) Lysine
  - (B) Methionine
  - (C) Tryptophan
  - (D) Lysine and tryptophan
- 314. The percentage of ingested protein/nitrogen absorbed into blood stream is known as**
- (A) Net protein utilisation
  - (B) Protein efficiency ratio
  - (C) Digestibility coefficient
  - (D) Biological value of protein

**315. Biological value of a protein is**

- (A) The percentage of ingested protein/nitrogen absorbed into circulation
- (B) The percentage of ingested protein/nitrogen in the body
- (C) The percentage of ingested protein utilised for protein synthesis in the body
- (D) The gain in body weight (gm) per gm of protein ingested

**316. Net protein utilisation depends upon**

- (A) Protein efficiency ratio
- (B) Digestibility coefficient
- (C) Digestibility coefficient and protein efficiency ratio
- (D) Digestibility coefficient and biological value

**317. The gain in body weight (gm) per gm of protein ingested is known as**

- (A) Net protein utilisation
- (B) Protein efficiency ratio
- (C) Digestibility coefficient
- (D) Biological value of protein

**318. The following is considered as reference standard for comparing the nutritional quality of proteins:**

- (A) Milk proteins      (B) Egg proteins
- (C) Meat proteins      (D) Fish proteins

**319. Biological value of egg proteins is about**

- (A) 70 %      (B) 80 %
- (C) 86 %      (D) 94 %

**320. The following has the highest protein efficiency ratio:**

- (A) Milk proteins      (B) Egg proteins
- (C) Meat proteins      (D) Fish proteins

**321. The following has the lowest protein efficiency ratio:**

- (A) Maize proteins      (B) Wheat proteins
- (C) Milk proteins      (D) Rice proteins

**322. Protein content of egg is about**

- (A) 10%      (B) 13%
- (C) 16%      (D) 20%

**323. Protein content of meat is about**

- (A) 10%      (B) 13%
- (C) 16%      (D) 20%

**324. Protein content of rice is about**

- (A) 7%      (B) 12%
- (C) 15%      (D) 20%

**325. The calorific value of wheat is about**

- (A) 2.5 kcal/gm      (B) 3.5 kcal/gm
- (C) 4.5 kcal/gm      (D) 5.5 kcal/gm

**326. For vegetarians, pulses are an important source of**

- (A) Carbohydrates      (B) Proteins
- (C) Fat      (D) Iron

**327. The amino acids present in pulses can supplement the limiting amino acids of**

- (A) Cereals      (B) Milk
- (C) Fish      (D) Nuts and beans

**328. Milk is a good source of**

- (A) Proteins, calcium and iron
- (B) Proteins, calcium and ascorbic acid
- (C) Proteins, lactose and retinol
- (D) Proteins, lactose and essential fatty acids

**329. Milk is a good source of all of the following except**

- (A) Essential amino acids
- (B) Vitamin C
- (C) Galactose
- (D) Calcium and phosphorous

**330. Milk is poor in**

- (A) Cholesterol      (B) Retinol
- (C) Calcium      (D) Iron

**331. Egg is rich in all of the following except**

- (A) Cholesterol      (B) Saturated fatty acids
- (C) Ascorbic acid      (D) Calcium

**332. A phosphoprotein present in egg is**

- (A) Casein      (B) Albumin
- (C) Ovoglobulin      (D) Ovovitellin

- 333. Consumption of raw eggs can cause deficiency of**  
(A) Calcium (B) Lipoic acid  
(C) Biotin (D) Vitamin A
- 334. Egg is poor in**  
(A) Essential amino acids  
(B) Carbohydrates  
(C) Avidin  
(D) Biotin
- 335. Cholesterol is present in all the following except**  
(A) Milk (B) Fish  
(C) Egg white (D) Egg yolk
- 336. Meat is rich in all of the following except**  
(A) Iron (B) Fluorine  
(C) Copper (D) Zinc
- 337. Kwashiorkor occurs when the diet is severely deficient in**  
(A) Iron (B) Calories  
(C) Proteins (D) Essential fatty acids
- 338. Clinical features of Kwashiorkor include all of the following except**  
(A) Mental retardation (B) Muscle wasting  
(C) Oedema (D) Anaemia
- 339. Kwashiorkor usually occurs in**  
(A) The post-weaning period  
(B) Pregnancy  
(C) Lactation  
(D) Old age
- 340. Marasmus occurs from deficient intake of**  
(A) Essential amino acids  
(B) Essential fatty acids  
(C) Calories  
(D) Zinc
- 341. Marasmus differs from Kwashiorkor in the which of these following respect**  
(A) Mental retardation occurs in kwashiorkor but not in marasmus  
(B) Growth is retarded in kwashiorkor but not in marasmus  
(C) Muscle wasting occurs in marasmus but not kwashiorkor  
(D) Subcutaneous fat disappears in marasmus but not in kwashiorkor
- 342. Energy reserves of an average well-fed adult man are about**  
(A) 50,000 kcal (B) 100,000 kcal  
(C) 200,000 kcal (D) 300,000 kcal
- 343. During starvation, the first reserve nutrient to be depleted is**  
(A) Glycogen (B) Proteins  
(C) Triglycerides (D) Cholesterol
- 344. Synthesis of the following enzymes is increased during starvation.**  
(A) Digestive enzymes  
(B) Gluconeogenic enzymes  
(C) Urea cycle enzymes  
(D) Glucokinase
- 345. In hypoparathyroidism**  
(A) Plasma calcium and inorganic phosphorous are low  
(B) Plasma calcium and inorganic phosphorous are high  
(C) Plasma calcium is low and inorganic phosphorous high  
(D) Plasma calcium is high and inorganic phosphorous low
- 346. The number of amino acid residues in calcitonin in**  
(A) 9 (B) 32  
(C) 51 (D) 84
- 347. Calcitonin is synthesised in**  
(A) Parathyroid glands  
(B) Thyroid gland  
(C) Pars intermedia of pituitary  
(D) Adrenal cortex
- 348. Plasma calcium is lowered by**  
(A) Parathormone (B) Calcitonin  
(C) Aldosterone (D) Deoxycorticosterone

**349.  $\alpha$  Cells of Islets of Langerhans secrete**

- (A) Insulin                      (B) Glucagon  
(C) Somatostatin              (D) Cholecystokinin

**350. A/G ratio is**

- (A) Strength of proteins  
(B) ratio of serum proteins  
(C) ratio of ceruloplasmin  
(D) None of these

**351. Insulin is made up of**

- (A) A single polypeptide chain having 51 amino acid residues  
(B) A single polypeptide chain having 84 amino acid residues  
(C) A-chain having 21 and B-chain having 30 amino acid residues  
(D) A-chain having 30 and B-chain having 21 amino acid residues

**352. The number of amino acid residues in pre-proinsulin is**

- (A) 51                              (B) 84  
(C) 109                            (D) 119

**353. Pre-proinsulin contains a signal sequence having**

- (A) 9 amino acid residues  
(B) 19 amino acid residues  
(C) 27 amino acid residues  
(D) 33 amino acid residues

**354. The number of intra-chain disulphide bonds in pro-insulin:**

- (A) One                            (B) Two  
(C) Three                        (D) Four

**355. Pentagastrin is a**

- (A) Naturally occurring form of gastrin  
(B) Inactive metabolite of gastrin  
(C) Active metabolite of gastrin  
(D) Synthetic form of gastrin

**356. Secretion of gastrin is evoked by**

- (A) Entry of food into stomach  
(B) Vagal stimulation  
(C) Lower aliphatic alcohols  
(D) All of these

**357. Gastrin stimulates**

- (A) Gastric motility      (B) Gastric secretion  
(C) Both (A) and (B)    (D) None of these

**358. Secretin is made up of**

- (A) 17 amino acids      (B) 27 amino acids  
(C) 37 amino acids      (D) 47 amino acids

**359. Secretin causes all of the following except**

- (A) Secretion of pancreatic juice  
(B) Secretion of bile  
(C) Inhibition of gastric secretion  
(D) Stimulation of intestinal motility

**360. All of the following statements about cholecystokinin pancreozymin are true except**

- (A) It is secreted by mucosa of small intestine  
(B) It stimulates secretion of pancreatic juice rich in enzymes  
(C) It stimulates contraction of gall bladder  
(D) It inhibits gastric motility

**361. All of the following statements about pancreatic somatostatin are true except**

- (A) It is secreted by  $\delta$  cells of islets of Langerhans  
(B) It stimulates the secretion of gastrin  
(C) It inhibits the secretion of secretin  
(D) It inhibits the secretion of cholecystokinin-pancreozymin

**362. Histidine is converted into histamine by**

- (A) Carboxylation      (B) Decarboxylation  
(C) Methylation        (D) Hydroxylation

**363. Histamine is synthesised in**

- (A) Brain                        (B) Mast cells  
(C) Basophils                (D) All of these

**364. Histamine causes all the following except**

- (A) Stimulation of gastric secretion  
(B) Vasoconstriction  
(C) Pruritus  
(D) Increase in capillary permeability

**365.  $H_2$ -receptors are blocked by**

- (A) Diphenhydramine    (B) Mepayramine  
(C) Pyrilamine            (D) Cimetidine

- 366. Serotonin is synthesised from**  
 (A) Serine (B) Phenylalanine  
 (C) Tyrosine (D) Tryptophan
- 367. All the following statements about serotonin are true except**  
 (A) It causes vasodilatation  
 (B) It causes bronchoconstriction  
 (C) It is metabolized by monoamine oxidase  
 (D) Its metabolite is 5-hydroxyindole acetic acid
- 368. All the following statements about angiotensin are true except**  
 (A) Its precursor is an  $\alpha_2$ -globulin  
 (B) Its active form is an octapeptide  
 (C) It is a vasodilator  
 (D) It increases the secretion of aldosterone
- 369. Methyl dopa decreases blood pressure by**  
 (A) Inhibiting the synthesis of catecholamines  
 (B) Antagonising the action of aldosterone  
 (C) Stimulating the release of renin  
 (D) Inhibiting the breakdown of angiotensin
- 370. Binding of gamma-aminobutyric acid to its receptors in brain increases the permeability of cell membrane to**  
 (A)  $\text{Cl}^-$  (B)  $\text{Na}^+$   
 (C)  $\text{K}^+$  (D)  $\text{Ca}^{++}$
- 371. Binding of acetylcholine to its receptors increases the permeability of cell membrane to**  
 (A)  $\text{Ca}^{++}$  (B)  $\text{Na}^+$   
 (C)  $\text{K}^+$  (D)  $\text{Na}^+$  and  $\text{K}^+$
- 372. All of the following are glycoproteins except**  
 (A) Collagen (B) Albumin  
 (C) Transferrin (D) IgM
- 373. Sialic acids are present in**  
 (A) Proteoglycans (B) Glycoproteins  
 (C) Both (A) and (B) (D) None of these
- 374. Hyaluronidase hydrolyses**  
 (A) Hyaluronic acid  
 (B) Chondroitin sulphate  
 (C) Heparin  
 (D) Hyaluronic acid and chondroitin sulphate
- 375. The most abundant protein in bones is**  
 (A) Collagen type I  
 (B) Collagen type II  
 (C) Collagen type III  
 (D) Non-collagen proteins
- 376. The most abundant collagen in cartilages is**  
 (A) Type I (B) Type II  
 (C) Type III (D) Type IV
- 377. Collagen and elastin have the following similarity:**  
 (A) Both are triple helices  
 (B) Both have hydroxyproline residues  
 (C) Both have hydrolysine residues  
 (D) Both are glycoproteins
- 378. Abnormal collagen structure is seen in all of the following except**  
 (A) I-cell disease  
 (B) Osteogenesis imperfecta  
 (C) Menke's disease  
 (D) Ehlers-Danlos syndrome
- 379. I-cell disease results from absence of the following from lysosomal enzymes:**  
 (A) Signal sequence  
 (B) Mannose-6-phosphate  
 (C) Sialic acid  
 (D) A serine residue
- 380. In I-cell disease, lysosomal enzymes**  
 (A) Are not synthesised  
 (B) Are inactive  
 (C) Lack signal sequence  
 (D) Cannot reach lysosomes
- 381. Renal glycosuria occurs due to**  
 (A) Increased filtration of glucose in glomeruli  
 (B) Increased secretion of glucose by renal tubular cells  
 (C) Decreased reabsorption of glucose by renal tubular cells  
 (D) Increased conversion of glycogen into glucose in tubular cells
- 382. Haematuria can occur in**  
 (A) Haemolytic anaemia

- (B) Mismatched blood transfusion  
 (C) Yellow fever  
 (D) Stone in urinary tract
- 383. Haematuria can occur in all of the following except**  
 (A) Acute glomerulonephritis  
 (B) Cancer of urinary tract  
 (C) Stone in urinary tract  
 (D) Mismatched blood transfusion
- 384. Chyluria can be detected by addition of the following to the urine:**  
 (A) Sulphosalicylic acid (B) Nitric acid  
 (C) Acetic anhydride (D) Chloroform
- 385. Normal range of serum urea is**  
 (A) 0.6–1.5 mg/dl (B) 9–11 mg/dl  
 (C) 20–45 mg/dl (D) 60–100 mg/dl
- 386. Normal range of serum creatinine is**  
 (A) 0.6–1.5 mg/dl (B) 9–11 mg/dl  
 (C) 20–45 mg/dl (D) 60–100 mg/dl
- 387. Standard urea clearance is**  
 (A) 54 ml/min (B) 75 ml/min  
 (C) 110 ml/min (D) 130 ml/min
- 388. Maximum urea clearance is**  
 (A) 54 ml/min (B) 75 ml/min  
 (C) 110 ml/min (D) 130 ml/min
- 389. Average creatinine clearance in an adult man is about**  
 (A) 54 ml/min (B) 75 ml/min  
 (C) 110 ml/min (D) 130 ml/min
- 390. Inulin clearance in an average adult man is about**  
 (A) 54 ml/min (B) 75 ml/min  
 (C) 110 ml/min (D) 130 ml/min
- Q391. Among the following, a test of tubular function is**  
 (A) Creatinine clearance  
 (B) Inulin clearance  
 (C) PAH clearance  
 (D) PSP excretion test
- 392. A simple way to assess tubular function is to withhold food and water for 12 hours and, then, measure**  
 (A) Serum urea  
 (B) Serum creatinine  
 (C) Urine output in one hour  
 (D) Specific gravity of urine
- 393. Among the following, the most sensitive indicator of glomerular function is**  
 (A) Serum urea  
 (B) Serum creatinine  
 (C) Urea clearance  
 (D) Creatinine clearance
- 394. All the following statements about inulin are correct except**  
 (A) It is completely non-toxic  
 (B) It is completely filtered by glomeruli  
 (C) It is not reabsorbed by tubular cells  
 (D) It is secreted by tubular cells
- 395. Non-protein nitrogenous substances in blood include all of the following except**  
 (A) Urea (B) Uric acid  
 (C) Creatinine (D) Inositol
- 396. Non-protein nitrogenous substances in blood are raised in**  
 (A) Starvation  
 (B) Liver damage  
 (C) Renal failure  
 (D) All of these
- 397. Creatinine clearance is decreased in**  
 (A) Acute tubular necrosis  
 (B) Acute glomerulonephritis  
 (C) Hypertension  
 (D) Myopathies
- 398. Serum amylase is increased in**  
 (A) Acute parotitis (B) Acute pancreatitis  
 (C) Pancreatic cancer (D) All of these
- 399. Maximum rise in serum amylase occurs in**  
 (A) Acute parotitis  
 (B) Acute pancreatitis  
 (C) Chronic pancreatitis  
 (D) Pancreatic cancer

- 400. Serum lipase is increased in**  
 (A) Acute parotitis (B) Acute pancreatitis  
 (C) Infective hepatitis (D) Biliary obstruction
- 401. Which one of the following metabolites is not directly produced in the hexose monophosphate pathway?**  
 (A) Fructose-6-phosphate  
 (B) Dihydroxy acetone phosphate  
 (C) CO<sub>2</sub>  
 (D) Erythrose-4-phosphate
- 402. Which one of the following statements concerning glucose-6-phosphate dehydrogenase deficiency is correct?**  
 (A) Young R.B.Cs, particularly reticulocytes, contain the highest enzyme activity cells show less enzyme activity  
 (B) Glucose-6-P Dehydroglucose deficiency leads to disfunction of many tissues  
 (C) G-6-p Dehydroglucose deficiency is due to a single deletion of a large sequence of DNA in the G-6-PD gene  
 (D) G-6-PD deficiency is precipitated by ingestion of drugs such as aspirin
- 403. The phenomenon of inhibition of glycolysis by O<sub>2</sub> is termed as**  
 (A) Red drop (B) Pasteur effect  
 (C) Michaelis effect (D) Fischer's effect
- 404. Serotonin is derived in the body from the following amino acid:**  
 (A) Phenylalanine (B) Histidine  
 (C) Tryptophan (D) Serine
- 405. Which amino acid is a lipotropic factor?**  
 (A) Lysine (B) Leucine  
 (C) Tryptophan (D) Methionine
- 406. Which among the following is a nutritionally essential amino acid for man ?**  
 (A) Alanine (B) Glycine  
 (C) Tyrosine (D) Tryptophan
- 407. The essential amino acids**  
 (A) Must be supplied in the diet because the organism has lost the capacity to aminate the corresponding ketoacids  
 (B) Must be supplied in the diet because the human has an impaired ability to synthesize the carbon chain of the corresponding ketoacids  
 (C) Are identical in all species studied  
 (D) Are defined as those amino acids which cannot be synthesized by the organism at a rate adequate to meet metabolic requirements
- 408. Which among the following is an essential amino acid?**  
 (A) Cysteine (B) Leucine  
 (C) Tyrosine (D) Aspartic acid
- 409. Which among the following is a basic amino acid?**  
 (A) Asparagine (B) Arginine  
 (C) Proline (D) Alanine
- 410. This amino acid cannot have optical isomers:**  
 (A) Alanine (B) Histidine  
 (C) Threonine (D) Glycine
- 411. The amino acid which contains a guanidine group is**  
 (A) Histidine (B) Arginine  
 (C) Citrulline (D) Ornithine
- 412. GABA(gama amino butyric acid) is**  
 (A) Post-synaptic excitatory transmitter  
 (B) Post-synaptic inhibitor transmitter  
 (C) activator of glia-cell function  
 (D) inhibitor of glia-cell function
- 413. Sulphur-containing amino acid is**  
 (A) Glutathione (B) Chondroitin sulphate  
 (C) Homocysteine (D) Tryptophan
- 414. The useful reagent for detection of amino acids is**  
 (A) Molisch reagent  
 (B) Dichlorophenol Indophenol  
 (C) Ninhydrin  
 (D) Biuret
- 415. The amino acid which contains an indole group is**  
 (A) Histidine (B) Arginine  
 (C) Glycine (D) Tryptophan

**416. Sakaguchi reaction is answered by**

- (A) Lysine
- (B) Ornithine
- (C) Arginine
- (D) Arginino succinic acid

**417. The pH of an amino acid depends**

- (A) Optical rotation
- (B) Dissociation constant
- (C) Diffusion coefficient
- (D) Chain length

**418. When amino acids are treated with neutral formaldehyde, the pH of the mixture**

- (A) Is not altered
- (B) Increases
- (C) Decreases
- (D) First increases then decreases

**419. Which among the following has an imidazole group?**

- (A) Histidine
- (B) Tryptophan
- (C) Proline
- (D) Hydroxy proline

**420. The amino acid exist as Zwitter ions when they are in**

- (A) solid state
- (B) acidic solution
- (C) alkaline solution
- (D) neutral solution

**421. Plasma proteins are isolated by**

- (A) Salting out
- (B) Electrophoresis
- (C) Flourimetry
- (D) Both (A) and (B)

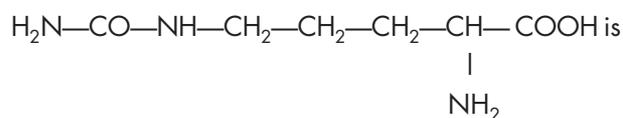
**422. After digestion amino acids**

- (A) Are absorbed into portal circulation
- (B) Are absorbed into lymph
- (C) Are excreted to the extent of 50%
- (D) Converted into glucose in the intestine

**423. Cysteine has the formula:**

- (A)  $\text{CH}_3\text{SH}$
- (B)  $\text{H}_2\text{N}-\text{CH}_2-\text{COOH}$
- (C)  $\text{HS}-\text{CH}_2-\text{CH}(\text{NH}_2)-\text{COOH}$
- (D)  $\text{S}-\text{CH}_2-\text{CH}(\text{NH}_2)-\text{COOH}$

**424. The compound having the formula**



- (A) Lysine
- (B) Glutamine
- (C) Serine
- (D) Citrulline

**425. An amino acid which contains a disulphide bond is**

- (A) Lysine
- (B) Methionine
- (C) Homocysteine
- (D) Cystine

**426. One of the following has a phenolic group:**

- (A) Histidine
- (B) Hydroxy lysine
- (C) Seratonine
- (D) Hydroxy proline

**427. An amino acid not containing the usual—COOH group is**

- (A) Alanine
- (B) Tryptophan
- (C) Methionine
- (D) Taurine

**428. Branched chain amino acids are**

- (A) Cysteine and cystine
- (B) Tyrosine and Tryptophan
- (C) Glycine and Serine
- (D) Valine, Leucine and Isoleucine

**429. A Zwitter ion is one which has in aqueous solution:**

- (A) One positive charge and one negative charge
- (B) Two positive charges and one negative charge
- (C) Two negative charges and one positive charge
- (D) No electrical charges at all

**430. The amino acid which gives yellow colour with Ninhydrin in paper chromatography is**

- (A) Tyrosine
- (B) Proline
- (C) Tryptophan
- (D) Alanine

**431. Hydroxylation of Proline and Lysine in a protein is effected by**

- (A) Vitamin B<sub>1</sub>
- (B) Vitamin B<sub>2</sub>
- (C) Vitamin B<sub>6</sub>
- (D) Vitamin C

**432. Millon's test is for identification of**

- (A) Tyrosine
- (B) Tryptophan
- (C) Proline
- (D) Arginine

**433. Hopkins-Cole test is for identification of**

- (A) Tyrosine
- (B) Tryptophan
- (C) Arginine
- (D) Cysteine

- 434. Collagen is very rich in**  
 (A) Glycine (B) Serine  
 (C) Aspartic acid (D) Glutamic acid
- 435. All amino acids are optically active except**  
 (A) Glycine (B) Serine  
 (C) Threonine (D) Tryptophan
- 436. Out of 200 different amino acids form in nature the number of amino acids present in protein:**  
 (A) 20 (B) 25  
 (C) 40 (D) 35
- 437. Enzyme catalyzed hydrolysis of proteins produces amino acids of the form:**  
 (A) D (B) L  
 (C) DL (D) All of these
- 438. The ionizable groups of amino acids are at least.**  
 (A) 1 (B) 2  
 (C) 3 (D) 4
- 439. The neutral amino acid is**  
 (A) Lysine (B) Proline  
 (C) Leucine (D) Histidine
- 440. The amino acid containing hydroxyl group:**  
 (A) Alanine (B) Isoleucine  
 (C) Arginine (D) Threonine
- 441. The sulphur containing amino acid:**  
 (A) Homoserine (B) Serine  
 (C) Methionine (D) Valine
- 442. The basic amino acid:**  
 (A) Glycine (B) Leucine  
 (C) Histidine (D) Proline
- 443. The amino acid which synthesizes many hormones:**  
 (A) Valine (B) Phenyl alanine  
 (C) Alanine (D) Histidine
- 444. Amino acids are insoluble in**  
 (A) Acetic acid (B) Chloroform  
 (C) Ethanol (D) Benzene
- 445. The major end product of protein nitrogen metabolism in man is**  
 (A) Glycine (B) Uric acid  
 (C) Urea (D)  $\text{NH}_3$
- 446. An amino acid not involved in urea cycle is**  
 (A) Arginine (B) Histidine  
 (C) Ornithine (D) Citrulline
- 447.  $\text{NH}_3$  is detoxified in brain chiefly as**  
 (A) Urea (B) Uric acid  
 (C) Creatinine (D) Glutamine
- 448. In humans,  $\text{NH}_3$  is detoxified in liver as**  
 (A) Creatinine (B) Uric acid  
 (C) Urea (D) Uronic acid
- 449. The body protein after eighteen years**  
 (A) Remains unchanged  
 (B) Is decomposed only slightly at intervals of one month  
 (C) Is in a constant state of flux  
 (D) Is used only for energy requirement
- 450. The only known physiological methylating agents in the animal organism are**  
 (A) Choline and betaine  
 (B) Choline and  $\delta$ -adenosyl methionine  
 (C) Betaine and  $\delta$ -adenosyl methionine  
 (D) Dimethyl glycine and betaine
- 451. In the synthesis of 1 molecule of urea in the Kreb's Hanseleit cycle, the number of ATPs required is**  
 (A) 1 (B) 2  
 (C) 3 (D) 4
- 452. For biosynthesis of proteins**  
 (A) Amino acids only are required  
 (B) Amino acids and nucleic acids only are required  
 (C) Amino acid, nucleic acids and ATP only are required  
 (D) Amino acids, nucleic acids, ATP, GTP, enzymes and activators are required

- 453. Transmethylation of guanido acetic acid gives**  
 (A) Creatine phosphate  
 (B) Creatinine  
 (C) Choline  
 (D) n-methyl nicotinamide
- 454. The 2 energy rich compounds needed for protein biosynthesis are**  
 (A) ATP and GTP (B) ATP and UTP  
 (C) ATP and CTP (D) ATP and TTP
- 455. The following ketoacid is involved in fixing dietary  $\text{NH}_3$  into amino acid:**  
 (A) Pyruvate (B) Oxalo acetate  
 (C) Oxalo succinate (D)  $\alpha$ -keto glutarate
- 456. The metabolite which sustains urea cycle is**  
 (A) Ornithine  
 (B) Citrulline  
 (C) Carbamoyl phosphate  
 (D) n-acetyl glutamate
- 457. Tetra hydroglolate can be freed from  $\text{N}^5$  methyl tetrahydrofolate only by**  
 (A) Nor epinephrine (B) Ethanol amine  
 (C) Nicotinamide (D) Vitamin  $\text{B}_{12}$
- 458. Neogenesis of methyl group is**  
 (A) The availability of methyl group form  $\delta$  adenosyl methionine  
 (B) The availability of methyl group from betaine  
 (C) Interaction between  $\text{N}^5 \text{N}^{10}$  methylene tetra hydrofolate with a  $\text{NAD}^+$  dependent reductase  
 (D) Availability of methyl group from methyl  $\text{B}_{12}$
- 459. More creatinine is excreted by**  
 (A) Adult males (B) Adult females  
 (C) Children (D) Pregnant women
- 460. A growing peptide in a ribosome can not be shifted to the adjacent ribosome because**  
 (A) It is firmly attached  
 (B) It will get the amino acid cleaved  
 (C) The gap between the ribosomes is too big for a shift  
 (D) The adjacent ribosomes have different composition
- 461. The first amino acid incorporated in a polypeptide in a ribosome of a human is**  
 (A) N formyl methionine (B) Methionine  
 (C) Phenyl alanine (D) Hydroxy lysine
- 462. The first amino acid incorporated in a polypeptide in a ribosome of a bacterium is**  
 (A) N formyl methionine (B) Methionine  
 (C) Alanine (D) Glycine
- 463. The integrator between the TCA cycle and urea cycle is**  
 (A) Fumarate (B) Malate  
 (C) Pyruvate (D) Citrate
- 464. Bence jones proteinuria is characterized by**  
 (A) Non-heat coagulability  
 (B) Heat coagulability at  $100^\circ\text{C}$   
 (C) Heat coagulability at 45 to  $60^\circ\text{C}$   
 (D) Precipitation at  $25^\circ\text{C}$
- 465. Bence Jones proteins may be excreted in urine of patients suffering from**  
 (A) Tuberculosis (B) Diabetes mellitus  
 (C) Multiple myeloma (D) Hyperthyroidism
- 466. Xanthuric acid is an abnormal metabolite of**  
 (A) Xanthine (B) Uric acid  
 (C) Tyrosine (D) Tryptophan
- 467. Two nitrogen atoms of Urea in the urea cycle come from**  
 (A)  $\text{NH}_3$   
 (B) One from  $\text{NH}_3$  and one from aspartate  
 (C) One from  $\text{NH}_3$  and one from glutamate  
 (D) One from  $\text{NH}_3$  and one from alanine
- 468. Pyruvic acid can be obtained by transamination of alanine with**  
 (A)  $\alpha$ - keto glutaric acid  
 (B) Acetoacetic acid  
 (C)  $\beta$ -OH butyric acid  
 (D) Phosphoenol Pyruvic acid
- 469. In the synthesis of 1 molecule of urea in the Kreb's Henseleit cycle the number of AMPs formed is**  
 (A) 1 (B) 2  
 (C) 3 (D) 4

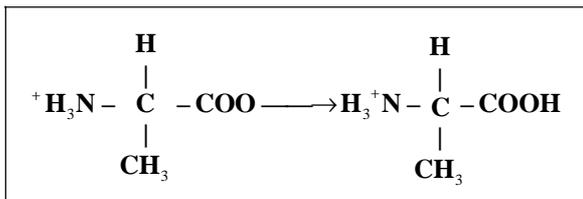
- 470. Formation of melanin from tyrosine requires the action of**
- (A) Dopa decarboxylation  
(B) Diamine oxidase  
(C) Peroxidase  
(D) Tyrosinase
- 471. In one of the following the quality of the protein synthesized is affected:**
- (A) Diabetes mellitus (B) Gont  
(C) Multiple myeloma (D) Primaquine sensitivity
- 472. Citrulline is an intermediate of**
- (A) TCA cycle (B) Urea cycle  
(C) Pentose cycle (D) Calvin cycle
- 473. The semialdehydes are formed under the action of enzymes characterised as**
- (A) Aldolases  
(B) Peptidyl lysyl oxidases  
(C) Collagenases  
(D) Elastases
- 474. Which of the following statement about the peptide bond is true?**
- (A) It is a carbon-carbon bond  
(B) It has cis hydrogen and oxygen groups  
(C) It is planar  
(D) It has rotational freedom
- 475. Isoenzymes for a given reaction**
- (A) Have different specificities  
(B) Have identical affinities for the same substrate  
(C) Exhibit different electrophoretic motilities  
(D) Contain similar ratios of different polypeptide chains
- 476. The highest concentration of cystine can be found in**
- (A) Melanin (B) Chondroitin sulphate  
(C) Myosin (D) Keratin
- 477. One round of Edman degradation of the peptide:  $H_2N-Gly-Arg-Lys-Phe-Asp-COOH$  would result in which of the following structures or their phenyl isothiocyanate derivatives?**
- (A)  $H_2N-Gly-Arg-COOH + H_2N-Lys-Phe-Asp-COOH$   
(B)  $H_2N-Gly-Arg-Lys-Phe-COOH + Asp$   
(C)  $H_2N-Arg-Lys-Phe-Asp-COOH + Gly$   
(D)  $H_2N-Gly-Arg-Lys-COOH + H_2N-Phe-Asp-COOH$
- 478. Which of the following techniques is used to separate proteins based upon differences in their mass?**
- (A) Isoelectric focusing  
(B) Dialysis  
(C) SDS-gel Electrophoresis  
(D) Western blotting
- 479. The greatest buffering capacity at physiologic pH would be provided by a protein rich in which of the following amino acids ?**
- (A) Lysine (B) Histidine  
(C) Aspartic acid (D) Valine
- 480. Which one of the amino acids could serve as the best buffer at pH 7?**
- (A) Glutamic acid (B) Arginine  
(C) Valine (D) Histidine
- 481. Which one of the following statements concerning glutamine is correct?**
- (A) Contains three tetratable groups  
(B) Is classified as an acidic amino acid  
(C) Contains an amide group  
(D) Migrates to the cathode during electrophoresis at pH 7.0
- 482. One of the given example is an amino acid:**
- (A) Oh-Lysine (B) Protein  
(C) Leucine (D) Serine
- 483. The lone pair of electrons at one of the ring nitrogens in the given amino acid makes a potential ligand, which is important in binding the iron atoms in hemoglobin:**
- (A) Tryptophan (B) Threonine  
(C) Histidine (D) Serine
- 484. The amino acid which is not optically active is**
- (A) Alanine (B) Glycine  
(C) Glutamine (D) Lysine

- 485. Optically active compounds are capable of**  
(A) Different reactions  
(B) Rotating plane of polarized light  
(C) Showing same chemical properties  
(D) None of these
- 486. The reference compound for absolute configuration of optically active compound is**  
(A) Alanine (B) Lactic acid  
(C) Glyceraldehyde (D) Dihydroxy acetone
- 487. All the standard amino acids except the following have one chiral 'c' atom:**  
(A) Threonine, Isoleucine  
(B) Isoleucine, Alanine  
(C) Threonine, Alanine  
(D) Alanine, Glutamine
- 488. The role of complement proteins:**  
(A) Defense  
(B) Helps immunity of the body  
(C) Not predicatable  
(D) None of these
- 489. Optical isomers that are mirror images and non superimposable are called**  
(A) Diastereomers (B) Euantiomers  
(C) dl isomers (D) Stereomers
- 490. Living cells have the unique ability to synthesize only \_\_\_\_\_ the form of optical isomer due to \_\_\_\_\_.**  
(A) 'd' form, stereospecific enzymes  
(B) 'l' form stereospecific enzymes  
(C) 'd' form, DNA  
(D) 'L' form, DNA
- 491. Isoelectric pH of an amino acid is that pH at which it has a**  
(A) Positive charge (B) Negative charge  
(C) No net charge (D) All of these
- 492. Albuminoids are similar to**  
(A) Albumin (B) Globulin  
(C) Both A and B (D) None of these
- 493. Abnormal chain of amino acids in sickle cells anaemia is**  
(A) Alpha chain (B) Beta chain  
(C) Gama chain (D) Delta chain
- 494. In prehepatic jaundice, protein flocculation test is**  
(A) Normal/weekly positive  
(B) Usually positive  
(C) Negative  
(D) None of these
- 495. Side chains of all amino acids contain aromatic rings except**  
(A) Pheynl alanine (B) Alanine  
(C) Tyrosine (D) Tryptophan
- 496. In Nitroprusside test, amino acid cystein produces**  
(A) Blue colour complex  
(B) Red colour  
(C) Yellow colour  
(D) Purple colour
- 497. Bonds that are formed between two cysteine residues is**  
(A) Disulphide (B) Peptide  
(C) Electrostatic (D) Hydrophobic
- 498. The acid amide of Aspartic acid is**  
(A) Glutamine (B) Arginine  
(C) Asparagine (D) Ornithine
- 499. It is the only amino acid having an ionizing 'R' group with a pK' near 7 and is important in the active site of some enzymes:**  
(A) Arginine (B) Cystein  
(C) Cystine (D) Histidine
- 500. Hemoglobin has a high content of this amino acid:**  
(A) Proline (B) Leucine  
(C) Arginine (D) Histicline
- 501. A hexa peptide with 5 aspartic acid would have a net charge at pH 7:**  
(A) Neutral (B) Positive  
(C) Negative (D) Not predictable
- 502. In the genetic disorder of cystinuria, the patient excretes large quantities of cystine in their urine and its low solubility causes crystalline cystine to precipitate as stones in kidneys. The remedy involves**

**ingesting Na HCO<sub>3</sub>. Reaction of this treatment is**

- (A) NaHCO<sub>2</sub> combines with cystine
- (B) NaHCO<sub>3</sub> raises the pH above the isoelectric point of cystine
- (C) NaHCO<sub>3</sub> prevents stone formation by hydrolysis of cystine to cysteine
- (D) None of these

**503. In the following reaction, Alanine acts as a**

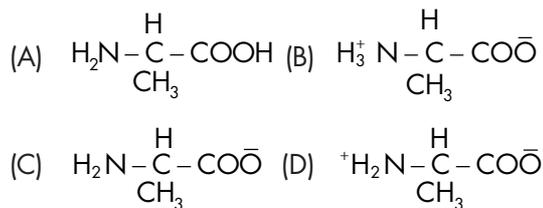


- (A) Acid
- (B) Base
- (C) Zwitter ion
- (D) None of these

**504. Amino acids excepting histidine are not good buffering agents in cell because**

- (A) They exist as zwitter ions
- (B) Their pk and not in the physiological pH of a cell
- (C) Only Histidine has pk of its R group at 6.0 unlike the others which have at a different pH
- (D) None of these

**505. At neutral pH Alanine has the following structure:**



**506. The amino acids in which the R groups have a net positive charge at pH 7.0 are**

- (A) Lysine, Arginine, Histidine
- (B) Lysine, Asparagine
- (C) Histidine, Asparagine
- (D) Glutamine, Arginine

**507. Apolipoproteins are**

- (A) AI
- (B) AII
- (C) CI
- (D) All of these

**508. The amino acid which has a pK near 4 and thus is negatively charged at pH 7 is**

- (A) Alanine
- (B) Glutamic acid
- (C) Glutamine
- (D) Asparagine

**509. The side chain of which of the following amino acid contain sulphur atom?**

- (A) Methionine
- (B) Threonine
- (C) Leucine
- (D) Tryptophan

**510. Which of the followings gives a positive test for Ninhydrin?**

- (A) Reducing sugars
- (B) Triglycerides
- (C) Alpha aminoacids
- (D) Esterified Fats

**511. In glutathione (a tripeptide) is present apart from Glutamic acid and cysteine:**

- (A) Serine
- (B) Glycine
- (C) Leucine
- (D) Phenyl alanine

**512. 2-Amino 3-OH propanoic acid is**

- (A) Glycine
- (B) Alanine
- (C) Valine
- (D) Serine

**513. All amino acids have one asymmetric carbon atom, except**

- (A) Arginine
- (B) Asparagine
- (C) Histidine
- (D) Glycine

**514. Number of amino acids present in the plant, animal and microbial proteins:**

- (A) 20
- (B) 80
- (C) 150
- (D) 200

**515. Immunoglobulins are characterized by their**

- (A) Heavy chains
- (B) Molecular weight
- (C) Light chains
- (D) Electrophoretic behaviour

**516. The bond in proteins that is not hydrolysed under usual conditions of denaturation:**

- (A) Hydrophobic bond
- (B) Hydrogen bond
- (C) Disulphide bond
- (D) Peptide bonds

**517. If the amino group and a carboxylic group of the amino acid are attached to same carbon atom, the amino acid is called**

- (A) Alpha
- (B) Beta
- (C) Gamma
- (D) Delta

- 518. Zymogen is**  
(A) An intracellular enzyme  
(B) Serum enzyme  
(C) A complete extracellular enzyme  
(D) An inactivated enzyme
- 519. SGOT level in a adult is**  
(A) 5–40 units/dl (B) 1–4 units/dl  
(C) 5–15 units/dl (D) 50–100 units/dl
- 520. Activity of ceruloplasmin shown in vitro:**  
(A) Reductase (B) Hydrolase  
(C) Ligase (D) Oxidase
- 521. Increased serum alanine during fasting is due to**  
(A) Breakdown of muscle proteins  
(B) Decreased utilization of non essential amino acids  
(C) Leakage of aminoacids to plasma  
(D) Impaired renal function
- 522. The following 4 amino acids are required for completion of urea cycle except**  
(A) Aspartic acid (B) Arginine  
(C) Ornithine (D) Glycine
- 523. Number of amino acids present in the dietary proteins:**  
(A) 22 (B) 23  
(C) 20 (D) 19
- 524. Urea synthesis takes place in**  
(A) Blood (B) Liver  
(C) Kidney (D) Heart
- 525. All followings are ketogenic aminoacids except**  
(A) Leucine (B) Isoleucine  
(C) Phenyl alanine (D) Glycine
- 526. The amino acid containing an indole ring:**  
(A) Tryptophan (B) Arginine  
(C) Threonine (D) Phenylalanine
- 527. Histidine is converted to histamine through the process of**  
(A) Transamination  
(B) Decarboxylation  
(C) Oxidative deamination  
(D) Urea cycle
- 528. Physiologically active configuration of amino acids:**  
(A) L  
(B) D  
(C) For some amino acids it is either of two  
(D) Neither L nor D
- 529. Cystine is synthesized from**  
(A) Cysteine (B) Methionine  
(C) Arginine (D) Leucine
- 530. The major constituent of the proteins of hair and keratin of skin:**  
(A) Arginine (B) Cysteine  
(C) Glycine (D) Arginine
- 531. NH<sub>3</sub> is removed from brain mainly by**  
(A) Creatinine formation  
(B) Uric acid production  
(C) Urea formation  
(D) Glutamine formation
- 532. Mechanism by which NH<sub>3</sub> is removed from the kidneys is**  
(A) Urea formation  
(B) Uric acid formation  
(C) Creatinine formation  
(D) None of these
- 533. Low density plasma proteins are rich in**  
(A) Chylomicrons (B) Cholesterol  
(C) Triglycerides (D) Phospholipids
- 534. Transcortins are**  
(A) Mucoproteins (B) Glycoproteins  
(C) Metalloproteins (D) Lipoproteins
- 535. Proteins that carries Iron into different tissues is**  
(A) Ceruloplasmin (B) Trans cortin  
(C) Mucoproteins (D) Glycoproteins
- 536. Naturally occurring amino acids have**  
(A) L-Configuration (B) D-Configuration  
(C) DL-Configuration (D) None of these
- 537. Abnormal chain of aminoacids in sickle cell anemia is**  
(A) β-chain (B) β-chain  
(C) γ-chain (D) r-chain

- 538. A dietary deficiency of tryptophan and nicotinate leads to**  
 (A) Beri Beri (B) Xerophthalmia  
 (C) Anemia (D) Pellegra
- 539. Which one of the following is an essential amino acid?**  
 (A) Arginine (B) Tyrosine  
 (C) Phenylalanine (D) Proline
- 540. One of the following amino acid is solely ketogenic:**  
 (A) Lysine (B) Alanine  
 (C) Valine (D) Glutamate
- 541. Along with CO<sub>2</sub>, NH<sub>3</sub> and ATP, the amino acid that is needed in urea cycle is**  
 (A) Alanine (B) Isoleucine  
 (C) Aspartate (D) Glycine
- 542. Isoelectric pH of an amino acid is that pH at which it has a**  
 (A) Positive charge (B) Negative charge  
 (C) No charge (D) None of these
- 543. Which of the following contributes nitrogen atoms to both purine and pyrimidine rings?**  
 (A) Aspartate  
 (B) Carbamoyl phosphate  
 (C) CO<sub>2</sub>  
 (D) Glutamine
- 544. Which amino acid is a lipotropic factor?**  
 (A) Lysine (B) Lecuine  
 (C) Tryptophan (D) Methionine
- 545. Which of the following protein is rich in cysteine?**  
 (A) Elastine (B) Collagen  
 (C) Fibrin (D) Keratin
- 546. Which amino acid is present at 6<sup>th</sup> position of β-chain of Hbs instead of glutamate in HbA?**  
 (A) Cysteine (B) Valine  
 (C) Aspartate (D) Glutamate
- 547. The amino acid which contains an indole group is**  
 (A) Histidine (B) Arginine  
 (C) Cystine (D) Tryptophan
- 548. From two amino acids peptide bond formation involves removal of one molecule of**  
 (A) Water (B) Ammonia  
 (C) Carbondioxide (D) Carboxylic acid
- 549. Polymers of more than 100 amino acids are termed**  
 (A) Proteins (B) Polypeptides  
 (C) Both (A) and (B) (D) None of these
- 550. The example of globulins:**  
 (A) Leucosin (B) Tuberin  
 (C) Oryzenin (D) Legunelin
- 551. The example of scleroproteins:**  
 (A) Glutamin (B) Giladin  
 (C) Salmine (D) Elastin
- 552. The example of phosphoprotein:**  
 (A) Mucin (B) Ovovitellin  
 (C) Ovomuroid (D) Tendomuroid
- 553. The example of metalloproteins:**  
 (A) Siderophilin (B) OREES muroid  
 (C) Elastin (D) All of these
- 554. The example of chromoprotein:**  
 (A) Salmine (B) Catalase  
 (C) Zein (D) Gliadin
- 555. Deamination is \_\_\_\_\_ of amino group.**  
 (A) Removal (B) Addition  
 (C) Supplementation (D) None of these
- 556. Proteins produce polypeptides from proteins by**  
 (A) Oxidizing (B) Reducing  
 (C) Hydrolyzing (D) None of these
- 557. Proteins react with biuret reagent which is suggestive of 2 or more**  
 (A) Hydrogen bonds (B) Peptide bonds  
 (C) Disulphide bonds (D) Hydrophobic bonds

- 558. The disulphide bond is not broken under the usual conditions of**  
 (A) Filtration (B) Reduction  
 (C) Oxidation (D) Denaturation
- 559. Insulin is oxidized to separate the protein molecule into its constituent polypeptide chains without affecting the other part of the molecule by the use of**  
 (A) Performic acid (B) Oxalic acid  
 (C) Citric acid (D) Malic acid
- 560. Each hydrogen bond is quite**  
 (A) Weak (B) Strong  
 (C) Both (A) and (B) (D) None of these
- 561. A coiled structure in which peptide bonds are folded in regular manner by**  
 (A) Globular proteins (B) Fibrous proteins  
 (C) Both (A) and (B) (D) None of these
- 562. In many proteins the hydrogen bonding produces a regular coiled arrangement called**  
 (A)  $\alpha$ -helix (B)  $\beta$ -helix  
 (C) Both (A) and (B) (D) None of these
- 563. Many globular proteins are stable in solution although they lack in**  
 (A) Hydrogen bonds (B) Salt bonds  
 (C) Non-polar bonds (D) Disulphide bonds
- 564. Each turn of  $\alpha$ -helix contains the number of amino acids**  
 (A) 2.8 (B) 3.2  
 (C) 3.4 (D) 3.6
- 565. The distance travelled per turn of  $\alpha$ -helix in nm is**  
 (A) 0.34 (B) 0.44  
 (C) 0.54 (D) 0.64
- 566.  $\alpha$ -helix is disrupted by certain amino acids like**  
 (A) Proline (B) Arginine  
 (C) Histidine (D) Lysine
- 567.  $\alpha$ -helix is stabilized by**  
 (A) Hydrogen bonds (B) Disulphide bonds  
 (C) Salt bonds (D) Non-polar bonds
- 568. Foetal haemoglobin contains**  
 (A) Two  $\alpha$  and two  $\gamma$  chains  
 (B) Two  $\beta$  and two  $\gamma$  chains  
 (C) Both (A) and (B)  
 (D) None of these
- 569. When haemoglobin takes up oxygen there is a change in the structure due to the moving closer together of**  
 (A)  $\beta$ -chains (B)  $\beta$ -chains  
 (C)  $\gamma$ -chains (D)  $\alpha$  and  $\gamma$  chains
- 570. The hydrogen bonds in the secondary and tertiary structure of proteins are directly attacked by**  
 (A) Salts (B) Alkalies  
 (C) Detergents (D) All of these
- 571. The hydrogen bonds between peptide linkages are interfered by**  
 (A) Guanidine (B) Uric acid  
 (C) Salicylic acid (D) Oxalic acid
- 572. The digestability of certain denatured proteins by proteolytic enzymes**  
 (A) Decreases (B) Increases  
 (C) Normal (D) None of these
- 573. The antigenic antibody functions of proteins by denaturation are frequently**  
 (A) Not changed (B) Changed  
 (C) Both (A) and (B) (D) None of these
- 574. In case of severe denaturation of protein, there is**  
 (A) Reversible denaturation  
 (B) Moderate reversible denaturation  
 (C) Irreversible denaturation  
 (D) None of these
- 575. When egg albumin is heated till it is coagulated, the secondary and tertiary structures of the proteins are completely lost resulting in a mixture of randomly arranged**  
 (A) Dipeptide chains (B) Tripeptide chains  
 (C) Polypeptide chains (D) All of these

- 576. In glycoproteins the carbohydrate is in the form of disaccharide units, the number of units are**  
 (A) 50–100 (B) 200–300  
 (C) 400–500 (D) 600–700
- 577. The milk protein in the stomach of the infants is digested by**  
 (A) Pepsin (B) Trypsin  
 (C) Chymotrypsin (D) Rennin
- 578. Achylia gastrica is said to be when absence of**  
 (A) Pepsin only (B) Both pepsin and HCl  
 (C) HCl only (D) All of these
- 579. The pH of gastric juice become low in**  
 (A) Hemolytic anemia (B) Pernicious anemia  
 (C) Both (A) and (B) (D) None of these
- 580. In small intestine trypsin hydrolyzes peptide linkages containing**  
 (A) Arginine (B) Histidine  
 (C) Serine (D) Aspartate
- 581. Chymotrypsin in the small intestine hydrolyzes peptide linkages containing**  
 (A) Alanine (B) Pheynl alanine  
 (C) Valine (D) Methionine
- 582. Carboxy peptidase B in the small intestine hydrolyzes peptides containing**  
 (A) Leucine (B) Isoleucine  
 (C) Arginine (D) Cysteine
- 583. The transport of amino acids regulated by active processes of different numbers:**  
 (A) 1 (B) 2  
 (C) 3 (D) 4
- 584. The third active process for amino acids transport involves**  
 (A) Acidic amino acids  
 (B) Basic amino acids  
 (C) Neutral amino acids  
 (D) Sulphur containing amino acids
- 585. The neutral amino acids for absorption need**  
 (A) TPP (B) B<sub>6</sub> – PO<sub>4</sub>  
 (C) NAD<sup>+</sup> (D) NADP<sup>+</sup>
- 586. If one amino acid is fed excess, the absorption of another is**  
 (A) Slightly accelerated  
 (B) Moderately accelerated  
 (C) Highly accelerated  
 (D) Retarded
- 587. Under normal conditions, food proteins are generally readily digested upto the present**  
 (A) 67 to 73 (B) 74 to 81  
 (C) 82 to 89 (D) 90 to 97
- 588. By overheating the nutritional value of cereal proteins is**  
 (A) Increased (B) Decreased  
 (C) Unchanged (D) None of these
- 589. More than half of the protein of the liver and intestinal mucosa are broken down and resynthesised in**  
 (A) 10 days (B) 12 days  
 (C) 15 days (D) 18 days
- 590. The half-life of antibody protein is about**  
 (A) 4 weeks (B) 3 weeks  
 (C) 2 weeks (D) 1 week
- 591. Protein anabolism is stimulated by**  
 (A) ACTH (B) Testosterone  
 (C) Glucagon (D) Epinephrine
- 592. The metabolism of protein is integrated with that of carbohydrate and fat through**  
 (A) Oxaloacetate (B) Citrate  
 (C) Isocitrate (D) Malate
- 593. The building up and breaking down of protoplasm are concerned with the metabolism of**  
 (A) Carbohydrate (B) Lipid  
 (C) Protein (D) Minerals
- 594. The amino acids abstracted from the liver are not utilized for repair or special synthesis but are broken down to**  
 (A) Keto acids (B) Sulphur dioxide  
 (C) Water (D) Ammonia

- 595. The unwanted amino acids abstracted from the tissues are either used up by the tissue or in the liver converted into**  
(A) Ammonia (B) Urea  
(C) Ammonium salts (D) Uric acid
- 596. Amino acids provide the nitrogen for the synthesis of**  
(A) The bases of the phospholipids  
(B) Uric acid  
(C) Glycolipids  
(D) Chondroitin sulphates
- 597. The metabolism of all proteins ingested over and above the essential requirements is called**  
(A) Exogenous metabolism  
(B) Endogenous metabolism  
(C) Both (A) and (B)  
(D) None of these
- 598. Sulphur containing amino acids after catabolism produces a substance which is excreted:**  
(A)  $\text{SO}_2$  (B)  $\text{HNO}_3$   
(C)  $\text{H}_2\text{SO}_4$  (D)  $\text{H}_3\text{PO}_4$
- 599. Ethereal sulphate is synthesized from the \_\_\_\_\_ amino acid.**  
(A) Neutral (B) Acidic  
(C) Basic (D) Sulphur containing
- 600. The amino acids required for creatine formation:**  
(A) Glycine (B) Arginine  
(C) Methionine (D) All of these
- 601. In human and other ureotelic organisms, the end product of amino acid nitrogen metabolism:**  
(A) Bile acids (B) Ketone bodies  
(C) Urea (D) Barium sulphate
- 602. The end product of amino acid nitrogen metabolism in uricotelic organisms (reptiles and birds) is**  
(A) Bilirubin (B) Urea  
(C) Uric acid (D) Biliverdin
- 603. The transaminase activity needs the coenzyme:**  
(A) ATP (B)  $\text{B}_6 - \text{PO}_4$   
(C)  $\text{FAD}^+$  (D)  $\text{NAD}^+$
- 604. Transamination is a**  
(A) Irreversible process (B) Reversible process  
(C) Both (A) and (B) (D) None of these
- 605. Most amino acids are substrates for transamination except**  
(A) Alanine (B) Threonine  
(C) Serine (D) Valine
- 606. Oxidative conversion of many amino acids to their corresponding -ketoacids occurs in mammalian:**  
(A) Liver and kidney (B) Adipose tissue  
(C) Pancreas (D) Intestine
- 607. The  $\alpha$ -ketoacid is decarboxylated by  $\text{H}_2\text{O}_2$  forming a carboxylic acid with one carbon atom less in the absence of the enzyme:**  
(A) Catalase (B) Decarboxylase  
(C) Deaminase (D) Phosphatase
- 608. The activity of mammalian L-amino acid oxidase, an FMN - flavo protein, is quite**  
(A) Slow (B) Rapid  
(C) Both (A) and (B) (D) None of these
- 609. From dietary protein as well as from the urea present in fluids secreted into the gastrointestinal tract intestinal bacteria produce**  
(A) Carbondioxide  
(B) Ammonia  
(C) Ammonium sulphate  
(D) Creatine
- 610. The symptom of ammonia intoxication includes**  
(A) Blurring of vision (B) Constipation  
(C) Mental confusion (D) Diarrhoea
- 611. Ammonia intoxication symptoms occur when brain ammonia levels are**  
(A) Slightly diminished (B) Highly diminished  
(C) Increased (D) All of these

- 612. Ammonia production by the kidney is depressed in**  
 (A) Acidosis (B) Alkalosis  
 (C) Both (A) and (B) (D) None of these
- 613. Ammonia is excreted as ammonium salts during metabolic acidosis but the majority is excreted as**  
 (A) Phosphates (B) Creatine  
 (C) Uric acid (D) Urea
- 614. Synthesis of glutamine is accompanied by the hydrolysis of**  
 (A) ATP (B) ADP  
 (C) TPP (D) Creatin phosphate
- 615. In brain, the major metabolism for removal of ammonia is the formation of**  
 (A) Glutamate (B) Aspartate  
 (C) Asparagine (D) Glutamine
- 616. Carbamoyl phosphate synthetase structure is marked by change in the presence of**  
 (A) N-Acetyl glutamate  
 (B) N-Acetyl Aspartate  
 (C) Neuraminic acid  
 (D) Oxalate
- 617. The biosynthesis of Urea occurs mainly in the Liver:**  
 (A) Cytosol  
 (B) Microsomes  
 (C) Nucleus  
 (D) Mitochondria
- 618. One mol. of Urea is synthesized at the expense of the \_\_\_\_\_ mols. of ATP.**  
 (A) 2 (B) 3  
 (C) 4 (D) 5
- 619. Urea biosynthesis occurs mainly in the liver involving the number of amino acids:**  
 (A) 3 (B) 4  
 (C) 5 (D) 6
- 620. The normal daily output of Urea through urine in grams:**  
 (A) 10 to 20 (B) 15 to 25  
 (C) 20 to 30 (D) 25 to 35
- 621. In severe acidosis, the output of urea is**  
 (A) Decreased (B) Slightly increased  
 (C) Highly increased (D) Moderately increased
- 622. Uremia occurs in**  
 (A) Cirrhosis of the liver (B) Nephritis  
 (C) Diabetes mellitus (D) Coronary thrombosis
- 623. Clinical symptom in urea cycle disorder is**  
 (A) Mental retardation (B) Drowsiness  
 (C) Diarrhoea (D) Oedema
- 624. The sparing action of methionine is**  
 (A) Tyrosine (B) Cystine  
 (C) Arginine (D) Tryptophan
- 625.  $\text{NH}_4^+$  aminates glutamate to form glutamine requiring ATP and**  
 (A)  $\text{K}^+$  (B)  $\text{Na}^+$   
 (C)  $\text{Ca}^{++}$  (D)  $\text{Mg}^{++}$
- 626. Glutathione is a**  
 (A) Dipeptide (B) Tripeptide  
 (C) Polypeptide (D) None of these
- 627. All following are conjugated proteins except**  
 (A) Nucleoproteins (B) Proteoses  
 (C) Metalloproteins (D) Flavoproteins
- 628. All  $\alpha$ -amino acids have one asymmetric carbon atom except**  
 (A) Arginine (B) Glycine  
 (C) Aspartic acid (D) Histidine
- 629. Number of amino acids present in plants, animals and microbial proteins:**  
 (A) 20 (B) 80  
 (C) 150 (D) 200
- 630. Hydrated density of (HD) lipoproteins is**  
 (A) 0.94 gm/ml  
 (B) 0.94-1.006 gm/ml  
 (C) 1.006-1.063 gm/ml  
 (D) 1.063-1.21 gm/l
- 631. The bond in proteins that is not broken under usual conditions of denaturation:**  
 (A) Hydrophobic bond (B) Hydrogen bond  
 (C) Disulphide bond (D) Peptide bonds

- 632. Plasma proteins act as**  
 (A) Buffers (B) Immunoglobulins  
 (C) Reserve proteins (D) All of these
- 633. Group that reacts in the Biuret test:**  
 (A) Peptide (B) Amino group  
 (C) Carboxylic group (D) Aldehyde group
- 634. In nitroprusside test, amino acid cysteine produces a:**  
 (A) Red colour (B) Blue colour  
 (C) Yellow colour (D) Purple colour
- 635. Protein present in hemoglobin has the structure known as**  
 (A) Primary (B) Secondary  
 (C) Tertiary (D) Quarternary
- 636. Isoelectric pH of an amino acid is that pH at which it has a**  
 (A) Positive charge (B) Negative charge  
 (C) Nil net charge (D) None of these
- 637. Albuminoids are similar to**  
 (A) Albumin (B) Globulin  
 (C) Both (A) and (B) (D) None of these
- 638. Optical isomers of all aminoacids exist except**  
 (A) Glycine (B) Arginine  
 (C) Alanine (D) Hydroxy proline
- 639. Proteins that constitute keratin, collagen and elastin in body are**  
 (A) Protamines (B) Phosphol proteins  
 (C) Scleroproteins (D) Metaproteins
- 640. Systematic name of lysine is**  
 (A) Amino acetic acid  
 (B) 2,6 diamino hexanoic acid  
 (C) Aminosuccinic acid  
 (D) 2-Aminopropanoic acid
- 641. Side chains of all following amino acids contain aromatic rings except**  
 (A) Phenyl alanine (B) Alanine  
 (C) Tyrosine (D) Tryptophan
- 642. Abnormal chain of amino acids in sickle cell anaemia is**  
 (A) Alpha chain (B) Beta chain  
 (C) Delta chain (D) Gama chain
- 643. Number of chains in globin part of normal Hb:**  
 (A) 1 (B) 2  
 (C) 3 (D) 4
- 644. The PH of albumin is**  
 (A) 3.6 (B) 4.7  
 (C) 5.0 (D) 6.1
- 645. Ninhydrin reaction gives a purple colour and evolves CO<sub>2</sub> with**  
 (A) Peptide bonds (B) Histamine  
 (C) Ergothioneine (D) Asparagine
- 646. Denaturation of proteins involves breakdown of**  
 (A) Secondary structure (B) Tertiary structure  
 (C) Quarternary structure (D) All of these
- 647. In denaturation of proteins, the bond which is not broken:**  
 (A) Disulphide bond (B) Peptide bond  
 (C) Hydrogen bond (D) Ionic bond
- 648. The purity of an isolated protein can be tested by employing various methods.**  
 (A) Solubility curve  
 (B) Molecular weight  
 (C) Ultra Centrifugation  
 (D) Immuno Ractivity  
 (E) All of these
- 649. More than one break in the line or in saturation curve indicates the following quality of protein.**  
 (A) Non homogeneity (B) Purity  
 (C) Homogeneity (D) None of these
- 650. A sharp moving boundary is obtained between the pure solvent and solute containing layer in**  
 (A) Chromatography  
 (B) Immuno Reactivity  
 (C) Ultra Centrifugation  
 (D) Solubility curve

- 651. The antibodies raised against a pure protein will show only one sharp spike on this technique:**
- (A) Solubility curve  
(B) Solvent precipitation  
(C) Molecular weight determination  
(D) Immuno electrophoresis
- 652. This technique takes the advantage of the fact that each protein has different pH at which it is electrically neutral i.e., its isoelectric pH:**
- (A) Isoelectric focussing  
(B) Immunoel Ectro Phoresis  
(C) Chromatography  
(D) HPLC
- 653. The following technique makes use of the difference in net charges of proteins at a given pH:**
- (A) Thin layer chromatography  
(B) Ion exchange chromatography  
(C) High performance liquid chromatography  
(D) Paper chromatography
- 654. The ratio of the distance moved by a compound to the distance moved by the solvent front is known as its**
- (A) PI value                      (B) Linking number  
(C) Rf value                      (D) Gold number
- 655. The movement of charged particles towards one of the electrodes under the influence of electrical current is**
- (A) Gel filtration  
(B) Molecular sieving  
(C) Gas liquid chromatography  
(D) Electrophoresis
- 656. An anion exchange resin linked to cellulose backbone is**
- (A) DEAE cellulose      (B) CM cellulose  
(C) Sephadex              (D) None of these
- 657. A cation exchange resin linked to cellulose backbone is**
- (A) CM-cellulose      (B) DEAE cellulose  
(C) Starch              (D) Biogel
- 658. The sorting out of molecules according to size and shape may be adapted to protein purification in this technique:**
- (A) Adsorption chromatography  
(B) Gel filtration chromatography  
(C) Paper chromatography  
(D) None of these
- 659. Frequently employed materials for the adsorption chromatography of proteins include**
- (A) High capacity supporting gel  
(B) Starch blocks  
(C) Calcium phosphate gel alumina gel and hydroxy apatite  
(D) All of these
- 660. The solubility of most proteins is lowered at high salt concentrations is called as**
- (A) Salting in process      (B) Salting out process  
(C) Isoelectric focussing      (D) None of these
- 661. Phenylalanine, ornithine and methionine are involved in the biogenesis of**
- (A) Lysergic acid      (B) Reserpine  
(C) L-Hyoscyamine      (D) Papaverine
- 662. All the following diuretics inhibit the carbonic anhydrase except**
- (A) Acetazolamide      (B) Bumetanide  
(C) Furosemide      (D) Ethacrynic acid
- 663. Protein is a polymer of**
- (A) Sugars                      (B) Phenols  
(C) Amino acids              (D) Carboxylic acids
- 664. All the following amino acids are optically active except**
- (A) Tryptophane      (B) Phenylalanine  
(C) Valine                      (D) Glycine
- 665. Proteinous substances which catalyze biochemical reactions are known as**
- (A) Activators                      (B) Catalysts  
(C) Enzymes                      (D) Hormones
- 666. Insulin is a protein which controls**
- (A) Blood clotting      (B) Metabolic pathway  
(C) Digestion                      (D) Kreb's cycle

- 667. Proteins which are responsible for defence mechanism are called**  
(A) Antimetabolites (B) Antibodies  
(C) Antimycins (D) Apoproteins
- 668. When the net charge on an amino acid is zero, the pH is maintained as?**  
(A) 4.5 (B) 11.2  
(C) 7.0 (D) 9.1
- 669. Isoelectric point of amino acids is used for**  
(A) Crystallisation (B) Precipitation  
(C) Solubility (D) Reactivity
- 670. Xanthoproteic test is positive in proteins containing**  
(A) Sulphur amino acids  
(B)  $\alpha$ -Amino acids  
(C) Aromatic amino acids  
(D) Aliphatic amino acids
- 671. All  $\alpha$ -amino acids give positive**  
(A) Million's test (B) Biuret test  
(C) Xanthoproteic test (D) Ninhydrine test
- 672. N-terminal amino acids of a polypeptide are estimated by**  
(A) Edmann reaction (B) Sanger's reagent  
(C) Formaldehyde test (D) Ninhydrine reaction
- 673. Million's test is positive for**  
(A) Phenylalanine (B) Glycine  
(C) Tyrosine (D) Proline
- 674. Indole group of tryptophan responses positively to**  
(A) Glyoxylic acid (B) Schiff's reagent  
(C) Biuret test (D) Resorcinol test
- 675. Guanidine group of arginine gives positive test with**  
(A) Lead acetate  
(B) Sakaguchi reagent  
(C) Trichloroacetic acid  
(D) Molisch's reagent
- 676. Thiol group of cysteine gives red colour with**  
(A) Sodium acetate  
(B) Lead acetate  
(C) Sodium nitroprusside  
(D) Barfoed's reagent
- 677. Protein deficiency disease is known as**  
(A) Cushing's disease  
(B) Fabry's disease  
(C) Parkinson's disease  
(D) Kwashiorkor and marasmus
- 678. A vegetable source of protein is**  
(A) Egg plant  
(B) Soyabean  
(C) Tree of the Heaven  
(D) Devil's dung
- 679. Oxaloacetate is converted to aspartic acid by**  
(A) Reductase (B) Oxidase  
(C) Transaminase (D) Catalase
- 680. Deficiency of biotin results in decrease in**  
(A) Amino acid synthesis  
(B) Lipid synthesis  
(C) Kidney  
(D) Fatty acid synthesis
- 681. The precursor of bile salts, sex hormones and vitamin D is**  
(A) Diosgenin (B) Cholesterol  
(C) Campesterol (D) Ergosterol
- 682. Unsaturated fatty acids is known as**  
(A) Non-essential fatty acids  
(B) Essential fatty acids  
(C) Cerebrosides  
(D) Phospholipids
- 683. Biuret test is specific for**  
(A) Two peptide linkage  
(B) Phenolic group  
(C) Imidazole ring  
(D) None of these
- 684. Most of calcium is present in bone, but 2% present in soft tissue and the blood is called**  
(A) Calcinated blood (B) Solidified blood  
(C) Physiological blood (D) Colloidal blood
- 685. Calcium present with protein is known as free while in salt form is called as**  
(A) Bound (B) Precipitated  
(C) Solid (D) Polymorphs

- 686. The following ions help in enzymatic transfer of phosphate from ATP to pyruvic acid:**  
 (A) Sodium (B) Calcium  
 (C) Magnesium (D) Potassium
- 687. International enzyme commission classifies enzymes into**  
 (A) Three classes (B) Six classes  
 (C) Four classes (D) Ten classes
- 688. Michaelis - Menten equation is used to explain the effect of substrate concentration on**  
 (A) Carbohydrate (B) Enzyme  
 (C) Lipid (D) Protein
- 689. The pH at which an enzyme has maximum activity is known as**  
 (A) Isoelectric pH (B) Optimum pH  
 (C) Low pH (D) High pH
- 690. Degradation of proteins to amino acids, glucose from carbohydrates and fatty acids from lipids is known as**  
 (A) Anabolism (B) Metabolism  
 (C) Catabolism (D) Cretinism
- 691. During glycolysis of glucose the energy liberated in the absence of oxygen is known as**  
 (A) Oxygenesis  
 (B) Glyconeogenesis  
 (C) Glycogenolysis  
 (D) Anaerobic fermentation
- 692. Deficiency of urea cycle enzymes results into accumulation of citrulline argininosuccinate arginine in the liver resulting in increasing concentration of ..... in the blood.**  
 (A) Calcium (B) Sodium  
 (C) Ammonia (D) Lipid
- 693. Accumulation of tryptophan in blood is known as**  
 (A) Pompe's disease (B) Wilson's disease  
 (C) Wolman's disease (D) Hartnup's disease
- 694. Lymphocytes are responsible for the formation of**  
 (A) Serum (B) Plasma  
 (C) Antibody (D) Calcium
- 695. Platelets contain an enzyme which has important role in clotting in blood. This enzyme is known as**  
 (A) Cholinesterase (B) Transaminase  
 (C) Decarboxylase (D) Thrombokinase
- 696. Treatment of pentoses with a concentrated mineral acid yields a cyclic aldehyde known as**  
 (A) Pentaldehyde (B) Cyclopental  
 (C) Hexaldehyde (D) Furfural
- 697. Isoelectric pH is that pH at which protein is electrically:**  
 (A) Neutral (B) Anionic  
 (C) Cationic (D) None of these
- 698. About 6.25 g of haemoglobin is produced and destroyed in the body each day and the total amount of haemoglobin in a normal healthy 70 kg weighing male adult is**  
 (A) 250 g (B) 150 g  
 (C) 100 g (D) 70 g
- 699. Pancreatic juice contains all of the following except**  
 (A) Trypsinogen (B) Lipase  
 (C) Cholecystokinin (D) Chymotrypsinogen
- 700. The milk protein in the stomach in an adult is digested by**  
 (A) Pepsin (B) Rennin  
 (C) HCl (D) Chymotrypsinogen
- 701. Carboxypeptidase, an enzyme of pancreatic juice, contains**  
 (A) Mn (B) Zinc  
 (C) Magnesium (D) Manganese
- 702. The zymogen from trypsinogen of pancreatic juice is converted to active trypsin by**  
 (A) Peisin (B) Enterocrinin  
 (C) Enterokinase (D) Rennin
- 703. Inactive zymogens are precursors of all the following gastrointestinal enzymes except**  
 (A) Carboxypeptidase (B) Pepsin  
 (C) Amino peptidase (D) Chymotrypsin

- 704. Rennin acts on casein of milk in infants in presence of**  
(A)  $Mg^{++}$  (B)  $Zn^{++}$   
(C)  $Co^{++}$  (D)  $Ca^{++}$
- 705. All the following are true about phenylketonuria except**  
(A) Deficiency of phenylalanine hydroxylase  
(B) Mental retardation  
(C) Increased urinary excretion of p-hydroxyphenyl pyruvic acid  
(D) Decrease serotonin formation
- 706. Which of the amino acid produces a vasodilator on decarboxylation?**  
(A) Glutamin acid (B) Histidine  
(C) Ornithine (D) Cysteine
- 707. Neutral amino acid is**  
(A) Leucine (B) Lysine  
(C) Aspartic acid (D) Histidine
- 708. The amino acid containing hydroxy group:**  
(A) Glycine (B) Isoleucine  
(C) Arginine (D) Threonine
- 709. The amino acid which synthesizes many hormones:**  
(A) Valine (B) Phenylalanine  
(C) Alanine (D) Histidine
- 710. Insulin degradation of disulfide bond formation is effected by**  
(A) Pyruvate dehydrogenase  
(B) Xylitol reductase  
(C) Gutathione reductase  
(D) Xanthine oxidase
- 711. A protein reacts with biuret reagent which indicates 2 or more**  
(A) Blood clotting (B) Peptide bond  
(C) Disulphide bonds (D) Hydrophobic bonds
- 712. In many proteins the hydrogen bonding produces a regular coiled arrangement which is called as**  
(A)  $\beta$ -Helix (B)  $\alpha$ -Helix  
(C) Both (A) and (B) (D) Spiral
- 713. The milk protein in the stomach of the infants is digested by**  
(A) Pepsin (B) Trypsin  
(C) Chymotrypsin (D) Rennin
- 714. Protein anabolism is stimulated by**  
(A) ACTH (B) Testosterone  
(C) Glucagon (D) Epinephrine
- 715. The number of helices present in a collagen molecule is**  
(A) 1 (B) 2  
(C) 3 (D) 4
- 716. Which bond is present in the primary structure of protein?**  
(A) Ester (B) Hydrogen  
(C) Ionic bond (D) Peptide
- 717. Sakaguchi reaction is specific for**  
(A) Guanidine group (B) Phenolic group  
(C) Carboxylic group (D) None of these
- 718. With the exception of glycine all amino acids found in protein are**  
(A) Isocitrate dehydrogenase  
(B) Fumarase  
(C) Succinate thiokinase  
(D) ATPase
- 719. In protein structure the  $\alpha$ -helix and  $\beta$ -pleated sheets are example of**  
(A) Primary structure (B) Secondary structure  
(C) Tertiary structure (D) Quaternary structure
- 720. An essential amino acid in man is**  
(A) Proline (B) Threonine  
(C) Asparagine (D) Tyrosine
- 721. An amino acid that does not form an  $\alpha$ -helix is**  
(A) Asparagine (B) Tyrosine  
(C) Tryptophan (D) Proline
- 722. The protein present in hair is**  
(A) Elastin (B) Prolamine  
(C) Keratin (D) Gliadin

**723. Plasma protein can be separated by**

- (A) Salting out with  $(\text{NH}_4)_2\text{SO}_4$
- (B) Ultracentrifugation
- (C) Immuno electrophoresis
- (D) All of these

**724. RNA does not contain**

- (A) Uracil
- (B) Adenine
- (C) Hydroxy methyl cytosine
- (D) Phosphate

**725. In mammalian cells, ribosomal RNA is produced mainly in the**

- (A) Nucleus
- (B) Nucleolus
- (C) Ribosome
- (D) Golgi apparatus

**726. Which co-enzyme is not involved in oxidative decarboxylation of pyruvic acid?**

- (A) TPP
- (B)  $\text{Mg}^{++}$
- (C) Biotin
- (D) CoA-SH

**727. A polymeric unit of starch which has a branched structure is**

- (A) Glucose
- (B) Amylopectin
- (C) Isomaltose
- (D) Amylose

**728. The repeating unit in hyaluronic acid is**

- (A) Glucuronic acid and Galactosamine
- (B) Glucuronic acid and glucosamine
- (C) Glucuronic acid and N-acetyl glucosamine
- (D) Glucuronic acid and N-acetyl galactosamine

**729. The repeating disaccharide unit in cellulose is**

- (A) Sucrose
- (B) Maltose
- (C) Dextrose
- (D) Cellobiose

**ANSWERS**

1. A	2. A	3. A	4. A	5. A	6. A
7. A	8. A	9. A	10. D	11. B	12. A
13. A	14. C	15. C	16. B	17. B	18. C
19. B	20. C	21. B	22. A	23. B	24. D
25. A	26. C	27. B	28. B	29. A	30. A
31. C	32. B	33. D	34. B	35. C	36. A
37. B	38. C	39. C	40. B	41. B	42. A
43. B	44. C	45. C	46. A	47. A	48. B
49. D	50. A	51. A	52. A	53. D	54. A
55. B	56. A	57. C	58. B	59. C	60. A
61. B	62. A	63. D	64. C	65. D	66. C
67. A	68. D	69. A	70. A	71. C	72. B
73. A	74. B	75. A	76. A	77. D	78. D
79. A	80. A	81. C	82. A	83. C	84. D
85. C	86. B	87. B	88. A	89. A	90. A
91. A	92. B	93. C	94. D	95. A	96. A
97. A	98. D	99. A	100. A	101. D	102. D
103. D	104. D	105. A	106. A	107. A	108. C
109. D	110. A	111. A	112. A	113. A	114. B
115. D	116. C	117. A	118. A	119. D	120. C
121. B	122. B	123. A	124. A	125. A	126. A
127. B	128. C	129. A	130. A	131. B	132. C
133. A	134. A	135. A	136. A	137. C	138. A
139. A	140. D	141. C	142. A	143. C	144. B
145. A	146. B	147. B	148. B	149. D	150. A
151. A	152. B	153. C	154. C	155. B	156. C
157. D	158. D	159. C	160. C	161. B	162. D
163. A	164. D	165. C	166. B	167. D	168. D
169. C	170. C	171. D	172. B	173. A	174. D
175. D	176. C	177. B	178. B	179. A	180. A
181. C	182. C	183. B	184. C	185. B	186. C
187. D	188. A	189. B	190. D	191. C	192. C
193. B	194. C	195. D	196. B	197. D	198. C
199. B	200. B	201. C	202. D	203. C	204. C
205. D	206. C	207. D	208. B	209. A	210. D
211. C	212. A	213. C	214. A	215. C	216. D
217. B	218. D	219. B	220. B	221. C	222. D
223. C	224. C	225. C	226. D	227. C	228. D
229. C	230. A	231. C	232. D	233. D	234. D
235. C	236. B	237. A	238. D	239. B	240. D
241. B	242. B	243. C	244. A	245. B	246. A
247. C	248. D	249. B	250. C	251. C	252. A

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253. D	254. D	255. D	256. B	257. D	258. B
259. D	260. D	261. D	262. D	263. D	264. B
265. A	266. B	267. B	268. D	269. B	270. D
271. C	272. B	273. C	274. C	275. D	276. B
277. B	278. D	279. C	280. D	281. A	282. D
283. B	284. C	285. A	286. D	287. B	288. B
289. D	290. B	291. D	292. C	293. D	294. D
295. B	296. C	297. B	298. C	299. B	300. C
301. A	302. B	303. B	304. C	305. B	306. B
307. A	308. A	309. C	310. D	311. B	312. D
313. D	314. C	315. B	316. D	317. B	318. B
319. D	320. B	321. A	322. B	323. D	324. A
325. B	326. B	327. A	328. C	329. B	330. D
331. C	332. D	333. C	334. B	335. C	336. B
337. C	338. A	339. A	340. C	341. D	342. B
343. A	344. B	345. C	346. B	347. B	348. B
349. B	350. B	351. C	352. C	353. B	354. C
355. D	356. D	357. C	358. B	359. D	360. D
361. B	362. B	363. D	364. B	365. D	366. D
367. A	368. C	369. A	370. A	371. D	372. B
373. B	374. D	375. A	376. B	377. A	378. B
379. D	380. B	381. D	382. D	383. D	384. D
385. C	386. A	387. A	388. B	389. C	390. D
391. D	392. D	393. D	394. D	395. C	396. B
397. D	398. B	399. B	400. A	401. B	402. A
403. B	404. C	405. D	406. D	407. B	408. B
409. B	410. D	411. B	412. B	413. C	414. C
415. D	416. C	417. B	418. C	419. A	420. D
421. D	422. A	423. C	424. D	425. D	426. C
427. D	428. D	429. A	430. B	431. D	432. A
433. B	434. A	435. A	436. A	437. B	438. B
439. C	440. D	441. C	442. C	443. B	444. D
445. C	446. B	447. D	448. C	449. C	450. C
451. C	452. D	453. A	454. A	455. B	456. C
457. D	458. C	459. A	460. C	461. B	462. A
463. A	464. C	465. C	466. D	467. B	468. A
469. A	470. D	471. C	472. B	473. A	474. B
475. B	476. D	477. C	478. C	479. B	480. D
481. C	482. B	483. C	484. B	485. B	486. C
487. C	488. D	489. B	490. B	491. C	492. C
493. B	494. A	495. B	496. B	497. A	498. C
499. D	500. D	501. C	502. C	503. C	504. C
505. B	506. A	507. D	508. B	509. A	510. C

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511. B	512. D	513. D	514. A	515. A	516. C
517. A	518. D	519. A	520. D	521. A	522. D
523. C	524. B	525. D	526. A	527. B	528. A
529. A	530. B	531. D	532. D	533. B	534. A
535. B	536. A	537. B	538. D	539. C	540. A
541. C	542. C	543. A	544. D	545. D	546. B
547. D	548. A	549. A	550. B	551. D	552. B
553. A	554. B	555. A	556. C	557. B	558. D
559. A	560. A	561. A	562. A	563. D	564. D
565. C	566. A	567. A	568. A	569. A	570. B
571. A	572. A	573. B	574. C	575. C	576. D
577. D	578. B	579. B	580. A	581. B	582. C
583. C	584. C	585. B	586. D	587. D	588. B
589. A	590. C	591. B	592. A	593. C	594. D
595. B	596. A	597. A	598. C	599. D	600. D
601. C	602. C	603. B	604. B	605. B	606. A
607. A	608. A	609. B	610. A	611. C	612. B
613. D	614. A	615. D	616. A	617. D	618. B
619. D	620. C	621. A	622. B	623. A	624. B
625. D	626. B	627. B	628. B	629. D	630. B
631. D	632. D	633. A	634. A	635. D	636. C
637. A	638. A	639. C	640. B	641. B	642. B
643. D	644. B	645. D	646. D	647. B	648. C
649. A	650. C	651. D	652. A	653. B	654. C
655. D	656. A	657. A	658. B	659. C	660. B
661. A	662. D	663. C	664. D	665. C	666. B
667. B	668. C	669. B	670. C	671. D	672. A
673. C	674. A	675. B	676. C	677. D	678. B
679. C	680. D	681. B	682. B	683. A	684. C
685. A	686. D	687. B	688. B	689. B	690. C
691. D	692. C	693. D	694. C	695. D	696. D
697. A	698. D	699. C	700. A	701. B	702. C
703. C	704. D	705. C	706. B	707. A	708. D
709. B	710. C	711. B	712. B	713. D	714. B
715. C	716. D	717. A	718. B	719. B	720. B
721. D	722. C	723. D	724. C	725. B	726. C
727. B	728. C	729. D			

## EXPLANATIONS FOR THE ANSWERS

12. A Albumin (mol. Wt. 69,000) is the major constituent of plasma proteins with a concentration 3.5–5.0 g/dl. It is exclusively synthesized by the liver. Plasma albumin performs osmotic, transport and nutritive function, besides the buffering action.
67. A Ceruloplasmin is a blue coloured, copper containing  $\alpha^2$ -globulin. Its normal plasma concentration is around 30 mg/dl and it is decreased in Wilson's disease.
103. D Defects in clotting factors cause abnormalities in blood clotting. Hemophilia A (defect-antihemophilic factor *i.e.*, VII), hemophilia B or Christmas disease (defect-Christmas factor, *i.e.*, IX) are the major abnormalities known.
151. A Lysine, arginine, histidine. These are dibasic monocarboxylic acids.
212. A The amino acids which are never found in protein structure are collectively referred to as non-protein amino acids. However, the non-protein amino acids perform several biological functions. *e.g.*, ornithine, citrulline, thyroxine.
268. D Amino acids are divided into 3 groups based on their metabolic fates.
- (a) *Glycogenic*: These amino acids can serve as precursors for the synthesis of glucose (or glycogen) *e.g.*, alanine, aspartate, glycine.
- (b) *Ketogenic*: Fat can be synthesized from these amino acids *e.g.*, leucine, lysine.
- (c) *Glycogenic or ketogenic*: The amino acids that can form glucose as well as fat *e.g.*, isoleucine, phenylalanine, lysine.
300. C Zwitterion (dipolar ion) is a hybrid molecule containing positive and negative ionic groups. Each amino acid has a characteristic pH (*e.g.*, leucine pH 6.0), at which it exists as zwitterions.
350. B Albumin/Globulin (A/G) ratio expresses their relation in the serum concentration. The normal A/G ratio is 1.2 to 1.5:1, taking the concentration of albumin and globulins respectively in the range of 3.5-5.0 g/dl and 2.5–3.5 g/dl. The A/G ratio is lowered either due to a decrease in albumin (liver disease) or an increase in globulins (chronic infections).
421. D By salting out technique (using ammonium sulfate or sodium sulfate), the plasma proteins can be separated into 3 groups – albumin, globulins and fibrinogen. Electrophoresis is the most commonly employed analytical technique for the separation of plasma (serum) proteins. Paper or agar gel electrophoresis with veronal buffer (pH 8.6) separates plasma proteins into 5 distinct bands namely albumin,  $\alpha_1$  -  $\alpha_2$ ,  $\beta$ - and  $\gamma$ -globulins.
488. D Complement system is composed of about 20 plasma proteins that complement the functions of antibodies in defending the body from invading antigens. The complement system helps the body immunity by promoting phagocytosis, formation of antigen-antibody complexes and inflammatory reaction.
507. D Apolipoproteins or apoproteins are the (structural) protein components of lipoproteins and are closely involved in the metabolism of the later, *e.g.*, AI, AIII, B<sub>100</sub>, C<sub>1</sub>, CII
555. A The removal of amino group from the amino acids as ammonia is deamination. It may be oxidative or non-oxidative in nature. The NH<sub>3</sub> so liberated is used for synthesis of urea.
600. D The three amino acids glycine, arginine and methionine are required for creatine formation. Glycine combines
683. A Biuret test is answered by compounds containing two or more CO–NH groups *i.e.*, peptide bonds. All protein and peptides possessing at least two peptide linkages *i.e.*, tripeptide (with 3 amino acids) give positive biuret test. The principle of biuret test is conveniently used to detect the presence of proteins in biological fluids. The mechanism of biuret test is not clearly known. It is believed that the colour is due to the formation of a copper co-ordinated complex.
717. A Arginine, containing guanidine group, reacts with  $\alpha$ -naphthol and alkaline hypobromite to form a red colour complex.

**FATS AND FATTY ACID METABOLISM**

- 1. An example of a hydroxy fatty acid is**  
(A) Ricinoleic acid (B) Crotonic acid  
(C) Butyric acid (D) Oleic acid
- 2. An example of a saturated fatty acid is**  
(A) Palmitic acid (B) Oleic acid  
(C) Linoleic acid (D) Erucic acid
- 3. If the fatty acid is esterified with an alcohol of high molecular weight instead of glycerol, the resulting compound is**  
(A) Lipositol (B) Plasmalogen  
(C) Wax (D) Cephalin
- 4. A fatty acid which is not synthesized in the body and has to be supplied in the diet is**  
(A) Palmitic acid (B) Lauric acid  
(C) Linolenic acid (D) Palmitoleic acid
- 5. Essential fatty acid:**  
(A) Linoleic acid (B) Linolenic acid  
(C) Arachidonic acid (D) All these
- 6. The fatty acid present in cerebroside is**  
(A) Lignoceric acid (B) Valeric acid  
(C) Caprylic acid (D) Behenic acid
- 7. The number of double bonds in arachidonic acid is**  
(A) 1 (B) 2  
(C) 4 (D) 6
- 8. In humans, a dietary essential fatty acid is**  
(A) Palmitic acid (B) Stearic acid  
(C) Oleic acid (D) Linoleic acid
- 9. A lipid containing alcoholic amine residue is**  
(A) Phosphatidic acid (B) Ganglioside  
(C) Glucocerebroside (D) Sphingomyelin
- 10. Cephalin consists of**  
(A) Glycerol, fatty acids, phosphoric acid and choline  
(B) Glycerol, fatty acids, phosphoric acid and ethanolamine  
(C) Glycerol, fatty acids, phosphoric acid and inositol  
(D) Glycerol, fatty acids, phosphoric acid and serine
- 11. In mammals, the major fat in adipose tissues is**  
(A) Phospholipid (B) Cholesterol  
(C) Sphingolipids (D) Triacylglycerol
- 12. Glycosphingolipids are a combination of**  
(A) Ceramide with one or more sugar residues  
(B) Glycerol with galactose  
(C) Sphingosine with galactose  
(D) Sphingosine with phosphoric acid

- 13. The importance of phospholipids as constituent of cell membrane is because they possess**
- (A) Fatty acids  
(B) Both polar and nonpolar groups  
(C) Glycerol  
(D) Phosphoric acid
- 14. In neutral fats, the unsaponifiable matter includes**
- (A) Hydrocarbons (B) Triacylglycerol  
(C) Phospholipids (D) Cholesterol
- 15. Higher alcohol present in waxes is**
- (A) Benzyl (B) Methyl  
(C) Ethyl (D) Cetyl
- 16. Keratin consists of**
- (A) Nervonic acid (B) Lignoceric acid  
(C) Cervonic acid (D) Clupanodonic acid
- 17. Gangliosides are complex glycosphingolipids found in**
- (A) Liver (B) Brain  
(C) Kidney (D) Muscle
- 18. Unsaturated fatty acid found in the cod liver oil and containing 5 double bonds is**
- (A) Clupanodonic acid  
(B) Cervonic acid  
(C) Elaidic acid  
(D) Timnodonic acid
- 19. Phospholipid acting as surfactant is**
- (A) Cephalin (B) Phosphatidyl inositol  
(C) Lecithin (D) Phosphatidyl serine
- 20. An oil which contains cyclic fatty acids and once used in the treatment of leprosy is**
- (A) Elaidic oil (B) Rapeseed oil  
(C) Lanoline (D) Chaulmoogric oil
- 21. Unpleasant odours and taste in a fat (rancidity) can be delayed or prevented by the addition of**
- (A) Lead (B) Copper  
(C) Tocopherol (D) Ergosterol
- 22. Gangliosides derived from glucosylceramide contain in addition one or more molecules of**
- (A) Sialic acid (B) Glycerol  
(C) Diacylglycerol (D) Hyaluronic acid
- 23. 'Drying oil', oxidized spontaneously by atmospheric oxygen at ordinary temperature and forms a hard water proof material is**
- (A) Coconut oil (B) Peanut oil  
(C) Rape seed oil (D) Linseed oil
- 24. Deterioration of food (rancidity) is due to presence of**
- (A) Cholesterol  
(B) Vitamin E  
(C) Peroxidation of lipids  
(D) Phenolic compounds
- 25. The number of ml of N/10 KOH required to neutralize the fatty acids in the distillate from 5 gm of fat is called**
- (A) Reichert-Meissel number  
(B) Polenske number  
(C) Acetyl number  
(D) Non volatile fatty acid number
- 26. Molecular formula of cholesterol is**
- (A)  $C_{27}H_{45}OH$   
(B)  $C_{29}H_{47}OH$   
(C)  $C_{29}H_{47}OH$   
(D)  $C_{23}H_{41}OH$
- 27. The cholesterol molecule is**
- (A) Benzene derivative  
(B) Quinoline derivative  
(C) Steroid  
(D) Straight chain acid
- 28. Salkowski test is performed to detect**
- (A) Glycerol (B) Cholesterol  
(C) Fatty acids (D) Vitamin D
- 29. Palmitic, oleic or stearic acid ester of cholesterol used in manufacture of cosmetic creams is**
- (A) Elaidic oil (B) Lanoline  
(C) Spermoceti (D) Chaulmoogric oil

- 30. Dietary fats after absorption appear in the circulation as**  
(A) HDL (B) VLDL  
(C) LDL (D) Chylomicron
- 31. Free fatty acids are transported in the blood**  
(A) Combined with albumin  
(B) Combined with fatty acid binding protein  
(C) Combined with  $\beta$ -lipoprotein  
(D) In unbound free salts
- 32. Long chain fatty acids are first activated to acetyl-CoA in**  
(A) Cytosol (B) Microsomes  
(C) Nucleus (D) Mitochondria
- 33. The enzyme acyl-CoA synthase catalyses the conversion of a fatty acid of an active fatty acid in the presence of**  
(A) AMP (B) ADP  
(C) ATP (D) GTP
- 34. Carnitine is synthesized from**  
(A) Lysine and methionine  
(B) Glycine and arginine  
(C) Aspartate and glutamate  
(D) Proline and hydroxyproline
- 35. The enzymes of  $\beta$ -oxidation are found in**  
(A) Mitochondria (B) Cytosol  
(C) Golgi apparatus (D) Nucleus
- 36. Long chain fatty acids penetrate the inner mitochondrial membrane**  
(A) Freely  
(B) As acyl-CoA derivative  
(C) As carnitine derivative  
(D) Requiring Na dependent carrier
- 37. An important feature of Zellweger's syndrome is**  
(A) Hypoglycemia  
(B) Accumulation of phytanic acid in tissues  
(C) Skin eruptions  
(D) Accumulation of  $C_{26}$ - $C_{38}$  polyenoic acid in brain tissues
- 38. An important finding of Fabry's disease is**  
(A) Skin rash (B) Exophthalmos  
(C) Hemolytic anemia (D) Mental retardation
- 39. Gaucher's disease is due to deficiency of the enzyme:**  
(A) Sphingomyelinase  
(B) Glucocerebrosidase  
(C) Galactocerebrosidase  
(D)  $\beta$ -Galactosidase
- 40. Characteristic finding in Gaucher's disease is**  
(A) Night blindness  
(B) Renal failure  
(C) Hepatosplenomegaly  
(D) Deafness
- 41. An important finding in Neimann-Pick disease is**  
(A) Leukopenia  
(B) Cardiac enlargement  
(C) Corneal opacity  
(D) Hepatosplenomegaly
- 42. Fucosidosis is characterized by**  
(A) Muscle spasticity (B) Liver enlargement  
(C) Skin rash (D) Kidney failure
- 43. Metachromatic leukodystrophy is due to deficiency of enzyme:**  
(A)  $\alpha$ -Fucosidase (B) Arylsulphatase A  
(C) Ceramidase (D) Hexosaminidase A
- 44. A significant feature of Tangier disease is**  
(A) Impairment of chylomicron formation  
(B) Hypotriacylglycerolemia  
(C) Absence of Apo-C-II  
(D) Absence of Apo-C-I
- 45. A significant feature of Broad Beta disease is**  
(A) Hypocholesterolemia  
(B) Hypotriacylglycerolemia  
(C) Absence of Apo-D  
(D) Abnormality of Apo-E

- 46. Neonatal tyrosinemia improves on administration of**  
(A) Thiamin (B) Riboflavin  
(C) Pyridoxine (D) Ascorbic acid
- 47. Absence of phenylalanine hydroxylase causes**  
(A) Neonatal tyrosinemia  
(B) Phenylketonuria  
(C) Primary hyperoxaluria  
(D) Albinism
- 48. Richner-Hanhart syndrome is due to defect in**  
(A) Tyrosinase  
(B) Phenylalanine hydroxylase  
(C) Hepatic tyrosine transaminase  
(D) Fumarylacetoacetate hydrolase
- 49. Plasma tyrosine level in Richner-Hanhart syndrome is**  
(A) 1–2 mg/dL (B) 2–3 mg/dL  
(C) 4–5 mg/dL (D) 8–10 mg/dL
- 50. Amount of phenylacetic acid excreted in the urine in phenylketonuria is**  
(A) 100–200 mg/dL (B) 200–280 mg/dL  
(C) 290–550 mg/dL (D) 600–750 mg/dL
- 51. Tyrosinosis is due to defect in the enzyme:**  
(A) Fumarylacetoacetate hydrolase  
(B) p-Hydroxyphenylpyruvate hydroxylase  
(C) Tyrosine transaminase  
(D) Tyrosine hydroxylase
- 52. An important finding in Histidinemia is**  
(A) Impairment of conversion of  $\alpha$ -Glutamate to  $\alpha$ -ketoglutarate  
(B) Speech defect  
(C) Decreased urinary histidine level  
(D) Patients can not be treated by diet
- 53. An important finding in glycinuria is**  
(A) Excess excretion of oxalate in the urine  
(B) Deficiency of enzyme glycinease  
(C) Significantly increased serum glycine level  
(D) Defect in renal tubular reabsorption of glycine
- 54. Increased urinary indole acetic acid is diagnostic of**  
(A) Maple syrup urine disease  
(B) Hartnup disease  
(C) Homocystinuria  
(D) Phenylketonuria
- 55. In glycinuria daily urinary excretion of glycine ranges from**  
(A) 100–200 mg (B) 300–500 mg  
(C) 600–1000 mg (D) 1100–1400 mg
- 56. An inborn error, maple syrup urine disease is due to deficiency of the enzyme:**  
(A) Isovaleryl-CoAhydrogenase  
(B) Phenylalanine hydroxylase  
(C) Adenosyl transferase  
(D)  $\alpha$ -Ketoacid decarboxylase
- 57. Maple syrup urine disease becomes evident in extra uterine life by the end of**  
(A) First week (B) Second week  
(C) Third week (D) Fourth week
- 58. Alkaptonuria occurs due to deficiency of the enzyme:**  
(A) Maleylacetoacetate isomerase  
(B) Homogentisate oxidase  
(C) p-Hydroxyphenylpyruvate hydroxylase  
(D) Fumarylacetoacetate hydrolase
- 59. An important feature of maple syrup urine disease is**  
(A) Patient can not be treated by dietary regulation  
(B) Without treatment death, of patient may occur by the end of second year of life  
(C) Blood levels of leucine, isoleucine and serine are increased  
(D) Excessive brain damage
- 60. Ochronosis is an important finding of**  
(A) Tyrosinemia  
(B) Tyrosinosis  
(C) Alkaptonuria  
(D) Richner Hanhart syndrome

- 61. Phrynoderma is a deficiency of**  
(A) Essential fatty acids (B) Proteins  
(C) Amino acids (D) None of these
- 62. The percentage of linoleic acid in safflower oil is**  
(A) 73 (B) 57  
(C) 40 (D) 15
- 63. The percentage of polyunsaturated fatty acids in soyabean oil is**  
(A) 62 (B) 10  
(C) 3 (D) 2
- 64. The percentage of polyunsaturated fatty acids in butter is**  
(A) 60 (B) 37  
(C) 25 (D) 3
- 65. Dietary fibre denotes**  
(A) Undigested proteins  
(B) Plant cell components that cannot be digested by own enzymes  
(C) All plant cell wall components  
(D) All non digestible water insoluble polysaccharide
- 66. A high fibre diet is associated with reduced incidence of**  
(A) Cardiovascular disease  
(B) C.N.S. disease  
(C) Liver disease  
(D) Skin disease
- 67. Dietary fibres are rich in**  
(A) Cellulose (B) Glycogen  
(C) Starch (D) Proteoglycans
- 68. Minimum dietary fibre is found in**  
(A) Dried apricot (B) Peas  
(C) Bran (D) Cornflakes
- 69. A bland diet is recommended in**  
(A) Peptic ulcer (B) Atherosclerosis  
(C) Diabetes (D) Liver disease
- 70. A dietary deficiency in both the quantity and the quality of protein results in**  
(A) Kwashiorkar (B) Marasmus  
(C) Xerophthalmia (D) Liver diseases
- 71. The deficiency of both energy and protein causes**  
(A) Marasmus (B) Kwashiorkar  
(C) Diabetes (D) Beri-beri
- 72. Kwashiorkar is characterized by**  
(A) Night blindness (B) Edema  
(C) Easy fracturability (D) Xerophthalmia
- 73. A characteristic feature of Kwashiorkar is**  
(A) Fatty liver  
(B) Emaciation  
(C) Low insulin lever  
(D) Occurrence in less than 1 year infant
- 74. A characteristic feature of marasmus is**  
(A) Severe hypoalbuminemia  
(B) Normal epinephrine level  
(C) Mild muscle wasting  
(D) Low insulin and high cortisol level
- 75. Obesity generally reflects excess intake of energy and is often associated with the development of**  
(A) Nervousness  
(B) Non-insulin dependent diabetes mellitus  
(C) Hepatitis  
(D) Colon cancer
- 76. Atherosclerosis and coronary heart diseases are associated with the diet:**  
(A) High in total fat and saturated fat  
(B) Low in protein  
(C) High in protein  
(D) High in carbohydrate
- 77. Cerebrovascular disease and hypertension is associated with**  
(A) High calcium intake  
(B) High salt intake  
(C) Low calcium intake  
(D) Low salt intake
- 78. The normal range of total serum bilirubin is**  
(A) 0.2–1.2 mg/100 ml  
(B) 1.5–1.8 mg/100 ml  
(C) 2.0–4.0 mg/100 ml  
(D) Above 7.0 mg/100 ml

- 79. The normal range of direct reacting (conjugated) serum bilirubin is**
- (A) 0–0.1 mg/100 ml
  - (B) 0.1–0.4 mg/100 ml
  - (C) 0.4–0.6 mg/100 ml
  - (D) 0.5–1 mg/100 ml
- 80. The normal range of indirect (unconjugated) bilirubin in serum is**
- (A) 0–0.1 mg/100 ml
  - (B) 0.1–0.2 mg/100 ml
  - (C) 0.2–0.7 mg/100 ml
  - (D) 0.8–1.0 mg/100 ml
- 81. Jaundice is visible when serum bilirubin exceeds**
- (A) 0.5 mg/100 ml
  - (B) 0.8 mg/100 ml
  - (C) 1 mg/100 ml
  - (D) 2.4 mg/100 ml
- 82. An increase in serum unconjugated bilirubin occurs in**
- (A) Hemolytic jaundice
  - (B) Obstructive jaundice
  - (C) Nephritis
  - (D) Glomerulonephritis
- 83. One of the causes of hemolytic jaundice is**
- (A) G-6 phosphatase deficiency
  - (B) Increased conjugated bilirubin
  - (C) Glucokinase deficiency
  - (D) Phosphoglucomutase deficiency
- 84. Increased urobilinogen in urine and absence of bilirubin in the urine suggests**
- (A) Obstructive jaundice
  - (B) Hemolytic jaundice
  - (C) Viral hepatitis
  - (D) Toxic jaundice
- 85. A jaundice in which serum alanine transaminase and alkaline phosphatase are normal is**
- (A) Hepatic jaundice
  - (B) Hemolytic jaundice
  - (C) Parenchymatous jaundice
  - (D) Obstructive Jaundice
- 86. Fecal stercobilinogen is increased in**
- (A) Hemolytic jaundice
  - (B) Hepatic jaundice
  - (C) Viral hepatitis
  - (D) Obstructive jaundice
- 87. Fecal urobilinogen is increased in**
- (A) Hemolytic jaundice
  - (B) Obstruction of biliary duct
  - (C) Extrahepatic gall stones
  - (D) Enlarged lymphnodes
- 88. A mixture of conjugated and unconjugated bilirubin is found in the circulation in**
- (A) Hemolytic jaundice
  - (B) Hepatic jaundice
  - (C) Obstructive jaundice
  - (D) Post hepatic jaundice
- 89. Hepatocellular jaundice as compared to pure obstructive type of jaundice is characterized by**
- (A) Increased serum alkaline phosphatase, LDH and ALT
  - (B) Decreased serum alkaline phosphatase, LDH and ALT
  - (C) Increased serum alkaline phosphatase and decreased levels of LDH and ALT
  - (D) Decreased serum alkaline phosphatase and increased serum LDH and ALT
- 90. Icteric index of an normal adult varies between**
- (A) 1–2
  - (B) 2–4
  - (C) 4–6
  - (D) 10–15
- 91. Clinical jaundice is present with an icteric index above**
- (A) 4
  - (B) 8
  - (C) 10
  - (D) 15
- 92. Normal quantity of urobilinogen excreted in the feces per day is about**
- (A) 10–25 mg
  - (B) 50–250 mg
  - (C) 300–500 mg
  - (D) 700–800 mg

- 93. Fecal urobilinogen is decreased in**
- (A) Obstruction of biliary duct
  - (B) Hemolytic jaundice
  - (C) Excess fat intake
  - (D) Low fat intake
- 94. A complete absence of fecal urobilinogen is strongly suggestive of**
- (A) Obstruction of bile duct
  - (B) Hemolytic jaundice
  - (C) Intrahepatic cholestasis
  - (D) Malignant obstructive disease
- 95. Immediate direct Vanden Bergh reaction indicates**
- (A) Hemolytic jaundice
  - (B) Hepatic jaundice
  - (C) Obstructive jaundice
  - (D) Megaloblastic anemia
- 96. The presence of bilirubin in the urine without urobilinogen suggests**
- (A) Obstructive jaundice
  - (B) Hemolytic jaundice
  - (C) Pernicious anemia
  - (D) Damage to the hepatic parenchyma
- 97. Impaired galactose tolerance test suggests**
- (A) Defect in glucose utilisation
  - (B) Liver cell injury
  - (C) Renal defect
  - (D) Muscle injury
- 98. Increased serum ornithine carbamoyl transferase activity is diagnostic of**
- (A) Myocardial infarction
  - (B) Hemolytic jaundice
  - (C) Bone disease
  - (D) Acute viral hepatitis
- 99. The best known and most frequently used test of the detoxicating functions of liver is**
- (A) Hippuric acid test
  - (B) Galactose tolerance test
  - (C) Epinephrine tolerance test
  - (D) Rose Bengal dye test
- 100. The ability of liver to remove a dye like BSP from the blood suggests a normal**
- (A) Excretory function
  - (B) Detoxification function
  - (C) Metabolic function
  - (D) Circulatory function
- 101. Removal of BSP dye by the liver involves conjugation with**
- (A) Thiosulphate
  - (B) Glutamine
  - (C) Cystein component of glutathione
  - (D) UDP glucuronate
- 102. Normal value of plasma total proteins varies between**
- (A) 3–4 gm/100ml
  - (B) 6–8 gm/100ml
  - (C) 10–12 gm/100ml
  - (D) 14–16 gm/100ml
- 103. A decrease in albumin with increased production of other unidentified proteins which migrate in  $\beta$ ,  $\gamma$  region suggests**
- (A) Cirrhosis of liver
  - (B) Nephrotic syndrome
  - (C) Infection
  - (D) Chronic lymphatic leukemia
- 104. In increase in  $\alpha_2$ -Globulin with loss of albumin in urine suggests**
- (A) Primary immune deficiency
  - (B) Nephrotic syndrome
  - (C) Cirrhosis of liver
  - (D) Multiple myeloma
- 105. The normal levels of prothrombin time is about**
- (A) 2 sec
  - (B) 4 sec
  - (C) 14 sec
  - (D) 10–16 sec
- 106. In obstructive jaundice prothrombin time**
- (A) Remains normal
  - (B) Decreases
  - (C) Responds to vit K and becomes normal
  - (D) Responds to vit K and increases
- 107. In parenchymatous liver disease the prothrombin time**
- (A) Remains normal
  - (B) Increases
  - (C) Decreases
  - (D) Responds to Vit K

- 108. Urea clearance test is used to determine the**
- (A) Glomerular filtration rate
  - (B) Renal plasma flow
  - (C) Ability of kidney to concentrate the urine
  - (D) Measurement of tubular mass
- 109. The formula to calculate maximum urea clearance is  $\frac{U \times V}{B}$ , where U denotes**
- (A) Concentration of urea in urine in gm/24 hr
  - (B) Concentration of urea in urine in mg/100 ml
  - (C) Concentration of urea in blood in mg/100 ml
  - (D) Volume of urine in ml/mt
- 110. Average maximum urea clearance is**
- (A) 30 ml
  - (B) 50 ml
  - (C) 75 ml
  - (D) 90 ml
- 111. The average normal value for standard urea clearance is**
- (A) 20 ml
  - (B) 30 ml
  - (C) 40 ml
  - (D) 54 ml
- 112. Urea clearance is lowered in**
- (A) Acute nephritis
  - (B) Pneumonia
  - (C) Early stage of nephritic syndrome
  - (D) Benign hypertension
- 113. Glomerular filtration rate can be measured by**
- (A) Endogenous creatinine clearance
  - (B) Para-aminohippurate test
  - (C) Addis test
  - (D) Mosenthal test
- 114. At normal levels of creatinine in the blood, this metabolite is**
- (A) Filtered at the glomerulus but not secreted nor reabsorbed by the tubule
  - (B) Secreted by the tubule
  - (C) Reabsorbed by the tubule
  - (D) Secreted and reabsorbed by tubule
- 115. The normal values for creatinine clearance varies from**
- (A) 20–40 ml/min
  - (B) 40–60 ml/min
  - (C) 70–85 ml/min
  - (D) 95–105 ml/min
- 116. Measurement of insulin clearance test is a measure of**
- (A) Glomerular filtration rate
  - (B) Filtration factor
  - (C) Renal plasma flow
  - (D) Tubular secretory mass
- 117. The polysaccharide insulin is**
- (A) Filtered at the glomerulus but neither secreted nor reabsorbed by the tubule
  - (B) Filtered at the glomerulus and secreted by the tubule
  - (C) Filtered at the glomerulus and reabsorbed by the tubule
  - (D) Filtered at the glomerulus, secreted and reabsorbed by the tubule
- 118. Normal insulin clearance is**
- (A) 40 ml/1.73 sqm
  - (B) 60 ml/1.73 sqm
  - (C) 80 ml/1.73 sqm
  - (D) 120 ml/1.73 sqm
- 119. Creatinine EDTA clearance is a test to measure**
- (A) Renal plasma flow
  - (B) Filtration fraction
  - (C) Glomerular filtration rate
  - (D) Tubular function
- 120. The end products of saponification:**
- (A) glycerol
  - (B) acid
  - (C) soap
  - (D) Both (A) and (C)
- 121. The normal PAH clearance for a surface area of 1.73 sqm. is**
- (A) 200 ml/min
  - (B) 300 ml/min
  - (C) 400 ml/min
  - (D) 574 ml/min
- 122. Para amino hippurate is**
- (A) Filtered at glomeruli and secreted by the tubules
  - (B) Filtered at glomeruli and not secreted by the tubules
  - (C) Filtered at glomeruli and reabsorbed completely
  - (D) Not removed completely during a single circulation of the blood through the kidney.
- 123. The Tm for PAH i.e the maximal secretory capacity of the tubule for PAH can be used to gavage the**
- (A) Extent of tubular damage

- (B) Impairment of the capacity of the tubule to perform osmotic work  
(C) Impairment of renal plasma flow  
(D) Glomerular filtration rate
- 124. The normal Tm in mg/min/1.73 sqm for PAH is**  
(A) 20 (B) 40  
(C) 60 (D) 80
- 125. The normal range of filtration factor in an adult is**  
(A) 0.10–0.15 (B) 0.16–0.21  
(C) 0.25–0.30 (D) 0.35–0.40
- 126. The filtration factor tends to be normal in**  
(A) Early essential hypertension  
(B) Malignant phase of hypertension  
(C) Glomerulonephritis  
(D) Acute nephritis
- 127. The filtration factor is increased in**  
(A) Glomerulonephritis  
(B) Malignant phase of hypertension  
(C) Early essential hypertension  
(D) Acute nephritis
- 128. The filtration factor is decreased in**  
(A) Glomerulonephritis  
(B) Early essential hypertension  
(C) Malignant phase of hypertension  
(D) Starvation
- 129. Excretion of phenolsulphanthalein (PSP) reflects**  
(A) Glomerulonephritis  
(B) Maximal tubular excretory capacity  
(C) Filtration factor  
(D) Renal plasma flow
- 130. Which of the following is a polyunsaturated fatty acid?**  
(A) Palmitic acid (B) Palmitoleic acid  
(C) Linoleic acid (D) Oleic acid
- 131. Which of the following is omega-3 polyunsaturated fatty acid?**  
(A) Linoleic acid (B)  $\alpha$ -Linolenic acid  
(C)  $\gamma$ -Linolenic acid (D) Arachidonic acid
- 132. Triglycerides are**  
(A) Heavier than water  
(B) Major constituents of membranes  
(C) Non-polar  
(D) Hydrophilic
- 133. Cerebronic acid is present in**  
(A) Glycerophospholipids  
(B) Sphingophospholipids  
(C) Galactosyl ceramide  
(D) Gangliosides
- 134. Acylsphingosine is also known as**  
(A) Sphingomyelin (B) Ceramide  
(C) Cerebroside (D) Sulphatide
- 135. The highest phospholipids content is found in**  
(A) Chylomicrons (B) VLDL  
(C) LDL (D) HDL
- 136. The major lipid in chylomicrons is**  
(A) Triglycerides (B) Phospholipids  
(C) Cholesterol (D) Free fatty acids
- 137. Number of carbon atoms in cholesterol is**  
(A) 17 (B) 19  
(C) 27 (D) 30
- 138. The lipoprotein richest in cholesterol is**  
(A) Chylomicrons (B) VLDL  
(C) LDL (D) HDL
- 139. The major storage form of lipids is**  
(A) Esterified cholesterol  
(B) Glycerophospholipids  
(C) Triglycerides  
(D) Sphingolipids
- 140. Cerebronic acid is present in**  
(A) Triglycerides  
(B) Cerebroside  
(C) Esterified cholesterol  
(D) Sphingomyelin
- 141. The nitrogenous base in lecithin is**  
(A) Ethanolamine (B) Choline  
(C) Serine (D) Betaine

- 142. All the following are omega-6-fatty acids except**  
 (A) Linoleic acid (B)  $\alpha$ -Linolenic acid  
 (C)  $\gamma$ -Linolenic acid (D) Arachidonic acid
- 143. All the following have 18 carbon atoms except**  
 (A) Linoleic acid (B) Linolenic acid  
 (C) Arachidonic acid (D) Stearic acid
- 144. A 20-carbon fatty acid among the following is**  
 (A) Linoleic acid (B)  $\alpha$ -Linolenic acid  
 (C)  $\beta$ -Linolenic acid (D) Arachidonic acid
- 145. Triglycerides are transported from liver to extrahepatic tissues by**  
 (A) Chylomicrons (B) VLDL  
 (C) HDL (D) LDL
- 146. Cholesterol is transported from liver to extrahepatic tissues by**  
 (A) Chylomicrons (B) VLDL  
 (C) HDL (D) LDL
- 147. Elevated plasma level of the following projects against atherosclerosis:**  
 (A) Chylomicrons (B) VLDL  
 (C) HDL (D) LDL
- 148. All the following amino acids are non-essential except**  
 (A) Alanine (B) Histidine  
 (C) Cysteine (D) Proline
- 149. Sulphydryl group is present in**  
 (A) Cysteine (B) Methionine  
 (C) Both (A) and (B) (D) None of these
- 150. Oligosaccharide-pyrophosphoryl dolichol is required for the synthesis of**  
 (A) N-linked glycoproteins  
 (B) O-linked glycoproteins  
 (C) GPI-linked glycoproteins  
 (D) All of these
- 151. In N-linked glycoproteins, oligosaccharide is attached to protein through its**  
 (A) Asparagine residue (B) Glutamine residue  
 (C) Arginine residue (D) Lysine residue
- 152. De novo synthesis of fatty acids occurs in**  
 (A) Cytosol (B) Mitochondria  
 (C) Microsomes (D) All of these
- 153. Acyl Carrier Protein contains the vitamin:**  
 (A) Biotin (B) Lipoic acid  
 (C) Pantothenic acid (D) Folic acid
- 154. Which of the following is required as a reductant in fatty acid synthesis?**  
 (A) NADH (B) NADPH  
 (C) FADH<sub>2</sub> (D) FMNH<sub>2</sub>
- 155. Hepatic lipogenesis is stimulated by:**  
 (A) cAMP (B) Glucagon  
 (C) Epinephrine (D) Insulin
- 156. De novo synthesis of fatty acids requires all of the following except**  
 (A) Biotin (B) NADH  
 (C) Pantothenic acid (D) ATP
- 157. Acetyl CoA carboxylase regulates fatty acid synthesis by which of the following mechanism?**  
 (A) Allosteric regulation  
 (B) Covalent modification  
 (C) Induction and repression  
 (D) All of these
- 158.  $\beta$ -Oxidation of fatty acids requires all the following coenzymes except**  
 (A) CoA (B) FAD  
 (C) NAD (D) NADP
- 159. Which of the following can be oxidized by  $\beta$ -oxidation pathway?**  
 (A) Saturated fatty acids  
 (B) Monosaturated fatty acids  
 (C) Polyunsaturated fatty acids  
 (D) All of these
- 160. Propionyl CoA is formed on oxidation of**  
 (A) Monounsaturated fatty acids  
 (B) Polyunsaturated fatty acids  
 (C) Fatty acids with odd number of carbon atoms  
 (D) None of these

- 161. An enzyme required for the synthesis of ketone bodies as well as cholesterol is**  
(A) Acetyl CoA carboxylase  
(B) HMG CoA synthetase  
(C) HMG CoA reductase  
(D) HMG CoA lyase
- 162. Ketone bodies are synthesized in**  
(A) Adipose tissue (B) Liver  
(C) Muscles (D) Brain
- 163. All the following statements about ketone bodies are true except**  
(A) Their synthesis increases in diabetes mellitus  
(B) They are synthesized in mitochondria  
(C) They can deplete the alkali reserve  
(D) They can be oxidized in the liver
- 164. All the following statements about carnitine are true except**  
(A) It can be synthesised in the human body  
(B) It can be synthesized from methionine and lysine  
(C) It is required for transport of short chain fatty acids into mitochondria  
(D) Its deficiency can occur due to haemodialysis
- 165. Which of the following can be synthesized in the human body if precursors are available?**  
(A) Oleic acid (B) Palmitoleic acid  
(C) Arachidonic acid (D) All of these
- 166. All the following can be oxidized by  $\beta$ -oxidation except**  
(A) Palmitic acid  
(B) Phytanic acid  
(C) Linoleic acid  
(D) Fatty acids having an odd number of carbon atoms
- 167. Anti-inflammatory corticosteroids inhibit the synthesis of**  
(A) Leukotrienes (B) Prostaglandins  
(C) Thromboxanes (D) All of these
- 168. Diets having a high ratio of polyunsaturated: saturated fatty acids can cause**  
(A) Increase in serum triglycerides  
(B) Decrease in serum cholesterol  
(C) Decrease in serum HDL  
(D) Skin lesions
- 169. Thromboxanes cause**  
(A) Vasodilation  
(B) Bronchoconstriction  
(C) Platelet aggregation  
(D) All of these
- 170. Prostaglandins lower camp in**  
(A) Adipose tissue (B) Lungs  
(C) Platelets (D) Adenohypophysis
- 171. Slow reacting Substance of Anaphylaxis is a mixture of**  
(A) Prostaglandins (B) Prostacyclins  
(C) Thromboxanes (D) Leukotrienes
- 172. Dipalmitoyl lecithin acts as**  
(A) Platelet activating factor  
(B) Second messenger for hormones  
(C) Lung surfactant  
(D) Anti-ketogenic compound
- 173. Reichert-Meissl number:**  
(A) 0.1 N KOH (B) 0.5 KOH  
(C) 0.1 N NaOH (D) 0.5 NaOH
- 174. In glycerophospholipids, a polyunsaturated fatty acid is commonly attached to which of the following carbon atom of glycerol?**  
(A) Carbon 1 (B) Carbon 2  
(C) Both (A) and (B) (D) None of these
- 175. Lysolecithin is formed from lecithin by removal of**  
(A) Fatty acid from position 1  
(B) Fatty acid from position 2  
(C) Phosphorylcholine  
(D) Choline
- 176. Sphingosine is synthesized from**  
(A) Palmitoyl CoA and Choline  
(B) Palmitoyl CoA and ethanolamine  
(C) Palmitoyl CoA and serine  
(D) Acetyl CoA and choline
- 177. For synthesis of sphingosine, all the following coenzymes are required except**  
(A) Pyridoxal phosphate  
(B) NADPH  
(C) FAD  
(D) NAD

- 178. Cerebrosides contain all the following except**  
(A) Galactose (B) Sulphate  
(C) Sphingosine (D) Fatty acid
- 179. Niemann-Pick disease results from deficiency of**  
(A) Ceramidase (B) Sphingomyelinase  
(C) Arylsulphatase A (D) Hexosaminidase A
- 180. Chylomicron remnants are catabolised in**  
(A) Intestine (B) Adipose tissue  
(C) Liver (D) Liver and intestine
- 181. VLDL remnant may be converted into**  
(A) VLDL (B) LDL  
(C) HDL (D) Chylomicrons
- 182. Receptors for chylomicron remnants are**  
(A) Apo A specific (B) Apo B-48 specific  
(C) Apo C specific (D) Apo E specific
- 183. LDL receptor is specific for**  
(A) Apo B-48 and Apo B 100  
(B) Apo B-48 and Apo E  
(C) Apo B-100 and Apo D  
(D) Apo B-100 and apo D
- 184. Nascent HDL of intestinal origin lacks**  
(A) Apo A (B) Apo C  
(C) Apo E (D) Apo C and Apo E
- 185. HDL is synthesized in**  
(A) Adipose tissue (B) Liver  
(C) Intestine (D) Liver and intestine
- 186. Nascent HDL of intestinal origin acquires Apo C and Apo E from**  
(A) Chylomicrons  
(B) VLDL  
(C) LDL  
(D) HDL of the hepatic origin
- 187. Heparin releasable hepatic lipase converts**  
(A) VLDL remnants into LDL  
(B) Nascent HDL into HDL  
(C) HDL<sub>2</sub> into HDL<sub>3</sub>  
(D) HDL<sub>3</sub> into HDL<sub>2</sub>
- 188. Activated lecithin cholesterol acyl transferase is essential for the conversion of**  
(A) VLDL remnants into LDL  
(B) Nascent HDL into HDL  
(C) HDL<sub>2</sub> into HDL<sub>3</sub>  
(D) HDL<sub>3</sub> into HDL<sub>2</sub>
- 189. Fatty liver may be caused by**  
(A) Deficiency of methionine  
(B) Puromycin  
(C) Chronic alcoholism  
(D) All of these
- 190. Alcohol dehydrogenase converts ethanol into**  
(A) Acetyl CoA (B) Acetaldehyde  
(C) Acetate (D) CO<sub>2</sub> and H<sub>2</sub>O
- 191. Lipids are stored in the body mainly in the form of**  
(A) Phospholipids (B) Glycolipids  
(C) Triglycerides (D) Fatty acids
- 192. Lipid stores are mainly present in**  
(A) Liver (B) Brain  
(C) Muscles (D) Adipose tissue
- 193. Glycerol is converted into glycerol-3-phosphate by**  
(A) Thiokinase (B) Triokinase  
(C) Glycerol kinase (D) All of these
- 194. In adipose tissue, glycerol-3-phosphate required for the synthesis of triglycerides comes mainly from**  
(A) Hydrolysis of pre-existing triglycerides  
(B) Hydrolysis of phospholipids  
(C) Dihydroxyacetone phosphate formed in glycolysis  
(D) Free glycerol
- 195. Glycerol released from adipose tissue by hydrolysis of triglycerides is mainly**  
(A) Taken up by liver  
(B) Taken up by extrahepatic tissues  
(C) Reutilised in adipose tissue  
(D) Excreted from the body

- 196. Free glycerol cannot be used for triglyceride synthesis in**  
(A) Liver (B) Kidney  
(C) Intestine (D) Adipose tissue
- 197. Adipose tissue lacks**  
(A) Hormone-sensitive lipase  
(B) Glycerol kinase  
(C) cAMP-dependent protein kinase  
(D) Glycerol-3-phosphate dehydrogenase
- 198. A digestive secretion that does not contain any digestive enzyme is**  
(A) Saliva (B) Gastric juice  
(C) Pancreatic juice (D) Bile
- 199. Saliva contains a lipase which acts on triglycerides having**  
(A) Short chain fatty acids  
(B) Medium chain fatty acids  
(C) Long chain fatty acids  
(D) All of these
- 200. Salivary lipase hydrolyses the ester bond at**  
(A) Position 1 of triglycerides  
(B) Position 2 of triglycerides  
(C) Position 3 of triglycerides  
(D) All of these
- 201. Salivary lipase converts dietary triglycerides into**  
(A) Diglycerides and fatty acids  
(B) Monoglycerides and fatty acids  
(C) Glycerol and fatty acids  
(D) All of these
- 202. Pancreatic lipase requires for its activity:**  
(A) Co-lipase (B) Bile salts  
(C) Phospholipids (D) All of these
- 203. Pancreatic lipase converts triacylglycerols into**  
(A) 2, 3-Diacylglycerol  
(B) 1-Monoacylglycerol  
(C) 2-Monoacylglycerol  
(D) 3-Monoacylglycerol
- 204. Oxidation of fatty acids occurs**  
(A) In the cytosol  
(B) In the matrix of mitochondria  
(C) On inner mitochondrial membrane  
(D) On the microsomes
- 205. Activation of fatty acids requires all the following except**  
(A) ATP (B) Coenzyme A  
(C) Thiokinase (D) Carnitine
- 206. Mitochondrial thiokinase acts on**  
(A) Short chain of fatty acids  
(B) Medium chain fatty acids  
(C) Long chain fatty acids  
(D) All of these
- 207. Carnitine is required for the transport of**  
(A) Triglycerides out of liver  
(B) Triglycerides into mitochondria  
(C) Short chain fatty acids into mitochondria  
(D) Long chain fatty acids into mitochondria
- 208. Carnitine acylcarnitine translocase is present**  
(A) In the inner mitochondrial membrane  
(B) In the mitochondrial matrix  
(C) On the outer surface of inner mitochondrial membrane  
(D) On the inner surface of inner mitochondrial membrane
- 209. Net ATP generation on complete oxidation of stearic acid is**  
(A) 129 (B) 131  
(C) 146 (D) 148
- 210. Propionyl CoA formed oxidation of fatty acids having an odd number of carbon atoms is converted into**  
(A) Acetyl CoA  
(B) Acetoacetyl CoA  
(C) D-Methylmalonyl CoA  
(D) Butyryl CoA
- 211.  $\alpha$ -Oxidation of fatty acids occurs mainly in**  
(A) Liver (B) Brain  
(C) Muscles (D) Adipose tissue

- 212. Refsum's disease results from a defect in the following pathway except**
- (A) Alpha-oxidation of fatty acids
  - (B) Beta-oxidation of fatty acids
  - (C) Gamma-oxidation of fatty acids
  - (D) Omega-oxidation of fatty acids
- 213. The end product of omega-oxidation of fatty acids having an even number of carbon atoms is**
- (A) Adipic acid      (B) Suberic acid
  - (C) Both (A) and (B)    (D) None of these
- 214. De novo synthesis of fatty acids is catalysed by a multi-enzyme complex which contains**
- (A) One-SH group      (B) Two-SH groups
  - (C) Three-SH groups    (D) Four-SH groups
- 215. Fat depots are located in**
- (A) Intermuscular connective tissue
  - (B) Mesentary
  - (C) Omentum
  - (D) All of these
- 216. Salivary lipase is secreted by**
- (A) Parotid glands
  - (B) Sub-maxillary glands
  - (C) Dorsal surface of tongue
  - (D) None of these
- 217. Co-lipase is a**
- (A) Bile salt      (B) Vitamin
  - (C) Protein      (D) Phospholipid
- 218. Plasma becomes milky**
- (A) Due to high level of HDL
  - (B) Due to high level of LDL
  - (C) During fasting
  - (D) After a meal
- 219. Mitochondrial membrane is permeable to**
- (A) Short chain fatty acids
  - (B) Medium chain fatty acids
  - (C) Long chain fatty acids
  - (D) All of these
- 220. During each cycle of  $\beta$ -oxidation**
- (A) One carbon atom is removed from the carboxyl end of the fatty acid
  - (B) One carbon atom is removed from the methyl end of the fatty acid
  - (C) Two carbon atoms are removed from the carboxyl end of the fatty acid
  - (D) Two carbon atoms are removed from the methyl end of the fatty acid
- 221. Net generation of energy on complete oxidation of palmitic acid is**
- (A) 129 ATP equivalents
  - (B) 131 ATP equivalents
  - (C) 146 ATP equivalents
  - (D) 148 ATP equivalents
- 222. Net generation of energy on complete oxidation of a 17-carbon fatty acid is**
- (A) Equal to the energy generation from a 16-carbon fatty acid
  - (B) Equal to the energy generation from an 18-carbon fatty acid
  - (C) Less than the energy generation from a 16-carbon fatty acid
  - (D) In between the energy generation from a 16-carbon fatty acid and an 18-carbon fatty acid
- 223. Net energy generation on complete oxidation of linoleic acid is**
- (A) 148 ATP equivalents
  - (B) 146 ATP equivalents
  - (C) 144 ATP equivalents
  - (D) 142 ATP equivalents
- 224. Extramitochondrial synthesis of fatty acids occurs in**
- (A) Mammary glands    (B) Lungs
  - (C) Brain      (D) All of these
- 225. One functional sub-unit of multi-enzyme complex for de novo synthesis of fatty acids contains**
- (A) One —SH group
  - (B) Two —SH groups
  - (C) Three —SH groups
  - (D) Four —SH groups

- 226. NADPH required for fatty acid synthesis can come from**
- (A) Hexose monophosphate shunt  
 (B) Oxidative decarboxylation of malate  
 (C) Extramitochondrial oxidation of isocitrate  
 (D) All of these
- 227. Fatty liver may be prevented by all of the following except**
- (A) Choline (B) Betaine  
 (C) Methionine (D) Ethionine
- 228. Human desaturase enzyme system cannot introduce a double bond in a fatty acid beyond**
- (A) Carbon 9 (B) Carbon 6  
 (C) Carbon 5 (D) Carbon 3
- 229. Which of the following lipid is absorbed actively from intestines?**
- (A) Glycerol  
 (B) Cholesterol  
 (C) Monoacylglycerol  
 (D) None of these
- 230. C<sub>22</sub> and C<sub>24</sub> fatty acids required for the synthesis of sphingolipids in brain are formed by**
- (A) De novo synthesis  
 (B) Microsomal chain elongation  
 (C) Mitochondrial chain elongation  
 (D) All of these
- 231. Sphingomyelins:**
- (A) Phospholipids (B) Nitrolipids  
 (C) Alcohols (D) None of these
- 232. All of the following statements about hypoglycin are true except**
- (A) It is a plant toxin  
 (B) It causes hypoglycaemia  
 (C) It inhibits oxidation of short chain fatty acids  
 (D) It inhibits oxidation of long chain fatty acids
- 233. Synthesis of prostaglandins is inhibited by**
- (A) Glucocorticoids (B) Aspirin  
 (C) Indomethacin (D) All of these
- 234. Lipo-oxygenase is required for the synthesis of**
- (A) Prostaglandins (B) Leukotrienes  
 (C) Thromboxanes (D) All of these
- 235. All of the following statements about multiple sclerosis are true except**
- (A) There is loss of phospholipids from white matter  
 (B) There is loss of sphingolipids from white matter  
 (C) There is loss of esterified cholesterol from white matter  
 (D) White matter resembles gray matter in composition
- 236. After entering cytosol, free fatty acids are bound to**
- (A) Albumin (B) Globulin  
 (C) Z-protein (D) None of these
- 237. Release of free fatty acids from adipose tissue is increased by all of the following except**
- (A) Glucagon (B) Epinephrine  
 (C) Growth hormone (D) Insulin
- 238. All the following statements about brown adipose tissue are true except**
- (A) It is rich in cytochromes  
 (B) It oxidizes glucose and fatty acids  
 (C) Oxidation and phosphorylation are tightly coupled in it  
 (D) Dinitrophenol has no effect on it
- 239. Lovastatin and mevastatin lower**
- (A) Serum triglycerides  
 (B) Serum cholesterol  
 (C) Serum phospholipids  
 (D) All of these
- 240. Lovastatin is a**
- (A) Competitive inhibitor of acetyl CoA carboxylase  
 (B) Competitive inhibitor of HMG CoA synthetase  
 (C) Non-competitive inhibitor of HMG CoA reductase  
 (D) Competitive inhibitor of HMG CoA reductase
- 241. Abetalipoproteinaemia occurs due to a block in the synthesis of**
- (A) Apoprotein A (B) Apoprotein B  
 (C) Apoprotein C (D) Cholesterol

- 242. All of the following statements about Tangier disease are true except**
- (A) It is a disorder of HDL metabolism  
 (B) Its inheritance is autosomal recessive  
 (C) Apoproteins A-I and A-II are not synthesised  
 (D) Plasma HDL is increased
- 243. Genetic deficiency of lipoprotein lipase causes hyperlipoproteinaemia of following type:**
- (A) Type I (B) Type IIa  
 (C) Type IIb (D) Type V
- 244. Chylomicrons are present in fasting blood samples in hyperlipoproteinaemia of following types:**
- (A) Types I and IIa (B) Types IIa and IIb  
 (C) Types I and V (D) Types IV and V
- 245. Glutathione is a constituent of**
- (A) Leukotriene A<sub>4</sub> (B) Thromboxane A<sub>1</sub>  
 (C) Leukotriene C<sub>4</sub> (D) None of these
- 246. Prostaglandins are inactivated by**
- (A) 15-Hydroxyprostaglandin dehydrogenase  
 (B) Cyclo-oxygenase  
 (C) Lipo-oxygenase  
 (D) None of these
- 247. Phenylbutazone and indomethacin inhibit**
- (A) Phospholipase A<sub>1</sub> (B) Phospholipase A<sub>2</sub>  
 (C) Cyclo-oxygenase (D) Lipo-oxygenase
- 248. Prostaglandins stimulate**
- (A) Aggregation of platelets  
 (B) Lipolysis in adipose tissue  
 (C) Bronchodilatation  
 (D) Gastric acid secretion
- 249. For extramitochondrial fatty acid synthesis, acetyl CoA may be obtained from**
- (A) Citrate (B) Isocitrate  
 (C) Oxaloacetate (D) Succinate
- 250. Fluidity of membranes is increased by the following constituent except**
- (A) Polyunsaturated fatty acids  
 (B) Saturated fatty acids  
 (C) Integral proteins  
 (D) Cholesterol
- 251. Transition temperature of membranes may be affected by the following constituent of membranes:**
- (A) Peripheral proteins (B) Integral proteins  
 (C) Cholesterol (D) Oligosaccharides
- 252. Acetyl CoA formed from pyruvate can be used for the synthesis of all the following except**
- (A) Glucose (B) Fatty acids  
 (C) Cholesterol (D) Steroid hormones
- 253. Which of the following can be used as a source of energy in extrahepatic tissues?**
- (A) Acetoacetate (B) Acetone  
 (C) Both (A) and (B) (D) None of these
- 254. Anti-inflammatory corticosteroids inhibit**
- (A) Phospholipase A<sub>1</sub> (B) Phospholipase A<sub>2</sub>  
 (C) Cyclo-oxygenase (D) Lipo-oxygenase
- 255. Cyclo-oxygenase is involved in the synthesis of**
- (A) Prostaglandins (B) Thromboxanes  
 (C) Both (A) and (B) (D) None of these
- 256. Leukotrienes cause**
- (A) Increase in capillary permeability  
 (B) Aggregation of platelets  
 (C) Bronchodilatation  
 (D) None of these
- 257. Prostaglandins decrease all of the following except**
- (A) Gastric acid secretion  
 (B) Blood pressure  
 (C) Uterine contraction  
 (D) Platelet aggregation
- 258. Hypocholesterolaemia can occur in**
- (A) Hyperthyroidism  
 (B) Nephrotic syndrome  
 (C) Obstructive jaundice  
 (D) Diabetes mellitus

- 259. De novo synthesis and oxidation of fatty acids differ in the following respect:**
- (A) Synthesis occurs in cytosol and oxidation in mitochondria
  - (B) Synthesis is decreased and oxidation increased by insulin
  - (C) NADH is required in synthesis and FAD in oxidation
  - (D) Malonyl CoA is formed during oxidation but not during synthesis
- 260. Free fatty acids released from adipose tissue are transported in blood by**
- (A) Albumin
  - (B) VLDL
  - (C) LDL
  - (D) HDL
- 261.  $\beta$ -Galactosidase is deficient in**
- (A) Fabry's disease
  - (B) Krabbe's disease
  - (C) Gaucher's disease
  - (D) Metachromatic leukodystrophy
- 262. The enzyme deficient in metachromatic leukodystrophy is**
- (A) Arylsulphatase A
  - (B) Hexosaminidase A
  - (C) Ceramidase
  - (D) Sphingomyelinase
- 263. All of the following statements about generalized gangliosidosis are true except**
- (A) It results from deficiency of  $G_{M1}$ - $\beta$ -Gangliosidase
  - (B) Breakdown of  $G_{M1}$  ganglioside is impaired
  - (C)  $G_{M2}$  ganglioside accumulates in liver and elsewhere
  - (D) It leads to mental retardation
- 264. Hexosaminidase A is deficient in**
- (A) Tay-Sachs disease
  - (B) Gaucher's disease
  - (C) Niemann-Pick disease
  - (D) Fabry's disease
- 265. Mental retardation occurs in**
- (A) Tay-Sachs disease
  - (B) Gaucher's disease
  - (C) Niemann-Pick disease
  - (D) All of these
- 266. The enzyme deficient in Fabry's disease is**
- (A)  $\alpha$ -Galactosidase
  - (B)  $\beta$ -Galactosidase
  - (C)  $\alpha$ -Glucosidase
  - (D)  $\beta$ -Glucosidase
- 267. Highest protein content amongst the following is present in**
- (A) Wheat
  - (B) Rice
  - (C) Pulses
  - (D) Soyabean
- 268. Daily protein requirement of an adult man is**
- (A) 0.5 gm/kg of body weight
  - (B) 0.8 gm/kg of body weight
  - (C) 1.0 gm/kg of body weight
  - (D) 1.5 gm/kg of body weight
- 269. Daily protein requirement of an adult woman is**
- (A) 0.5 gm/kg of body weight
  - (B) 0.8 gm/kg of body weight
  - (C) 1.0 gm/kg of body weight
  - (D) 1.5 gm/kg of body weight
- 270. Cysteine can partially meet the requirement of**
- (A) Phenylalanine
  - (B) Threonine
  - (C) Methionine
  - (D) None of these
- 271. Invisible fat is present in**
- (A) Milk
  - (B) Coconut oil
  - (C) Groundnut oil
  - (D) Hydrogenated oils
- 272. Visible fat is present in**
- (A) Milk
  - (B) Pulses
  - (C) Coconut oil
  - (D) Egg yolk
- 273. Fat content of eggs is about**
- (A) 7%
  - (B) 10%
  - (C) 13%
  - (D) 16%
- 274. Fat content of pulses is about**
- (A) 5%
  - (B) 10%
  - (C) 15%
  - (D) 20%
- 275. Predominant fatty acids in meat are**
- (A) Saturated
  - (B) Monounsaturated
  - (C) Polyunsaturated
  - (D) Mono and poly-unsaturated

- 276. Oils having more than 50 % polyunsaturated fatty acids include all of the following except**  
 (A) Groundnut oil (B) Soyabean oil  
 (C) Sunflower oil (D) Safflower oil
- 277. Cholesterol is present in all of the following except**  
 (A) Egg (B) Fish  
 (C) Milk (D) Pulses
- 278. Which of the following has the highest cholesterol content?**  
 (A) Meat (B) Fish  
 (C) Butter (D) Milk
- 279. Which of the following has the highest cholesterol content?**  
 (A) Egg yolk (B) Egg white  
 (C) Meat (D) Fish
- 280. The following contains the least cholesterol:**  
 (A) Milk (B) Meat  
 (C) Butter (D) Cheese
- 281. Which of the following constitutes fibre or roughage in food?**  
 (A) Cellulose (B) Pectin  
 (C) Inulin (D) All of these
- 282. The starch content of wheat is about**  
 (A) 50% (B) 60%  
 (C) 70% (D) 80%
- 283. The starch content of pulses is about**  
 (A) 50% (B) 60%  
 (C) 70% (D) 80%
- 284. A significant source of starch among vegetables is**  
 (A) Radish (B) Spinach  
 (C) Potato (D) Cauliflower
- 285. The cyclic ring present in all the steroids:**  
 (A) Cyclopentano perhydrophenanthrene  
 (B) Nitropentano  
 (C) both (A) and (B)  
 (D) None of these
- 286. In Ames' assay, addition of a carcinogen to the culture medium allows *S. typhimurium* to grow**  
 (A) In the presence of histidine  
 (B) In the presence of arginine  
 (C) In the absence of histidine  
 (D) In the absence of arginine
- 287. In Ames' assay, liver homogenate is included in the culture medium because**  
 (A) It converts pro-carcinogens into carcinogens  
 (B) Liver can metabolise histidine  
 (C) *Salmonella* mainly infects liver  
 (D) Liver is very susceptible to cancer
- 288. Bile pigments are present and urobilinogen absent in urine in**  
 (A) Haemolytic jaundice  
 (B) Hepatocellular jaundice  
 (C) Obstructive jaundice  
 (D) Crigler-Najjar syndrome
- 289. Bile pigments are absent and urobilinogen increased in urine in**  
 (A) Haemolytic jaundice  
 (B) Hepatocellular jaundice  
 (C) Obstructive jaundice  
 (D) Rotor's syndrome
- 290. In obstructive jaundice, urine shows**  
 (A) Absence of bile pigments and urobilinogen  
 (B) Presence of bile pigments and urobilinogen  
 (C) Absence of bile pigments and presence of urobilinogen  
 (D) Presence of bile pigments and absence of urobilinogen
- 291. In haemolytic jaundice, urine shows**  
 (A) Absence of bile pigments and urobilinogen  
 (B) Presence of bile pigments and urobilinogen  
 (C) Absence of bile pigments and presence of urobilinogen  
 (D) Presence of bile pigments and absence of urobilinogen

- 292. Serum albumin may be decreased in**  
(A) Haemolytic jaundice  
(B) Hepatocellular jaundice  
(C) Obstructive jaundice  
(D) All of these
- 293. Normal range of serum albumin is**  
(A) 2.0–3.6 gm/dl (B) 2.0–3.6 mg/dl  
(C) 3.5–5.5 gm/dl (D) 3.5–5.5 mg/dl
- 294. Normal range of serum globulin is**  
(A) 2.0–3.6 mg/dl (B) 2.0–3.6 gm/dl  
(C) 3.5–5.5 gm/dl (D) 3.5–5.5 mg/dl
- 295. Serum albumin: globulin ratio is altered in**  
(A) Gilbert's disease (B) Haemolytic jaundice  
(C) Viral hepatitis (D) Stones in bile duct
- 296. Esterification of cholesterol occurs mainly in**  
(A) Adipose tissue (B) Liver  
(C) Muscles (D) Kidneys
- 297. Galactose intolerance can occur in**  
(A) Haemolytic jaundice  
(B) Hepatocellular jaundice  
(C) Obstructive jaundice  
(D) None of these
- 298. Prothrombin is synthesised in**  
(A) Erythrocytes  
(B) Reticulo-endothelial cells  
(C) Liver  
(D) Kidneys
- 299. Prothrombin time remains prolonged even after parenteral administration of vitamin K in**  
(A) Haemolytic jaundice  
(B) Liver damage  
(C) Biliary obstruction  
(D) Steatorrhoea
- 300. All the following statements about obstructive jaundice are true except**  
(A) Conjugated bilirubin in serum is normal  
(B) Total bilirubin in serum is raised  
(C) Bile salts are present in urine  
(D) Serum alkaline phosphatase is raised
- 301. All the following statements about obstructive jaundice are true except**  
(A) Prothrombin time may be prolonged due to impaired absorption of vitamin K  
(B) Serum alkaline phosphatase may be raised due to increased release of the enzyme from liver cells  
(C) Bile salts may enter systemic circulation due to biliary obstruction  
(D) There is no defect in conjugation of bilirubin
- 302. A test to evaluate detoxifying function of liver is**  
(A) Serum albumin: globulin ratio  
(B) Galactose tolerance test  
(C) Hippuric acid test  
(D) Prothrombin time
- 303. Hippuric acid is formed from**  
(A) Benzoic acid and alanine  
(B) Benzoic acid glycine  
(C) Glucuronic acid and alanine  
(D) Glucuronic acid and glycine
- 304. An enzyme which is excreted in urine is**  
(A) Lactase dehydrogenase  
(B) Amylase  
(C) Ornithine transcarbamoylase  
(D) None of these
- 305. Serum gamma glutamyl transpeptidase is raised in**  
(A) Haemolytic jaundice  
(B) Myocardial infarction  
(C) Alcoholic hepatitis  
(D) Acute cholecystitis
- 306. Oliguria can occur in**  
(A) Diabetes mellitus  
(B) Diabetes insipidus  
(C) Acute glomerulonephritis  
(D) Chronic glomerulonephritis
- 307. Urea clearance is the**  
(A) Amount of urea excreted per minute  
(B) Amount of urea present in 100 ml of urine  
(C) Volume of blood cleared of urea in one minute  
(D) Amount of urea filtered by glomeruli in one minute

- 308. Inulin clearance is a measure of**  
 (A) Glomerular filtration rate  
 (B) Tubular secretion flow  
 (C) Tubular reabsorption rate  
 (D) Renal plasma flow
- 309. Phenolsulphonphthalein excretion test is an indicator of**  
 (A) Glomerular filtration  
 (B) Tubular secretion  
 (C) Tubular reabsorption  
 (D) Renal blood flow
- 310. Para-amino hippurate excretion test is an indicator of**  
 (A) Glomerular filtration  
 (B) Tubular secretion  
 (C) Tubular reabsorption  
 (D) Renal plasma flow
- 311. Renal plasma flow of an average adult man is**  
 (A) 120–130 ml/minute  
 (B) 325–350 ml/minute  
 (C) 480–52 ml/minute  
 (D) 560–830 ml/minute
- 312. Filtration fraction can be calculated from**  
 (A) Standard urea clearance and PSP excretion  
 (B) Maximum urea clearance and PSP excretion  
 (C) Maximum urea clearance and PAH clearance  
 (D) Inulin clearance and PAH clearance
- 313. Normal filtration fraction is about**  
 (A) 0.2 (B) 0.4  
 (C) 0.6 (D) 0.8
- 314. Filtration fraction is increased in**  
 (A) Acute glomerulonephritis  
 (B) Chronic glomerulonephritis  
 (C) Hypertension  
 (D) Hypotension
- 315. Among the following, a test of Glomerular function is**  
 (A) Urea clearance  
 (B) PSP excretion test  
 (C) PAH clearance  
 (D) Hippuric acid excretion test
- 316. Esters of fatty acids with higher alcohols other than glycerol are said to be**  
 (A) Waxes (B) Fats  
 (C) Both (A) and (B) (D) None of these
- 317. The combination of an amino alcohol, fatty acid and sialic acid form**  
 (A) Phospholipids (B) Sulpholipids  
 (C) Glycolipids (D) Aminolipids
- 318. Hydrolysis of fats by alkali is called**  
 (A) Saponification number  
 (B) Saponification  
 (C) Both (A) and (B)  
 (D) None of these
- 319. The number of milliliters of 0.1 N KOH required to neutralize the insoluble fatty acids from 5 gms of fat is called**  
 (A) Acid number (B) Acetyl number  
 (C) Halogenation (D) Polenske number
- 320. The rate of fatty acid oxidation is increased by**  
 (A) Phospholipids (B) Glycolipids  
 (C) Aminolipids (D) All of these
- 321. Lecithin contains a nitrogenous base named as**  
 (A) Ethanolamine (B) Choline  
 (C) Inositol (D) All of these
- 322. Lecithins contain an unsaturated fatty acid at position:**  
 (A)  $\alpha$  (B)  $\alpha$  and  $\beta$   
 (C)  $\beta$  (D) None of these
- 323. Lecithins are soluble in ordinary solvents except**  
 (A) Benzene (B) Ethyl alcohol  
 (C) Methyl alcohol (D) Acetone
- 324. Lecithins combine with protein to form**  
 (A) Phosphoprotein (B) Mucoprotein  
 (C) Lipoprotein (D) Glycoprotein
- 325. Instead of ester link plasmalogens possess an other link in position:**  
 (A)  $\alpha$  (B)  $\beta$   
 (C)  $\gamma$  (D) None of these

- 326. The alkyl radical in plasmalogen is an alcohol:**  
(A) Saturated (B) Unsaturated  
(C) Both (A) and (B) (D) None of these
- 327. The concentration of sphingomyelins are increased in**  
(A) Gaucher's disease  
(B) Fabry's disease  
(C) Fabry disease  
(D) Niemann-Pick disease
- 328. Sphingomyelins contain a complex amino alcohol named as**  
(A) Serine (B) Lysolecithin  
(C) Sphingosine (D) Glycol
- 329. The types of sphingomyelins are**  
(A) 1 (B) 3  
(C) 4 (D) 5
- 330. Glycolipids contain an amino alcohol:**  
(A) Sphingosine (B) Iso-sphingosine  
(C) Both (A) and (B) (D) None of these
- 331. Cerebrosides may also be classified as**  
(A) Sphingolipids (B) Sulpholipids  
(C) Aminolipids (D) Glycolipids
- 332. Gaucher's disease is characterized specially by the increase in**  
(A) Lignoceric acid  
(B) Nervonic acid  
(C) Cerebomic acid  
(D) Hydroxynervonic acid
- 333. Gangliosides are the glycolipids occurring in**  
(A) Brain (B) Liver  
(C) Kidney (D) Muscle
- 334. Lipoprotein present in cell membrane is by nature:**  
(A) Hydrophilic (B) Hydrophobic  
(C) Both (A) and (B) (D) None of these
- 335. The density of lipoproteins increases as the protein content**  
(A) Increases  
(B) Decreases  
(C) Highly decreases  
(D) Slightly and promptly decreases
- 336. Lipoproteins may be identified more accurately by means of**  
(A) Electrophoresis  
(B) Ultra centrifugation  
(C) Centrifugation  
(D) Immunoelectrophoresis
- 337. Very low density lipoproteins are also known as**  
(A)  $\beta$ -lipoproteins (B) Pre  $\beta$ -lipoproteins  
(C)  $\alpha$ -lipoproteins (D) None of these
- 338. The protein moiety of lipoprotein is known as**  
(A) Apoprotein (B) Pre-protein  
(C) Post-protein (D) Pseudoprotein
- 339. The  $\beta$ -lipoprotein fraction increases in severe**  
(A) Diabetes Mellitus (B) Uremia  
(C) Nephritis (D) Muscular dystrophy
- 340.  $\Delta^9$  indicates a double bond between carbon atoms of the fatty acids:**  
(A) 8 and 9 (B) 9 and 10  
(C) 9 and 11 (D) 9 and 12
- 341. The number of carbon atoms in decanoic acid present in butter:**  
(A) 6 (B) 8  
(C) 10 (D) 12
- 342. Arachidonic acid contains the number of double bonds:**  
(A) 2 (B) 3  
(C) 4 (D) 5
- 343. The prostaglandins are synthesized from**  
(A) Arachidonic acid (B) Oleic acid  
(C) Linoleic acid (D) Linolenic acid
- 344. The iodine number of essential fatty acids of vegetable oils:**  
(A) High (B) Very high  
(C) Very low (D) Low
- 345. Cholesterol is a**  
(A) Animal sterol (B) M.F.  $C_{27}H_{46}O$   
(C) 5 methyl groups (D) All of these

- 346. Waxes contain higher alcohols named as**  
 (A) Methyl (B) Ethyl  
 (C) Phytol (D) Cetyl
- 347. Lieberman-Burchard reaction is performed to detect**  
 (A) Cholesterol (B) Glycerol  
 (C) Fatty acid (D) Vitamin D
- 348. Lipase present in the stomach cannot hydrolyze fats owing to**  
 (A) Alkalinity (B) Acidity  
 (C) High acidity (D) Neutrality
- 349. Fatty acids are oxidized by**  
 (A)  $\alpha$ -oxidation (B)  $\beta$ -oxidation  
 (C)  $\omega$ -oxidation (D) All of these
- 350. The fatty acids containing even number and odd number of carbon atoms as well as the unsaturated fatty acids are oxidized by**  
 (A)  $\alpha$ -oxidation (B)  $\beta$ -oxidation  
 (C)  $\omega$ -oxidation (D) All of these
- 351. Long chain fatty acids are first activated to acyl CoA in the**  
 (A) Cytosol (B) Mitochondria  
 (C) Ribosomes (D) Microsome
- 352. Long chain acyl CoA penetrates mitochondria in the presence of**  
 (A) Palmitate (B) Carnitine  
 (C) Sorbitol (D) DNP
- 353. Acyl-CoA dehydrogenase converts Acyl CoA to  $\alpha$ - $\beta$  unsaturated acyl-CoA in presence of the coenzyme:**  
 (A) NAD<sup>+</sup> (B) NADP<sup>+</sup>  
 (C) ATP (D) FAD
- 354. For the activation of long chain fatty acids the enzyme thiokinase requires the cofactor:**  
 (A) Mg<sup>++</sup> (B) Ca<sup>++</sup>  
 (C) Mn<sup>++</sup> (D) K<sup>+</sup>
- 355.  $\omega$ -oxidation takes place by the hydroxylase in microsomes involving**  
 (A) Cytochrome b (B) Cytochrome c  
 (C) Cytochrome p-450 (D) Cytochrome a<sub>3</sub>
- 356. Carboxylation of acetyl—CoA to malonyl—CoA takes place in presence of**  
 (A) FAD<sup>+</sup> (B) Biotin  
 (C) NAD<sup>+</sup> (D) NADP<sup>+</sup>
- 357. Malonyl-CoA reacts with the central**  
 (A) —SH group (B) —NH<sub>2</sub> group  
 (C) —COOH group (D) —CH<sub>2</sub>OH group
- 358. Fatty acid synthesis takes place in the presence of the coenzyme:**  
 (A) NAD<sup>+</sup> (B) Reduced NAD  
 (C) NADP<sup>+</sup> (D) Reduced NADP
- 359. Fatty acids are activated to acyl CoA by the enzyme thiokinase:**  
 (A) NAD<sup>+</sup> (B) NADP<sup>+</sup>  
 (C) CoA (D) FAD<sup>+</sup>
- 360. Phospholipids help the oxidation of**  
 (A) Glycerol (B) Fatty acids  
 (C) Glycerophosphates (D) None of these
- 361. The desaturation and chain elongation system of polyunsaturated fatty acids are greatly diminished in the absence of**  
 (A) Insulin (B) Glycagon  
 (C) Epinephrine (D) Thyroxine
- 362. Prostaglandins are liberated in the circulation by the stimulation of**  
 (A) Anterior pituitary glands  
 (B) Posterior pituitary glands  
 (C) Adrenal gland  
 (D) Thyroid gland
- 363. Prostaglandins have a common structure based on prostanic acid which contains carbon atoms:**  
 (A) 12 (B) 16  
 (C) 18 (D) 20
- 364. The carbon chains of prostanic acid are bonded at the middle of the chain by a**  
 (A) 5-membered ring (B) 6-membered ring  
 (C) 8-membered ring (D) None of these
- 365. All active prostaglandins have at least one double bond between positions:**  
 (A) 7 and 8 (B) 9 and 10  
 (C) 11 and 12 (D) 13 and 14

- 366. The enzyme systems for lengthening and shortening for saturating and desaturating of fatty acids occur in**  
(A) Intestine (B) Muscle  
(C) Kidney (D) Liver
- 367. Which of the following are classified as essential fatty acids?**  
(A) Arachidonic acid (B) Oleic acid  
(C) Acetic acid (D) Butyric acid
- 368. Prostaglandins are synthesized in the body from**  
(A) Myristic acid (B) Arachidonic acid  
(C) Stearic acid (D) Lignoceric acid
- 369. All the following saturated fatty acids are present in buffer except**  
(A) Butyric acid (B) Capryllic acid  
(C) Caproic acid (D) Capric acid
- 370. Biological functions of lipids include**  
(A) Source of energy  
(B) Insulating material  
(C) Maintenance of cellular integrity  
(D) All of these
- 371. Saponification number is**  
(A) mg of KOH required to saponify one gm of fat or oil  
(B) mg of KOH required to neutralize free fatty acids of one gms of fat  
(C) mg of KOH required to neutralize the acetic acid obtained by saponification of one gm of fat after it has been acetylated  
(D) None of these
- 372. Lipids have the following properties:**  
(A) Insoluble in water and soluble in fat solvent  
(B) High energy content  
(C) Structural component of cell membrane  
(D) All of these
- 373. Carbohydrate moiety in cerebrosides is**  
(A) Glucose (B) Sucrose  
(C) Galactose (D) Maltose
- 374. Which of the following is not an unsaturated fatty acid?**  
(A) Oleic acid (B) Stearic acid  
(C) Linaoleic acid (D) Palmitic acid
- 375. All the following are functions of prostaglandins except**  
(A) Lowering of B.P  
(B) Introduction of labour  
(C) Anti inflammatory  
(D) Prevention of myocardial infraction
- 376. Calorific value of lipids per gm is**  
(A) 4 Kcal (B) 8 Kcal  
(C) 9 Kcal (D) None of these
- 377. Fatty acid present in kerotin is**  
(A) Lignoceric acid (B) Cerebromic acid  
(C) Nervonic acid (D) Hydroxynervonic acid
- 378. All the following are ketones except**  
(A) Xylulose (B) Ribolose  
(C) Erythrose (D) Fructose
- 379. Saponification:**  
(A) Hydrolysis of fats by alkali  
(B) Hydrolysis of glycerol by liposes  
(C) Esterification  
(D) Reduction
- 380. Number of ml of 0.1 N KOH required to neutralize fatty acids from 5 gms of fat:**  
(A) Iodine number  
(B) Polenske number  
(C) Reichert-Miessl number  
(D) None of these
- 381. Hydrated density of HD lipoproteins is**  
(A) 0.94 gm/ml  
(B) 0.94–1.006 gm/ml  
(C) 1.006–1.063 gm/ml  
(D) 1.063–1.21 gm/ml
- 382. Saponification number indicates**  
(A) Unsaturation in fat  
(B) Average M.W of fatty acid  
(C) Acetyl number  
(D) Acid number

- 383. Acrolein Test is positive for**  
 (A) Glycerol (B) Prostaglandins  
 (C) Carbohydrates (D) Proteins
- 384. Iodine number denotes**  
 (A) Degree of unsaturation  
 (B) Saponification number  
 (C) Acid number  
 (D) Acetyl number
- 385. Maximum energy produced by**  
 (A) Fats (B) Carbohydrates  
 (C) Proteins (D) Nucleic acids
- 386. Lecithins are composed of**  
 (A) Glycerol + Fatty acids + Phosphoric acid + Choline  
 (B) Glycerol + Fatty acids + Phosphoric acid + Ethanolamine  
 (C) Glycerol + Fatty acids + Phosphoric acid + Serine  
 (D) Glycerol + Fatty acids + Phosphoric acid + Beaine
- 387. Sphingomyelins are composed of fatty acids, phosphoric acid and**  
 (A) Sphingosine and choline  
 (B) Glycerol and sphingosine  
 (C) Glycerol and Serine  
 (D) Glycerol and Choline
- 388. Depot fats of mammalian cells comprise mostly of**  
 (A) Cholesterol (B) Cholesterol esters  
 (C) Triacyl glycerol (D) Phospholipids
- 389. When choline of lecithine is replaced by ethanolamine the product is**  
 (A) Sphingomyelin (B) Cephalin  
 (C) Plasmalogens (D) Lysolecithine
- 390. Which of the following is a hydroxy fatty acid?**  
 (A) Oleic acid (B) Ricinoleic acid  
 (C) Caproic acid (D) Stearic acid
- 391. Acrolein test is answered by**  
 (A) Cholesterol (B) Glycerol  
 (C) Glycosides (D) Sphingol
- 392. The smell of fat turned rancid is due to**  
 (A) Presence of vit E (B) Presence of quinones  
 (C) Phenols (D) Volatile fatty acids
- 393. Phospholipids are important cell membrane components because**  
 (A) They have glycerol  
 (B) They can form bilayers in water  
 (C) They have both polar and non polar portions  
 (D) They combine covalently with proteins
- 394. Which one of the following is not a phospholipid?**  
 (A) Lecithin (B) Plasmalogen  
 (C) Lysolecithin (D) Gangliosides
- 395. A fatty acid which is not synthesized in human body and has to be supplied in the diet:**  
 (A) Palmitic acid (B) Oleic acid  
 (C) Linoleic acid (D) Stearic acid
- 396. In cephalin, choline is replaced by**  
 (A) Serine (B) Ethanolamine  
 (C) Betaine (D) Sphingosine
- 397. The triacyl glycerol present in plasma lipoproteins are hydrolyzed by**  
 (A) Lingual lipase (B) Pancreatic lipase  
 (C) Colipase (D) Lipoprotein lipase
- 398. Amphiphatic lipids are**  
 (A) Hydrophilic (B) Hydrophobic  
 (C) Both (A) and (B) (D) Lipophilic
- 399. Which of the following is not essential fatty acid?**  
 (A) Oleic acid (B) Linoleic acid  
 (C) Arachidonic acid (D) Linolenic acid
- 400. The calorific value of lipid is**  
 (A) 4.0 Kcal/gm (B) 6.0 Kcal/gm  
 (C) 9.0 Kcal/gm (D) 15 Kcal/gm
- 401. Rancidity of butter is prevented by the addition of**  
 (A) Vitamin D (B) Tocopherols  
 (C) Presence of priotin (D) Presence of 'Cu'

**402. Sphingomyelins on hydrolysis yields**

- (A) Glycerol, fatty acids, phosphoric acid and choline
- (B) Glycerol, sphingosine, choline and fatty acids
- (C) Sphingosine, phosphoric acid, Glycerol and inositol
- (D) Sphingosine, fatty acids, phosphoric acid and choline

**403. Inherited deficiency of enzyme cerebro-sidase produces**

- (A) Fabry's disease
- (B) Niemann pick disease
- (C) Gaucher's disease
- (D) Tay-sach's disease

**404. Phosphatidic acid on hydrolysis yields**

- (A) Glycerol, fatty acids, phosphoric acid, choline
- (B) Glycerol, fatty acids, phosphoric acid
- (C) Glycerol, fatty acids, phosphoric acid, Glucose
- (D) Sphingol, fatty acids, phosphoric acid

**405. The maximum number of double bonds present in essential fatty acid is**

- (A) 1
- (B) 2
- (C) 3
- (D) 4

**406. Cerebrosides are composed of**

- (A) Sphingosine, fatty acids, glycerol and phosphoric acid
- (B) Sphingosine, fatty acids, galactose
- (C) Glycerol, fatty acids, galactose
- (D) Glycerol, fatty acids, galactose, sphingol

**407. Acetoacetic acid and  $\beta$ -OH butyric acid are formed as**

- (A) Kidneys
- (B) Heart
- (C) Liver
- (D) Intestine

**408. Which amino acid is a lipotropic factor?**

- (A) lysine
- (B) Leucine
- (C) Tryptophan
- (D) Methionine

**409. The class of lipoproteins having a beneficial effect in atherosclerosis is**

- (A) Low density of lipoproteins
- (B) very low density lipoproteins
- (C) High density lipoproteins
- (D) Chylomicrons

**410. Cholesterol is the precursor for the bio-synthesis of**

- (A) fatty acid
- (B) prostaglandins
- (C) bile acids
- (D) sphingmyelin

**411. Which of the following condition is characterized by ketonuria but without glycosuria?**

- (A) Diabetes mellitus
- (B) Diabetes insipidus
- (C) Prolonged starvation
- (D) Addison's disease

**412. Ketone bodies are formed in**

- (A) Kidney
- (B) Liver
- (C) Heart
- (D) Intestines

**413. Changes in serum high density lipoproteins (HDL) are more truly reflected by those of**

- (A) HDL-1
- (B) HDL-2
- (C) HDL-3
- (D) HDL<sub>C</sub>

**414. Mitochondrial lipogenesis requires**

- (A) bicarbonate
- (B) biotin
- (C) acetyl CoA carboxylase
- (D) NADPH

**415. Fatty acids having chain length of 10 carbon atoms enter the**

- (A) Portal ciruclation
- (B) Lacteals
- (C) Systemic circulation
- (D) Colon

**416. A soluble system for synthesis of fatty acids have been isolated from avian liver, required for the formation of long chain fatty acids by this system is**

- (A) ATP
- (B) Acetyl CoA
- (C) NADPH
- (D) All of these

**417. Most animal tissues contain appreciable amounts of lipid, when in the form of depot fat it consists largely of**

- (A) Cholesterol ester
- (B) Phosphatides
- (C) Chylomicrons
- (D) Triacylglycerol

**418. A fatty acid not synthesized in man is**

- (A) Oleic
- (B) Palmitic
- (C) Linoleic
- (D) Stearic

- 419. The 'free fatty acids' (FFA) of plasma:**
- (A) metabolically inert
  - (B) mainly bound to  $\beta$ -lipoproteins
  - (C) stored in the fat
  - (D) mainly bound to serum albumin
- 420. Adipose tissue which is a store house for triacyl glycerol synthesis the same using**
- (A) The glycerol released by hydrolysis of triacyl glycerol
  - (B) The glycerol-3-phosphate obtained in the metabolism of glucose
  - (C) 2-phosphoglycerate
  - (D) 3-phosphoglycerate
- 421. Increase in blood of this class of lipoproteins is beneficial to ward off coronary heart disease:**
- (A) HDL
  - (B) LDL
  - (C) VLDL
  - (D) IDL
- 422. In the extra mitochondrial synthesis of fatty acids,  $\text{CO}_2$  is utilized**
- (A) To keep the system anaerobic and prevent regeneration of acetyl CoA
  - (B) In the conversion of malonyl to CoA hydroxybutyryl CoA
  - (C) In the conversion of acetyl CoA to malonyl CoA
  - (D) In the formation of acetyl CoA from 1 carbon intermediates
- 423. Current concepts concerning the intestinal absorption of triacylglycerols are that**
- (A) They must be completely hydrolysed before the constituent fatty acids can be absorbed
  - (B) They are hydrolysed partially and the material absorbed consists of free fatty acids, mono and diacyl glycerols and unchanged triacyl glycerols
  - (C) Fatty acids with less than 10 carbon atoms are absorbed about equally via lymph and via portal blood
  - (D) In the absence of bile the hydrolysis of triacyl glycerols is absorbed
- 424. Main metabolic end product of cholesterol:**
- (A) Coprosterol
  - (B) 5-pregnenolone
  - (C) Bile acid
  - (D) Glycine
- 425. In the type II (a) hyper lipoproteinemia there is increase in**
- (A) Chylomicron bond
  - (B)  $\beta$
  - (C) Pre beta
  - (D)  $\alpha$
- 426. Normal fat content of liver is about \_\_\_\_\_ gms %.**
- (A) 5
  - (B) 8
  - (C) 10
  - (D) 15
- 427. Obesity is accumulation of \_\_\_\_\_ in the body.**
- (A) Water
  - (B) NaCl
  - (C) Fat
  - (D) Proteins
- 428. The first lipoprotein to be secreted by the liver is**
- (A) VLDL
  - (B) nascent VLDL
  - (C) LDL
  - (D) IDL
- 429. This lipoprotein removes cholesterol from the body**
- (A) HDL
  - (B) VLDL
  - (C) IDL
  - (D) Chylomicrons
- 430. When the stored triacylglycerol is lipolysed in the adipose tissue blood levels of \_\_\_\_\_ increased.**
- (A) FFA only
  - (B) Glycerol only
  - (C) Free fatty acids (FFA) and Glycerol
  - (D) Triacyl glycerol
- 431. All long chain fatty acids with even number of carbon atoms are oxidized to a pool of \_\_\_\_\_ by  $\beta$ -oxidation.**
- (A)  $\text{CO}_2$
  - (B) Propionic acid
  - (C) Acetic acid
  - (D) Acetyl CoA
- 432. The level of free fatty acids in plasma is increased by**
- (A) Insulin
  - (B) Caffeine
  - (C) Glucose
  - (D) Niacin
- 433. Cholesterol is excreted as such into \_\_\_\_\_.**
- (A) Urine
  - (B) Faeces
  - (C) Bile
  - (D) Tears

- 434. LCAT is**  
(A) Lactose choline alamine transferse  
(B) Lecithin cholesterol acyl transferase  
(C) Lecithin carnitine acyl transferase  
(D) Lanoleate carbamoyl acyl transferase
- 435. Cholesterol molecule has \_\_\_\_\_ carbon atoms.**  
(A) 27 (B) 21  
(C) 15 (D) 12
- 436. A hydrocarbon formed in cholesterol synthesis is**  
(A) Mevalonate (B) HMG CoA  
(C) Squalene (D) Zymosterol
- 437. While citrate is converted to isocitrate in the mitochondria, it is converted to \_\_\_\_\_ in the cytosol.**  
(A) Acetyl CoA + oxaloacetate  
(B) Acetyl CoA + malonyl CoA  
(C) Acetyl CoA + Pyruvate  
(D) Acetyl CoA + acetoacetyl CoA
- 438. Avidin is antagonistic to**  
(A) Niacin (B) PABA  
(C) Biotin (D) Pantothenic acid
- 439. CTP is required for the synthesis of**  
(A) Fatty acids (B) Proteins  
(C) Phospholipids (D) Cholesterol
- 440. Lysolecithin is formed from lecithin by the action of**  
(A) Phospholipase A<sub>1</sub> (B) Phospholipase A<sub>2</sub>  
(C) Phospholipase C (D) Phospholipase D
- 441. Fatty acids can not be converted into carbohydrates in the body, as the following reaction is not possible:**  
(A) Conversion of glucose-6-phosphate into glucose  
(B) Fructose 1, 6 diphosphate to fructose-6-phosphate  
(C) Transformation of acetyl CoA to pyruvate  
(D) Formation of acetyl CoA from fatty acids
- 442. Cholesterol circulates in blood stream chiefly as**  
(A) Free cholesterol  
(B) Ester cholesterol  
(C) Low density lipoproteins  
(D) Low density lipoproteins and high density lipoproteins
- 443. What is the sub cellular site for the  $\beta$ -oxidation of fatty acids?**  
(A) Nucleus (B) Mitochondria  
(C) Lysosome (D) Cytosol
- 444. A diet containing this fat is helpful in lowering the blood cholesterol level.**  
(A) Unsaturated (B) Saturated  
(C) Vitamin enriched (D) Refined
- 445. Phospholipase A<sub>2</sub> is an enzyme which removes a fatty acid residue from lecithin to form**  
(A) Lecithin fragments  
(B) Phosphotidic acid  
(C) Glyceryl phosphate  
(D) Lysolecithin
- 446. Pancreatic lipase is an enzyme which hydrolyzes facts. It acts as a/an**  
(A) peptidase (B) hydrolase  
(C) carbohydrates (D) dehydrogenase
- 447. This interferes with cholesterol absorption**  
(A) Lipoprotein lipase  
(B) Creatinase  
(C) 7-dehydrocholesterol  
(D)  $\beta$ -sitosterol
- 448. The carbon chain of fatty acids is shortened by 2 carbon atoms at a time. This involves successive reactions catalysed by 4-enzymes. These act the following order:**  
(A) Acetyl CoA dehydrogenase,  $\beta$ -OH acyl CoA dehydrogenase, enoyl hydrase, thiolose  
(B) Acyl CoA dehydrogenase, thiolase, enoyl hydrase,  $\beta$ -OH acyl CoA dehydrogenase  
(C) Acyl CoA dehydrogenase, thiolose, enoyl hydrase,  $\beta$ -OH acyl CoA dehydrogenase  
(D) Enoyl hydrase,  $\beta$ -OH acyl CoA dehydrogenase, acyl CoA dehydrogenase, thiolose,

- 449. Acyl carrier protein is involved in the synthesis of**  
 (A) protein  
 (B) glycogen  
 (C) fatty acid outside the mitochondria  
 (D) fatty acid in the mitochondria
- 450. 1 molecule of palmitic acid on total oxidation to CO<sub>2</sub> will yield molecules of ATP (as high energy bonds):**  
 (A) 129 (B) 154  
 (C) 83 (D) 25
- 451. HMG CoA is formed in the metabolism of**  
 (A) Cholesterol, ketones and leucine  
 (B) Cholesterol, fatty acid and Leucine  
 (C) Lysine, Leucine and Isoleucine  
 (D) Ketones, Leucine and Lysine
- 452. NADPH is produced when this enzyme acts**  
 (A) Pyruvate dehydrogenase  
 (B) Malic enzyme  
 (C) Succinate dehydrogenase  
 (D) Malate dehydrogenase
- 453. As a result of each oxidation a long chain fatty acid is cleaved to give**  
 (A) An acid with 3-carbon less and propionyl CoA  
 (B) An acid with 2-carbon less and acetyl CoA  
 (C) An acid with 2-carbon less and acetyl CoA  
 (D) An acid with 4-carbon and butyryl CoA
- 454. Liposomes are**  
 (A) Lipid bilayered (B) Water in the middle  
 (C) Carriers of drugs (D) All of these
- 455. Long chain fatty acyl CoA esters are transported across the mitochondrial membrane by**  
 (A) cAMP (B) Prostaglandin  
 (C) Carnitine (D) Choline
- 456. The acetyl CoA formed on  $\beta$ -oxidation of all long chain fatty acids is metabolized under normal circumstances to**  
 (A) CO<sub>2</sub> and water (B) Cholesterol  
 (C) Fatty acids (D) Ketone bodies
- 457. Very low density lipoproteins are relatively rich in**  
 (A) Cholesterol (B) Triacyl glycerol  
 (C) Free fatty acids (D) Phospholipids
- 458. Neutral fat is stored in**  
 (A) Liver (B) Pancreas  
 (C) Adipose tissue (D) Brain
- 459. A pathway that requires NADPH as a cofactor is**  
 (A) Fatty acid oxidation  
 (B) Extra mitochondrial denovo fatty acid synthesis  
 (C) Ketone bodies formation  
 (D) Glycogenesis
- 460. The 'Committed step' in the biosynthesis of cholesterol from acetyl CoA is**  
 (A) Formation of acetoacetyl CoA from acetyl CoA  
 (B) Formation of mevalonate from HMG CoA  
 (C) Formation of HMG CoA from acetyl CoA and acetoacetyl CoA  
 (D) Formation of squalene by *squalene synthetase*
- 461. In  $\beta$ -Oxidation of fatty acids, which of the following are utilized as coenzymes?**  
 (A) NAD<sup>+</sup> and NADP<sup>+</sup>  
 (B) FADH<sub>2</sub> and NADH + H<sup>+</sup>  
 (C) FAD and FMN  
 (D) FAD and NAD<sup>+</sup>
- 462. The most important source of reducing equivalents for FA synthesis on the liver is**  
 (A) Glycolysis  
 (B) HMP-Shunt  
 (C) TCA cycle  
 (D) Uronic acid pathway
- 463. All of the following tissue are capable of using ketone bodies except**  
 (A) Brain (B) Renal cortex  
 (C) R.B.C. (D) Cardiac muscle
- 464. The major source of cholesterol in arterial smooth muscle cells is from**  
 (A) IDL (B) LDL  
 (C) HDL (D) Chylomicrons

- 465. Ketone bodies are synthesized from fatty acid oxidation products by which of the following organs?**  
(A) Liver (B) Skeletal muscles  
(C) Kidney (D) Brain
- 466. Chain elongation of fatty acids occurring in mammalian liver takes place in which of the following subcellular fractions of the cell?**  
(A) Nucleus (B) Ribosomes  
(C) Lysosomes (D) Microsomes
- 467. Which of the following cofactors or their derivatives must be present for the conversion of acetyl CoA to malonyl CoA extramitochondrial fatty acid synthesis?**  
(A) Biotin (B) FAD  
(C) FMN (D) ACP
- 468. Which of the following statement regarding  $\beta$ -oxidation is true?**  
(A) Requires  $\beta$ -ketoacyl CoA as a substrate  
(B) Forms CoA thioesters  
(C) Requires GTP for its activity  
(D) Yields acetyl CoA as a product
- 469. All statements regarding 3-OH-3 methyl glutaryl CoA are true except**  
(A) It is formed in the cytoplasm  
(B) Required in ketogenesis  
(C) Involved in synthesis of Fatty acid  
(D) An intermediate in cholesterol biosynthesis
- 470. Which of the following lipoproteins would contribute to a measurement of plasma cholesterol in a normal individual following a 12 hr fast?**  
(A) Chylomicrons  
(B) VLDL  
(C) Both VLDL and LDL  
(D) LDL
- 471. All the following statements regarding ketone bodies are true except**  
(A) They may result from starvation  
(B) They are formed in kidneys  
(C) They include acetoacetic acid and acetone  
(D) They may be excreted in urine
- 472. In synthesis of Triglyceride from  $\alpha$ -Glycerophosphate and acetyl CoA, the first intermediate formed is**  
(A)  $\beta$ -diacyl glycerol (B) Acyl carnitine  
(C) Monoacyl glycerol (D) Phosphatidic acid
- 473. During each cycle of  $\beta$ -oxidation of fatty acid, all the following compounds are generated except**  
(A) NADH (B)  $H_2O$   
(C) FAD (D) Acyl CoA
- 474. The energy yield from complete oxidation of products generated by second reaction cycle of  $\beta$ -oxidation of palmitoyl CoA will be**  
(A) 5 ATP (B) 12 ATP  
(C) 17 ATP (D) 34 ATP
- 475.  $\beta$ -Oxidation of odd-carbon fatty acid chain produces**  
(A) Succinyl CoA (B) Propionyl CoA  
(C) Acetyl CoA (D) Malonyl CoA
- 476. Brown adipose tissue is characterized by which of the following?**  
(A) Present in large quantities in adult humans  
(B) Mitochondrial content higher than white adipose tissue  
(C) Oxidation and phosphorylation are tightly coupled  
(D) Absent in hibernating animals
- 477. Ketosis is partly ascribed to**  
(A) Over production and Glucose  
(B) Under production of Glucose  
(C) Increased carbohydrate utilization  
(D) Increased fat utilization
- 478. The free fatty acids in blood are**  
(A) Stored in fat depots  
(B) Mainly bound to  $\beta$ -lipoproteins  
(C) Mainly bound to serum albumin  
(D) Metabolically most inactive
- 479. Carnitine is synthesized from**  
(A) Lysine (B) Serine  
(C) Choline (D) Arginine

- 480. A metabolite which is common to pathways of cholesterol biosynthesis from acetyl-CoA and cholecalciferol formation from cholesterol is**
- (A) Zymosterol  
(B) Lumisterol  
(C) Ergosterol  
(D) 7 Dehydrocholesterol
- 481. Acetyl CoA required for extra mitochondrial fatty acid synthesis is produced by**
- (A) Pyruvate dehydrogenase complex  
(B) Citrate lyase  
(C) Thiolase  
(D) Carnitine-acyl transferase
- 482. Biosynthesis of Triglyceride and Lecithine both require an intermediate:**
- (A) Monoacyl glycerol phosphate  
(B) Phosphatidic acid  
(C) Phosphatidyl ethanol amine  
(D) Phosphatidyl cytidylate
- 483. The rate limiting step cholesterol biosynthesis is**
- (A) Squalene synthetase  
(B) Mevalonate kinase  
(C) HMG CoA synthetase  
(D) HMG CoA reductase
- 484. All the following are constituents of ganglioside molecule except**
- (A) Glycerol (B) Sialic acid  
(C) Hexose sugar (D) Sphingosine
- 485. An alcoholic amine residue is present in which of the following lipids?**
- (A) Phosphatidic acid (B) Cholesterol  
(C) Sphingomyelin (D) Ganglioside
- 486. Sphingosine is the backbone of all the following except**
- (A) Cerebroside (B) Ceramide  
(C) Sphingomyelin (D) Lecithine
- 487. Chylomicron, intermediate density lipoproteins (IDL), low density lipoproteins (LDL) and very low density lipoproteins (VLDL) all are serum lipoproteins. What is the correct ordering of these particles from the lowest to the greatest density?**
- (A) LDL, IDL, VLDL, Chylomicron  
(B) Chylomicron, VLDL, IDL, LDL  
(C) VLDL, IDL, LDL, Chylomicron  
(D) Chylomicron, IDL, VLDL, LDL
- 488. A compound normally used to conjugate bile acids is**
- (A) Serine (B) Glycine  
(C) Glucuronic acid (D) Fatty acid
- 489. Which of the following lipoproteins would contribute to a measurement of plasma cholesterol in a normal person following a 12 hr fast?**
- (A) High density lipoproteins  
(B) Low density lipoproteins  
(C) Chylomicron  
(D) Chylomicron remnants
- 490. Which of the following products of triacylglycerol breakdown and subsequent  $\beta$ -Oxidation may undergo gluconeogenesis?**
- (A) Acetyl CoA (B) Propionyl CoA  
(C) All ketone bodies (D) Some amino acids
- 491. Which of the following regulates lipolysis in adipocytes?**
- (A) Activation of fatty acid synthesis mediated by CAMP  
(B) Glycerol phosphorylation to prevent futile esterification of fatty acids  
(C) Activation of triglyceride lipase as a result of hormone stimulated increases in CAMP levels  
(D) Activation of CAMP production by Insulin
- 492. Which one of the following compounds is a key intermediate in the synthesis of both triacyl glycerols and phospholipids?**
- (A) CDP Choline (B) Phosphatidase  
(C) Triacyl glyceride (D) Phosphatidyl serine
- 493. During each cycle of on going fatty acid oxidation, all the following compounds are generated except**
- (A)  $H_2O$  (B) Acetyl CoA  
(C) Fatty acyl CoA (D) NADH

- 494. All the following statements describing lipids are true except**
- (A) They usually associate by covalent interactions
  - (B) They are structurally components of membranes
  - (C) They are an intracellular energy source
  - (D) They are poorly soluble in H<sub>2</sub>O
- 495. All the following statements correctly describe ketone bodies except**
- (A) They may result from starvation
  - (B) They are present at high levels in uncontrolled diabetes
  - (C) They include—OH β-butyrate and acetone
  - (D) They are utilized by the liver during long term starvation
- 496. Which of the following features is predicted by the Nicolson–Singer fluid mosaic model of biological membranes?**
- (A) Membrane lipids do not diffuse laterally
  - (B) Membrane lipid is primarily in a monolayer form
  - (C) Membrane lipids freely flip-flop
  - (D) Membrane proteins may diffuse laterally
- 497. Oxidative degradation of acetyl CoA in the citric acid cycle gives a net yield of all the following except**
- (A) FADH<sub>2</sub>
  - (B) 3 NADH
  - (C) 2 ATP
  - (D) 2CO<sub>2</sub>
- 498. All the following correctly describe the intermediate 3-OH-3-methyl glutaryl CoA except**
- (A) It is generated enzymatically in the mitochondrial matrix
  - (B) It is formed in the cytoplasm
  - (C) It inhibits the first step in cholesterol synthesis
  - (D) It is involved in the synthesis of ketone bodies
- 499. Intermediate in the denovo synthesis of triacyl glycerols include all the following except**
- (A) Fatty acyl CoA
  - (B) CDP diacyl glycerol
  - (C) Glycerol-3-phosphate
  - (D) Lysophosphatidic acid
- 500. Mitochondrial α-ketoglutarate dehydrogenase complex requires all the following to function except**
- (A) CoA
  - (B) FAD
  - (C) NAD<sup>+</sup>
  - (D) NADP<sup>+</sup>
- 501. Each of the following can be an intermediate in the synthesis of phosphatidyl choline except**
- (A) Phosphatidyl inositol
  - (B) CDP-choline
  - (C) Phosphatidyl ethanolamine
  - (D) Diacylglycerol
- 502. High iodine value of a lipid indicates**
- (A) Polymerization
  - (B) Carboxyl groups
  - (C) Hydroxyl groups
  - (D) Unsaturation
- 503. Cholesterol, bile salts, vitamin D and sex hormones are**
- (A) Mucolipids
  - (B) Glycolipids
  - (C) Phospholipids
  - (D) Isoprenoid lipids
- 504. Water soluble molecular aggregates of lipids are known as**
- (A) Micelle
  - (B) Colloids
  - (C) Sphingol
  - (D) Mucin
- 505. Hypoglycemia depresses insulin secretion and thus increases the rate of**
- (A) Hydrolysis
  - (B) Reduction
  - (C) Gluconeogenesis
  - (D) Respiratory acidosis
- 506. The process of breakdown of glycogen to glucose in the liver and pyruvate and lactate in the muscle is known as**
- (A) Glyogenesis
  - (B) Glycogenolysis
  - (C) Gluconeogenesis
  - (D) Cellular degradation
- 507. Across a membrane phospholipids act as carrier of**
- (A) Organic compounds
  - (B) Inorganic ions
  - (C) Nucleic acids
  - (D) Food materials
- 508. Osteomalacia can be prevented by the administration of calcium and a vitamin:**
- (A) A
  - (B) B
  - (C) C
  - (D) D

- 509. Milk sugar is known as**  
 (A) Fructose (B) Glucose  
 (C) Sucrose (D) Lactose
- 510. The Intrinsic Factor (HCl and mucoproteins) present in the gastric juice help in the absorption of**  
 (A) Vitamin B<sub>2</sub> (B) Tocopherols  
 (C) Folic acid (D) Vitamin B<sub>12</sub>
- 511. Lipase can act only at pH:**  
 (A) 2.5–4 (B) 3.5–5  
 (C) 4 to 5 (D) 5–7
- 512. Bile is produced by**  
 (A) Liver (B) Gall-bladder  
 (C) Pancreas (D) Intestine
- 513. Non-protein part of rhodopsin is**  
 (A) Retinal (B) Retinol  
 (C) Carotene (D) Repsin
- 514. A pathway that requires NADPH as a co-factor is**  
 (A) Extramitochondrial folic acid synthesis  
 (B) Ketone body formation  
 (C) Glycogenesis  
 (D) Gluconeogenesis
- 515. LCAT activity is associated with which of the lipoprotein complex?**  
 (A) VLDL (B) Chylomicrones  
 (C) IDL (D) HDL
- 516. In  $\beta$ -oxidation of fatty acids which of the following are utilized as co-enzymes?**  
 (A) NAD<sup>+</sup> and NADP<sup>+</sup>  
 (B) FAD H<sub>2</sub> and NADH + H<sup>+</sup>  
 (C) FAD and FMN  
 (D) FAD and NAD<sup>+</sup>
- 517. The lipoprotein with the fastest electrophoretic mobility and lowest TG content are**  
 (A) VLDL (B) LDL  
 (C) HDL (D) Chylomicrones
- 518. The essential fatty acids retard**  
 (A) Atherosclerosis (B) Diabetes mellitus  
 (C) Nephritis (D) Oedema
- 519. The majority of absorbed fat appears in the forms of**  
 (A) HDL (B) Chylomicrone  
 (C) VLDL (D) LDL
- 520. Daily output of urea in grams is**  
 (A) 10 to 20 (B) 15 to 25  
 (C) 20 to 30 (D) 35 to 45
- 521. Uremia occurs in**  
 (A) Cirrohsis of liver (B) Nephritis  
 (C) Diabetes mellitus (D) Coronary thrombosis
- 522. Carboxyhemoglobin is formed by**  
 (A) CO (B) CO<sub>2</sub>  
 (C) HCO<sub>3</sub> (D) HCN
- 523. Methemoglobin is formed as a result of the oxidation of haemoglobin by oxidation agent:**  
 (A) Oxygen of Air (B) H<sub>2</sub>O<sub>2</sub>  
 (C) K<sub>4</sub>Fe(CN)<sub>6</sub> (D) KMnO<sub>4</sub>
- 524. Methemoglobin can be reduced to haemoglobin by**  
 (A) Removal of hydrogen  
 (B) Vitamin C  
 (C) Glutathione  
 (D) Creatinine
- 525. Fats are solids at**  
 (A) 10°C (B) 20°C  
 (C) 30°C (D) 40°C
- 526. Esters of fatty acids with higher alcohol other than glycerol are called as**  
 (A) Oils (B) Polyesters  
 (C) Waxes (D) Terpenoids
- 527. The main physiological buffer in the blood is**  
 (A) Haemoglobin buffer  
 (B) Acetate  
 (C) Phosphate  
 (D) Bicarbonate
- 528. All of the following substances have been used to estimate GFR except**  
 (A) Inulin (B) Creatinine  
 (C) Phenol red (D) Mannitol

- 529. Relationship between GFR and serum creatinine concentration is**  
(A) Non-existent (B) Inverse  
(C) Direct (D) Indirect
- 530. Urine turbidity may be caused by any of the following except**  
(A) Phosphates (B) Protein  
(C) RBC (D) WBC
- 531. Urine specific gravity of 1.054 indicates**  
(A) Excellent renal function  
(B) Inappropriate secretion of ADH  
(C) Extreme dehydration  
(D) Presence of glucose or protein
- 532. In hemolytic jaundice, the urinary bilirubin is**  
(A) Normal  
(B) Absent  
(C) More than normal  
(D) Small amount is present
- 533. In obstructive jaundice, urinary bilirubin is**  
(A) Absent  
(B) Increased  
(C) Present  
(D) Present in small amount
- 534. In hemolytic jaundice, bilirubin in urine is**  
(A) Usually absent  
(B) Usually present  
(C) Increased very much  
(D) Very low
- 535. The pH of gastric juice of infants is**  
(A) 2.0 (B) 4.0  
(C) 4.5 (D) 5.0
- 536. The pH of blood is about 7.4 when the ratio between (NaHCO<sub>3</sub>) and (H<sub>2</sub>CO<sub>3</sub>) is**  
(A) 10 : 1 (B) 20 : 1  
(C) 25 : 1 (D) 30 : 1
- 537. The absorption of glucose is decreased by the deficiency of**  
(A) Vitamin A (B) Vitamin D  
(C) Thiamine (D) Vitamin B<sub>12</sub>
- 538. For the activity of amylase which of the following is required as co-factor?**  
(A) HCO<sub>3</sub> (B) Na<sup>+</sup>  
(C) K<sup>+</sup> (D) Cl
- 539. Which of the following hormone increases the absorption of glucose from G.I.T?**  
(A) Insulin (B) Thyroid hormones  
(C) Glucagon (D) FSH
- 540. Predominant form of storage:**  
(A) Carbohydrates (B) Fats  
(C) Lipids (D) Both (B) and (C)
- 541. Degradation of Hb takes place in**  
(A) Mitochondrion (B) Erythrocytes  
(C) Cytosol of cell (D) R.E. cells
- 542. Biliverdin is converted to bilirubin by the process of**  
(A) Oxidation (B) Reduction  
(C) Conjugation (D) Decarboxylation
- 543. Amylase present in saliva is**  
(A) α-Amylase (B) β-Amylase  
(C) γ-Amylase (D) All of these
- 544. Phospholipids are important cell membrane components since**  
(A) They have glycerol  
(B) Form bilayers in water  
(C) Have polar and non-polar portions  
(D) Combine covalently with proteins
- 545. Which of the following is not a phospholipid?**  
(A) Lecithin (B) Plasmalogen  
(C) Lysolecithin (D) Gangliosides
- 546. A fatty acid which is not synthesized in human body and has to be supplied in the diet is**  
(A) Palmitic acid (B) Oleic acid  
(C) Linoleic acid (D) Stearic acid
- 547. Phospholipids occur in**  
(A) Myelin sheath  
(B) Stabilizes chylomicrons  
(C) Erythrocyte membrane  
(D) All of these

- 548. Which of the following is not essential fatty acids?**  
(A) Oleic acid (B) Linoleic acid  
(C) Arachidonic acid (D) Linolenic acid
- 549. The caloric value of lipids is**  
(A) 6.0 Kcal/g (B) 9.0 Kcal/g  
(C) 15.0 Kcal/g (D) 12.0 Kcal/g
- 550. The maximum number of double bonds present in essential fatty acid is**  
(A) 2 (B) 3  
(C) 4 (D) 5
- 551. Prostaglandin synthesis is increased by activating phospholipases by**  
(A) Mepacrine (B) Angiotensin II  
(C) Glucocorticoids (D) Indomethacin
- 552. Selwanof's test is positive in**  
(A) Glucose (B) Fructose  
(C) Galactose (D) Mannose
- 553. Spermatozoa in seminal fluid utilises the following sugar for metabolism:**  
(A) Galactose (B) Glucose  
(C) Sucrose (D) Fructose
- 554. Depot fats of mammalian cells comprise mostly of**  
(A) Cholesterol (B) Phospholipid  
(C) Cerebrosides (D) Triglycerol
- 555. When choline of lecithin is replaced by ethanolamine, the product is**  
(A) Spingomyelin (B) Cephalin  
(C) Plasmalogens (D) Lysolecithin
- 556. Which of the following is a hydroxyl fatty acid?**  
(A) Oleic Acid (B) Ricinoleic acid  
(C) Caproic acid (D) Arachidonic acid
- 557. Acroleic test is given by**  
(A) Cholesterol (B) Glycerol  
(C) Glycosides (D) Sphingol

**ANSWERS**

1. A	2. A	3. C	4. C	5. D	6. A
7. C	8. D	9. D	10. B	11. D	12. A
13. B	14. A	15. D	16. B	17. B	18. D
19. C	20. D	21. C	22. A	23. D	24. C
25. A	26. A	27. C	28. B	29. B	30. D
31. A	32. A	33. C	34. A	35. A	36. C
37. D	38. A	39. B	40. C	41. D	42. A
43. B	44. C	45. D	46. A	47. D	48. B
49. C	50. C	51. A	52. B	53. D	54. B
55. C	56. D	57. A	58. B	59. D	60. C
61. A	62. A	63. A	64. D	65. B	66. A
67. A	68. B	69. A	70. A	71. A	72. B
73. A	74. D	75. B	76. A	77. B	78. A
79. B	80. C	81. C	82. A	83. A	84. A
85. B	86. B	87. A	88. B	89. D	90. C
91. D	92. B	93. A	94. D	95. B	96. A
97. B	98. D	99. A	100. A	101. C	102. B
103. A	104. B	105. C	106. C	107. B	108. A
109. B	110. C	111. D	112. A	113. A	114. A
115. D	116. A	117. A	118. D	119. C	120. D
121. D	122. A	123. A	124. D	125. B	126. A
127. B	128. A	129. B	130. C	131. B	132. C
133. C	134. B	135. D	136. A	137. C	138. C
139. C	140. B	141. B	142. B	143. C	144. D
145. B	146. D	147. C	148. B	149. A	150. A
151. A	152. A	153. C	154. B	155. D	156. D
157. D	158. D	159. D	160. C	161. B	162. B
163. D	164. C	165. D	166. B	167. D	168. B
169. C	170. A	171. D	172. C	173. A	174. B
175. B	176. C	177. D	178. B	179. B	180. C
181. C	182. B	183. C	184. D	185. D	186. D
187. C	188. B	189. D	190. B	191. C	192. D
193. C	194. C	195. A	196. D	197. B	198. D
199. A	200. C	201. A	202. D	203. C	204. B
205. D	206. A	207. D	208. A	209. C	210. C
211. B	212. A	213. C	214. D	215. D	216. C
217. C	218. D	219. A	220. C	221. D	222. C
223. D	224. D	225. B	226. D	227. D	228. A
229. D	230. B	231. A	232. A	233. D	234. B
235. C	236. C	237. D	238. C	239. B	240. D
241. B	242. D	243. A	244. C	245. C	246. A

247. C	248. C	249. A	250. A	251. C	252. A
253. A	254. B	255. C	256. A	257. C	258. A
259. A	260. A	261. B	262. A	263. C	264. A
265. D	266. A	267. D	268. C	269. C	270. C
271. A	272. C	273. C	274. A	275. A	276. A
277. D	278. C	279. A	280. A	281. D	282. C
283. B	284. C	285. A	286. C	287. A	288. C
289. A	290. D	291. C	292. B	293. C	294. B
295. C	296. B	297. B	298. C	299. B	300. A
301. B	302. C	303. B	304. C	305. C	306. A
307. A	308. B	309. D	310. D	311. D	312. A
313. C	314. A	315. D	316. A	317. C	318. B
319. D	320. A	321. B	322. C	323. D	324. C
325. B	326. A	327. B	328. C	329. B	330. C
331. A	332. C	333. A	334. A	335. A	336. D
337. B	338. A	339. A	340. B	341. C	342. C
343. A	344. D	345. D	346. D	347. A	348. C
349. D	350. B	351. A	352. B	353. D	354. B
355. C	356. C	357. A	358. D	359. C	360. B
361. A	362. C	363. D	364. B	365. A	366. D
367. A	368. D	369. C	370. D	371. C	372. D
373. B	374. B	375. D	376. C	377. A	378. C
379. A	380. B	381. D	382. B	383. A	384. A
385. A	386. A	387. A	388. C	389. B	390. B
391. B	392. D	393. C	394. D	395. C	396. B
397. D	398. C	399. A	400. C	401. B	402. D
403. C	404. B	405. D	406. B	407. C	408. D
409. C	410. C	411. C	412. B	413. B	414. D
415. A	416. D	417. D	418. C	419. D	420. B
421. A	422. C	423. B	424. C	425. B	426. A
427. C	428. B	429. A	430. C	431. D	432. B
433. C	434. B	435. A	436. C	437. A	438. C
439. C	440. B	441. C	442. D	443. B	444. A
445. D	446. B	447. D	448. B	449. C	450. A
451. A	452. B	453. B	454. D	455. C	456. A
457. B	458. C	459. B	460. B	461. D	462. B
463. C	464. B	465. A	466. D	467. A	468. A
469. B	470. D	471. B	472. D	473. B	474. D
475. D	476. B	477. D	478. C	479. A	480. D
481. B	482. B	483. D	484. A	485. C	486. D
487. B	488. B	489. A	490. B	491. C	492. B
493. A	494. A	495. D	496. D	497. C	498. C

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499. B	500. D	501. A	502. D	503. D	504. A
505. C	506. B	507. B	508. D	509. D	510. D
511. D	512. A	513. A	514. A	515. D	516. D
517. C	518. A	519. B	520. C	521. B	522. A
523. C	524. B	525. B	526. C	527. D	528. C
529. B	530. B	531. D	532. C	533. B	534. A
535. D	536. B	537. C	538. D	539. B	540. D
541. D	542. B	543. A	544. C	545. D	546. C
547. D	548. A	549. B	550. C	551. B	552. B
553. D	554. D	555. B	556. B	557. B	

**EXPLANATIONS FOR THE ANSWERS**

5. D The fatty acids that cannot be synthesized by the body and therefore should be supplied through the diet are referred to as essential fatty acids (EFA). Linoleic acid and linolenic acid are essential. Some workers regard arachidonic acid as an EFA although it can be synthesized from linoleic acid.
61. A Phrynoderma (toad skin) is an essential fatty acid deficiency disorder. It is characterized by the presence of horny eruptions on the posterior and the lateral parts of the limbs, on the back and buttocks.
120. D The hydrolysis of triacylglycerols by alkali to produce glycerol and soaps is known as saponification.
173. A Reichert-Meissl number is defined as the number of moles of 0.1 N KOH required to completely neutralize the soluble volatile fatty acids distilled from 5 g fat.
231. A Sphingomyelins (sphingophospholipids) are a group of phospholipids containing sphingosine as the alcohol (in place of glycerol in other phospholipids).
285. A Cyclopentanoperhydrophenanthrene (CPPP), it consists of a phenanthrene nucleus to which a cyclopentene ring is attached.
345. D Cholesterol is an animal sterol with a molecular formula  $C_{27}H_{46}O$ . It has one hydroxyl group at  $C_3$  and a double bond between  $C_5$  and  $C_6$ . An 8 carbon aliphatic side chain is attached to  $C_{17}$ . Cholesterol contains a total of 5 methyl groups.
398. C The lipids which possess both hydrophobic and hydrophilic groups are known as amphipathic lipids (Greek: amphi- both; pathos- passion).
454. D Liposomes have an intermittent aqueous phase in lipid bilayer. They are produced when amphipathic lipids in aqueous medium are subjected to sonification. Liposomes are used as carriers of drugs to target tissues.
540. D Fats (triacylglycerols) are the most predominant storage form of energy, since they are highly concentrated form of energy (9 Cal/g) and can be stored in an anhydrous form (no association with water).

## CHAPTER 5

# VITAMINS

**1. Vitamins are**

- (A) Accessory food factors
- (B) Generally synthesized in the body
- (C) Produced in endocrine glands
- (D) Proteins in nature

**2. Vitamin A or retinal is a**

- (A) Steroid
- (B) Polyisoprenoid compound containing a cyclohexenyl ring
- (C) Benzoquinone derivative
- (D) 6-Hydroxychromane

**3.  $\beta$ -Carotene, precursor of vitamin A, is oxidatively cleaved by**

- (A)  $\beta$ -Carotene dioxygenase
- (B) Oxygenase
- (C) Hydroxylase
- (D) Transferase

**4. Retinal is reduced to retinol in intestinal mucosa by a specific retinaldehyde reductase utilising**

- (A) NADPH + H<sup>+</sup>      (B) FAD
- (C) NAD                      (D) NADH + H<sup>+</sup>

**5. Preformed Vitamin A is supplied by**

- (A) Milk, fat and liver
- (B) All yellow vegetables
- (C) All yellow fruits
- (D) Leafy green vegetables

**6. Retinol and retinal are interconverted requiring dehydrogenase or reductase in the presence of**

- (A) NAD or NADP      (B) NADH + H<sup>+</sup>
- (C) NADPH              (D) FAD

**7. Fat soluble vitamins are**

- (A) Soluble in alcohol
- (B) one or more Propene units
- (C) Stored in liver
- (D) All these

**8. The international unit of vitamin A is equivalent to the activity caused by**

- (A) 0.3  $\mu$ g of Vitamin A alcohol
- (B) 0.344  $\mu$ g of Vitamin A alcohol
- (C) 0.6  $\mu$ g of Vitamin A alcohol
- (D) 1.0  $\mu$ g of Vitamin A alcohol

**9. Lumirhodopsin is stable only at temperature below**

- (A) -10°C                      (B) -20°C
- (C) -40°C                      (D) -50°C

**10. Retinol is transported in blood bound to**

- (A) Aporetinol binding protein
- (B)  $\alpha_2$ -Globulin
- (C)  $\beta$ -Globulin
- (D) Albumin

- 11. The normal serum concentration of vitamin A in mg/100 ml is**  
 (A) 5–10 (B) 15–60  
 (C) 100–150 (D) 0–5
- 12. One manifestation of vitamin A deficiency is**  
 (A) Painful joints  
 (B) Night blindness  
 (C) Loss of hair  
 (D) Thickening of long bones
- 13. Deficiency of Vitamin A causes**  
 (A) Xerophthalmia  
 (B) Hypoprothrombinemia  
 (C) Megaloblastic anemia  
 (D) Pernicious anemia
- 14. An important function of vitamin A is**  
 (A) To act as coenzyme for a few enzymes  
 (B) To play an integral role in protein synthesis  
 (C) To prevent hemorrhages  
 (D) To maintain the integrity of epithelial tissue
- 15. Retinal is a component of**  
 (A) Iodopsin (B) Rhodopsin  
 (C) Cardiolipin (D) Glycoproteins
- 16. Retinoic acid participates in the synthesis of**  
 (A) Iodopsin (B) Rhodopsin  
 (C) Glycoprotein (D) Cardiolipin
- 17. On exposure to light rhodopsin forms**  
 (A) All trans-retinal (B) Cis-retinal  
 (C) Retinol (D) Retinoic acid
- 18. Carr-Price reaction is used to detect**  
 (A) Vitamin A (B) Vitamin D  
 (C) Ascorbic acid (D) Vitamin E
- 19. The structure shown below is of**  
 (A) Cholecalciferol  
 (B) 25-Hydroxycholecalciferol  
 (C) Ergocalciferol  
 (D) 7-Dehydrocholesterol
- 20. Vitamin D absorption is increased in**  
 (A) Acid pH of intestine  
 (B) Alkaline pH of intestine  
 (C) Impaired fat absorption  
 (D) Contents of diet
- 21. The most potent Vitamin D metabolite is**  
 (A) 25-Hydroxycholecalciferol  
 (B) 1,25-Dihydroxycholecalciferol  
 (C) 24, 25-Dihydroxycholecalciferol  
 (D) 7-Dehydrocholesterol
- 22. The normal serum concentration of 25-hydroxycholecalciferol in ng/ml is**  
 (A) 0–8 (B) 60–100  
 (C) 100–150 (D) 8–55
- 23. The normal serum concentration of 1,25-dihydroxycholecalciferol in pg/ml is**  
 (A) 26–65 (B) 1–5  
 (C) 5–20 (D) 80–100
- 24. The normal serum concentration of 24,25-dihydroxycholecalciferol in ng/ml is**  
 (A) 8–20 (B) 25–50  
 (C) 1–5 (D) 60–100
- 25. A poor source of Vitamin D is**  
 (A) Egg (B) Butter  
 (C) Milk (D) Liver
- 26. Richest source of Vitamin D is**  
 (A) Fish liver oils (B) Margarine  
 (C) Egg yolk (D) Butter
- 27. Deficiency of vitamin D causes**  
 (A) Ricket and osteomalacia  
 (B) Tuberculosis of bone  
 (C) Hypothyroidism  
 (D) Skin cancer
- 28. One international unit (I.U) of vitamin D is defined as the biological activity of**  
 (A) 0.025 µg of cholecalciferol  
 (B) 0.025 µg of 7-dehydrocholecalciferol  
 (C) 0.025 µg of ergosterol  
 (D) 0.025 µg of ergocalciferol

- 29. The  $\beta$ -ring of 7-dehydrocholesterol is cleaved to form cholecalciferol by**
- (A) Infrared light
  - (B) Dim light
  - (C) Ultraviolet irradiation with sunlight
  - (D) Light of the tube lights
- 30. Calcitriol synthesis involves**
- (A) Both liver and kidney
  - (B) Intestine
  - (C) Adipose tissue
  - (D) Muscle
- 31. Insignificant amount of Vitamin E is present in**
- (A) Wheat germ oil (B) Sunflower seed oil
  - (C) Safflower seed oil (D) Fish liver oil
- 32. The activity of tocopherols is destroyed by**
- (A) Commercial cooking
  - (B) Reduction
  - (C) Conjugation
  - (D) All of these
- 33. The requirement of vitamin E is increased with greater intake of**
- (A) Carbohydrates
  - (B) Proteins
  - (C) Polyunsaturated fat
  - (D) Saturated fat
- 34. Vitamin E reduces the requirement of**
- (A) Iron (B) Zinc
  - (C) Selenium (D) Magnesium
- 35. The most important natural antioxidant is**
- (A) Vitamin D (B) Vitamin E
  - (C) Vitamin B<sub>12</sub> (D) Vitamin K
- 36. Tocopherols prevent the oxidation of**
- (A) Vitamin A (B) Vitamin D
  - (C) Vitamin K (D) Vitamin C
- 37. Creatinuria is caused due to the deficiency of vitamin**
- (A) A (B) K
  - (C) E (D) D
- 38. All the following conditions produce a real or functional deficiency of vitamin K except**
- (A) Prolonged oral, broad spectrum antibiotic therapy
  - (B) Total lack of red meat in the diet
  - (C) The total lack of green leafy vegetables in the diet
  - (D) Being a new born infant
- 39. Vitamin K is found in**
- (A) Green leafy plants (B) Meat
  - (C) Fish (D) Milk
- 40. Function of Vitamin A:**
- (A) Healing epithelial tissues
  - (B) Protein synthesis regulation
  - (C) Cell growth
  - (D) All of these
- 41. Vitamin K<sub>2</sub> was originally isolated from**
- (A) Soyabean (B) Wheat gram
  - (C) Alfa Alfa (D) Putrid fish meal
- 42. Vitamin synthesized by bacterial in the intestine is**
- (A) A (B) C
  - (C) D (D) K
- 43. Vitamin K is involved in posttranslational modification of the blood clotting factors by acting as cofactor for the enzyme:**
- (A) Carboxylase (B) Decarboxylase
  - (C) Hydroxylase (D) Oxidase
- 44. Vitamin K is a cofactor for**
- (A) Gamma carboxylation of glutamic acid residue
  - (B)  $\beta$ -Oxidation of fatty acid
  - (C) Formation of  $\gamma$ -amino butyrate
  - (D) Synthesis of tryptophan
- 45. Hypervitaminosis K in neonates may cause**
- (A) Porphyria (B) Jaundice
  - (C) Pellagra (D) Prolonged bleeding
- 46. Dicoumarol is antagonist to**
- (A) Riboflavin (B) Retinol
  - (C) Menadione (D) Tocopherol

- 47. In the individuals who are given liberal quantities of vitamin C, the serum ascorbic acid level is**
- (A) 1–1.4  $\mu\text{g}/100\text{ ml}$   
 (B) 2–4  $\mu\text{g}/100\text{ ml}$   
 (C) 1–10  $\mu\text{g}/100\text{ ml}$   
 (D) 10–20  $\mu\text{g}/100\text{ ml}$
- 48. The vitamin which would most likely become deficient in an individual who develop a completely carnivorous life style is**
- (A) Thiamin (B) Niacin  
 (C) Vitamin C (D) Cobalamin
- 49. In human body highest concentration of ascorbic acid is found in**
- (A) Liver (B) Adrenal cortex  
 (C) Adrenal medulla (D) Spleen
- 50. The vitamin required for the formation of hydroxyproline (in collagen) is**
- (A) Vitamin C (B) Vitamin A  
 (C) Vitamin D (D) Vitamin E
- 51. Vitamin required for the conversion of p-hydroxyphenylpyruvate to homogentisate is**
- (A) Folacin (B) Cobalamin  
 (C) Ascorbic acid (D) Niacin
- 52. Vitamin required in conversion of folic acid to folinic acid is**
- (A) Biotin (B) Cobalamin  
 (C) Ascorbic acid (D) Niacin
- 53. Ascorbic acid can reduce**
- (A) 2, 6-Dibromobenzene  
 (B) 2, 6-Diiodoxy pyridine  
 (C) 2, 6-Dichlorophenol indophenol  
 (D) 2, 4-Dinitrobenzene
- 54. Sterilised milk lacks in**
- (A) Vitamin A (B) Vitamin D  
 (C) Vitamin C (D) Thiamin
- 55. Scurvy is caused due to the deficiency of**
- (A) Vitamin A (B) Vitamin D  
 (C) Vitamin K (D) Vitamin C
- 56. Both Wernicke's disease and beriberi can be reversed by administrating**
- (A) Retinol (B) Thiamin  
 (C) Pyridoxine (D) Vitamin B<sub>12</sub>
- 57. The Vitamin B<sub>1</sub> deficiency causes**
- (A) Ricket (B) Nyctalopia  
 (C) Beriberi (D) Pellagra
- 58. Concentration of pyruvic acid and lactic acid in blood is increased due to deficiency of the vitamin**
- (A) Thiamin (B) Riboflavin  
 (C) Niacin (D) Pantothenic acid
- 59. Vitamin B<sub>1</sub> coenzyme (TPP) is involved in**
- (A) Oxidative decarboxylation  
 (B) Hydroxylation  
 (C) Transamination  
 (D) Carboxylation
- 60. Increased glucose consumption increases the dietary requirement for**
- (A) Pyridoxine (B) Niacin  
 (C) Biotin (D) Thiamin
- 61. Thiamin is oxidized to thiochrome in alkaline solution by**
- (A) Potassium permanganate  
 (B) Potassium ferricyanide  
 (C) Potassium chlorate  
 (D) Potassium dichromate
- 62. Riboflavin is a coenzyme in the reaction catalysed by the enzyme**
- (A) Acyl CoA synthetase  
 (B) Acyl CoA dehydrogenase  
 (C)  $\beta$ -Hydroxy acyl CoA  
 (D) Enoyl CoA dehydrogenase
- 63. The daily requirement of riboflavin for adult in mg is**
- (A) 0–1.0 (B) 1.2–1.7  
 (C) 2.0–3.5 (D) 4.0–8.0
- 64. In new born infants phototherapy may cause hyperbilirubinemia with deficiency of**
- (A) Thiamin (B) Riboflavin  
 (C) Ascorbic acid (D) Pantothenic acid

- 65. Riboflavin deficiency causes**  
(A) Cheilosis  
(B) Loss of weight  
(C) Mental deterioration  
(D) Dermatitis
- 66. Magenta tongue is found in the deficiency of the vitamin**  
(A) Riboflavin (B) Thiamin  
(C) Nicotinic acid (D) Pyridoxine
- 67. Corneal vascularisation is found in deficiency of the vitamin:**  
(A) B<sub>1</sub> (B) B<sub>2</sub>  
(C) B<sub>3</sub> (D) B<sub>6</sub>
- 68. The pellagra preventive factor is**  
(A) Riboflavin (B) Pantothenic acid  
(C) Niacin (D) Pyridoxine
- 69. Pellagra is caused due to the deficiency of**  
(A) Ascorbic acid (B) Pantothenic acid  
(C) Pyridoxine (D) Niacin
- 70. Niacin or nicotinic acid is a monocarboxylic acid derivative of**  
(A) Pyridine (B) Pyrimidine  
(C) Flavin (D) Adenine
- 71. Niacin is synthesized in the body from**  
(A) Tryptophan (B) Tyrosine  
(C) Glutamate (D) Aspartate
- 72. The proteins present in maize are deficient in**  
(A) Lysine (B) Threonine  
(C) Tryptophan (D) Tyrosine
- 73. Niacin is present in maize in the form of**  
(A) Niatin (B) Nicotin  
(C) Niacytin (D) Nicyn
- 74. In the body 1 mg of niacin can be produced from**  
(A) 60 mg of pyridoxine  
(B) 60 mg of tryptophan  
(C) 30 mg of tryptophan  
(D) 30 mg of pantothenic acid
- 75. Pellagra occurs in population dependent on**  
(A) Wheat (B) Rice  
(C) Maize (D) Milk
- 76. The enzymes with which nicotinamide act as coenzyme are**  
(A) Dehydrogenases (B) Transaminases  
(C) Decarboxylases (D) Carboxylases
- 77. Dietary requirement of Vitamin D:**  
(A) 400 I.U. (B) 1000 I.U.  
(C) 6000 I.U. (D) 700 I.U.
- 78. The Vitamin which does not contain a ring in the structure is**  
(A) Pantothenic acid (B) Vitamin D  
(C) Riboflavin (D) Thiamin
- 79. Pantothenic acid is a constituent of the coenzyme involved in**  
(A) Decarboxylation (B) Dehydrogenation  
(C) Acetylation (D) Oxidation
- 80. The precursor of CoA is**  
(A) Riboflavin (B) Pyridoxamine  
(C) Thiamin (D) Pantothenate
- 81. 'Burning foot syndrome' has been ascribed to the deficiency of**  
(A) Pantothenic acid (B) Thiamin  
(C) Cobalamin (D) Pyridoxine
- 82. Pyridoxal phosphate is central to**  
(A) Deamination (B) Amidation  
(C) Carboxylation (D) Transamination
- 83. The vitamin required as coenzyme for the action of transaminases is**  
(A) Niacin  
(B) Pantothenic acid  
(C) Pyridoxal phosphate  
(D) Riboflavin
- 84. Vitamin B<sub>6</sub> deficiency may occur during therapy with**  
(A) Isoniazid (B) Terramycin  
(C) Sulpha drugs (D) Aspirin

- 85. Deficiency of vitamin B<sub>6</sub> may occur in**  
 (A) Obese person (B) Thin person  
 (C) Alcoholics (D) Diabetics
- 86. 'Xanthurenic acid index' is a reliable criterion for the deficiency of the vitamin**  
 (A) Pyridoxal (B) Thiamin  
 (C) Pantothenic acid (D) Cobalamin
- 87. Epileptiform convulsion in human infants have been attributed to the deficiency of the vitamin**  
 (A) B<sub>1</sub> (B) B<sub>2</sub>  
 (C) B<sub>6</sub> (D) B<sub>12</sub>
- 88. Biotin is a coenzyme of the enzyme**  
 (A) Carboxylase (B) Hydroxylase  
 (C) Decarboxylase (D) Deaminase
- 89. The coenzyme required for conversion of pyruvate to oxaloacetate is**  
 (A) FAD (B) NAD  
 (C) TPP (D) Biotin
- 90. In biotin-containing enzymes, the biotin is bound to the enzyme by**  
 (A) An amide linkage to carboxyl group of glutamine  
 (B) A covalent bond with CO<sub>2</sub>  
 (C) An amide linkage to an amino group of lysine  
 (D) An amide linkage to α-carboxyl group of protein
- 91. A molecule of CO<sub>2</sub> is captured by biotin when it acts as coenzyme for carboxylation reaction. The carboxyl group is covalently attached to**  
 (A) A nitrogen (N<sub>1</sub>) of the biotin molecule  
 (B) Sulphur of thiophene ring  
 (C) α-Amino group of lysine  
 (D) α-Amino group of protein
- 92. Consumption of raw eggs can cause deficiency of**  
 (A) Biotin (B) Pantothenic acid  
 (C) Riboflavin (D) Thiamin
- 93. The cofactor or its derivative required for the conversion of acetyl CoA to malonyl-CoA is**  
 (A) FAD (B) ACP  
 (C) NAD<sup>+</sup> (D) Biotin
- 94. A cofactor required in oxidative decarboxylation of pyruvate is**  
 (A) Lipoate  
 (B) Pantothenic acid  
 (C) Biotin  
 (D) Para aminobenzoic acid
- 95. The central structure of B<sub>12</sub> referred to as corrin ring system consists of**  
 (A) Cobalt (B) Manganese  
 (C) Magnesium (D) Iron
- 96. The central heavy metal cobalt of vitamin B<sub>12</sub> is coordinately bound to**  
 (A) Cyanide group (B) Amino group  
 (C) Carboxyl group (D) Sulphide group
- 97. Vitamin B<sub>12</sub> has a complex ring structure (corrin ring) consisting of four**  
 (A) Purine rings (B) Pyrimidine rings  
 (C) Pyrrole rings (D) Pteridine rings
- 98. Empirical formula of cobalamin is**  
 (A) C<sub>63</sub>H<sub>88</sub>N<sub>12</sub>O<sub>14</sub>P.CO  
 (B) C<sub>61</sub>H<sub>82</sub>N<sub>12</sub>O<sub>12</sub>P.CO  
 (C) C<sub>61</sub>H<sub>88</sub>N<sub>12</sub>O<sub>14</sub>P.CO  
 (D) C<sub>63</sub>H<sub>88</sub>N<sub>14</sub>O<sub>14</sub>P.CO
- 99. A deficiency of vitamin B<sub>12</sub> causes**  
 (A) Beri-Beri  
 (B) Scurvy  
 (C) Pernicious anemia  
 (D) Ricket
- 100. Vitamin B<sub>12</sub> deficiency can be diagnosed by urinary excretion of**  
 (A) Pyruvate (B) Methylmalonate  
 (C) Malate (D) Lactate
- 101. Subacute combined degeneration of cord is caused due to deficiency of**  
 (A) Niacin (B) Cobalamin  
 (C) Biotin (D) Thiamin

- 102. Vitamin required for metabolism of diols e.g. conversion of ethylene glycol to acetaldehyde is**  
(A) Thiamin (B) Cobalamin  
(C) Pyridoxine (D) Folic acid
- 103. Both folic acid and methyl cobalamin (vitamin B<sub>12</sub>) are required in**  
(A) Deamination of serine  
(B) Deamination of threonine  
(C) Conversion of pyridoxal phosphate to pyridoxamine phosphate  
(D) Methylation of homocystein to methionine
- 104. Folic acid or folate consists of the**  
(A) Base pteridine, p-amino benzoic acid and aspartate  
(B) Base purine, p-amino benzoic acid and glutamate  
(C) Base pteridine, p-amino benzoic acid and glutamate  
(D) Base purine, p-hydroxy benzoic acid and glutamate
- 105. Folate as a coenzyme is involved in the transfer and utilization of**  
(A) Amino group  
(B) Hydroxyl group  
(C) Single carbon moiety  
(D) Amido group
- 106. Folic acid deficiency can be diagnosed by increased urinary excretion of**  
(A) Methylmalonate (B) Figlu  
(C) Cystathionine (D) Creatinine
- 107. Sulpha drugs interfere with bacterial synthesis of**  
(A) Lipoate (B) Vitamin E  
(C) Tetrahydrofolate (D) Ascorbic acid
- 108. Folate deficiency causes**  
(A) Microcytic anemia  
(B) Hemolytic anemia  
(C) Iron deficiency anemia  
(D) Megaloblastic anemia
- 109. Thiamin is heat stable in**  
(A) Acidic medium (B) Alkaline medium  
(C) Both (A) and (B) (D) None of these
- 110. Thiamin deficiency includes**  
(A) Mental depression (B) Fatigue  
(C) Beriberi (D) All of these
- 111. Thiamin diphosphate is required for oxidative decarboxylation of**  
(A)  $\alpha$ -Keto acids (B)  $\alpha$ -Amino acids  
(C) Fatty acids (D) All of these
- 112. Loss of thiamin can be decreased by using**  
(A) Unpolished rice  
(B) Parboiled rice  
(C) Whole wheat flour  
(D) All of these
- 113. Daily requirement of thiamin is**  
(A) 0.1 mg/1,000 Calories  
(B) 0.5 mg/1,000 Calories  
(C) 0.8 mg/1,000 Calories  
(D) 1.0 mg/1,000 Calories
- 114. Thiamin requirement is greater in**  
(A) Non-vegetarians  
(B) Alcoholics  
(C) Pregnant women  
(D) Both B and C
- 115. People consuming polished rice as their staple food are prone to**  
(A) Beriberi (B) Pellagra  
(C) Both (A) and (B) (D) None of these
- 116. Riboflavin is heat stable in**  
(A) Acidic medium (B) Alkaline medium  
(C) Neutral medium (D) Both (A) and (C)
- 117. FAD is a coenzyme for**  
(A) Succinate dehydrogenase  
(B) Glycerol-3-phosphate dehydrogenase  
(C) Sphingosine reductase  
(D) All of these
- 118. Riboflavin deficiency can cause**  
(A) Peripheral neuritis (B) Diarrhoea  
(C) Angular stomatitis (D) None of these
- 119. Pellagra preventing factor is**  
(A) Thiamin (B) Riboflavin  
(C) Niacin (D) Pyridoxine

- 120. Niacin contains a**  
 (A) Sulphydryl group (B) Carboxyl group  
 (C) Amide group (D) All of these
- 121. NADP is required as a coenzyme in**  
 (A) Glycolysis (B) Citric acid cycle  
 (C) HMP shunt (D) Gluconeogenesis
- 122. NAD is required as a coenzyme for**  
 (A) Malate dehydrogenase  
 (B) Succinate dehydrogenase  
 (C) Glucose-6-phosphate dehydrogenase  
 (D) HMG CoA reductase
- 123. NAD is required as a coenzyme in**  
 (A) Citric acid cycle  
 (B) HMP shunt  
 (C)  $\beta$ -Oxidation of fatty acids  
 (D) Both (A) and (C)
- 124. Niacin can be synthesised in human beings from**  
 (A) Histidine (B) Phenylalanine  
 (C) Tyrosine (D) Tryptophan
- 125. Daily requirement of niacin is**  
 (A) 5 mg (B) 10 mg  
 (C) 20 mg (D) 30 mg
- 126. Niacin deficiency is common in people whose staple food is**  
 (A) Wheat  
 (B) Polished rice  
 (C) Maize and /or sorghum  
 (D) None of these
- 127. In pellagra, dermatitis usually affects**  
 (A) Exposed parts of body  
 (B) Covered parts of body  
 (C) Trunk only  
 (D) All parts of the body
- 128. Niacin deficiency can occur in**  
 (A) Hartnup disease (B) Phenylketonuria  
 (C) Alkaptonuria (D) None of these
- 129. Pantothenic acid contains an amino acid which is**  
 (A) Aspartic acid (B) Glutamic acid  
 (C)  $\beta$ -Alanine (D)  $\beta$ -Aminoisobutyric acid
- 130. Sulphydryl group of coenzyme a is contributed by**  
 (A)  $\beta$ -Alanine  
 (B)  $\beta$ -Aminoisobutyric acid  
 (C) Methionine  
 (D) Thioethanolamine
- 131. Coenzyme A contains a nitrogenous base which is**  
 (A) Adenine (B) Guanine  
 (C) Choline (D) Ethanolamine
- 132. The following is required for the formation of coenzyme A:**  
 (A) ATP (B) GTP  
 (C) CTP (D) None of these
- 133. Coenzyme A is required for catabolism of**  
 (A) Leucine (B) Isoleucine  
 (C) Valine (D) All of these
- 134. Deficiency of pantothenic acid in human beings can affect**  
 (A) Nervous system (B) Digestive system  
 (C) Both (A) and (B) (D) None of these
- 135. Pyridoxal phosphate is a coenzyme for**  
 (A) Glutamate oxaloacetate transaminase  
 (B) Glutamate pyruvate transaminase  
 (C) Tyrosine transaminase  
 (D) All of these
- 136. Pyridoxal phosphate is required as a coenzyme in**  
 (A) Transamination (B) Transulphuration  
 (C) Desulphuration (D) All of these
- 137. Pyridoxal phosphate is a coenzyme for**  
 (A) Glycogen synthetase  
 (B) Phosphorylase  
 (C) Both (A) and (B)  
 (D) None of these
- 138. Pyridoxine deficiency can be diagnosed by measuring urinary excretion of**  
 (A) Pyruvic acid (B) Oxaloacetic acid  
 (C) Xanthurenic acid (D) None of these

- 139. Pyridoxine deficiency can be diagnosed by measuring the urinary excretion of xanthurenic acid following a test dose of**  
(A) Glycine (B) Histidine  
(C) Tryptophan (D) Pyridoxine
- 140. Pyridoxine requirement depends upon the intake of**  
(A) Carbohydrates (B) Proteins  
(C) Fats (D) None of these
- 141. Anti-egg white injury factor is**  
(A) Pyridoxine (B) Biotin  
(C) Thiamin (D) Liponic acid
- 142. When eggs are cooked**  
(A) Biotin is destroyed but avidin remains unaffected  
(B) Avidin is inactivated but biotin remains unaffected  
(C) Both avidin and biotin are inactivated  
(D) Both avidin and biotin remain unaffected
- 143. Biotin is required as a coenzyme by**  
(A) Anaerobic dehydrogenases  
(B) Decarboxylases  
(C) Aerobic dehydrogenases  
(D) Carboxylases
- 144. Biotin is a coenzyme for**  
(A) Pyruvate carboxylase  
(B) Acetyl CoA carboxylase  
(C) Propionyl CoA carboxylase  
(D) All of these
- 145. Lipoic acid is a coenzyme for**  
(A) Pyruvate dehydrogenase  
(B)  $\alpha$ -Ketoglutarate dehydrogenase  
(C) Both (A) and (B)  
(D) None of these
- 146. Chemically, lipoic acid is**  
(A) Saturated fatty acid  
(B) Unsaturated fatty acid  
(C) Amino acid  
(D) Sulphur containing fatty acid
- 147. Folic acid contains**  
(A) Pteridine  
(B) p-Amino benzoic acid  
(C) Glutamic acid  
(D) All of these
- 148. Conversion of folate into tetrahydrofolate requires**  
(A) NADH (B) NADPH  
(C) FMNH<sub>2</sub> (D) FADH<sub>2</sub>
- 149. Riboflavin deficiency symptoms are**  
(A) Glossitis (B) stomatitis  
(C) Vomiting (D) Both (A) and (B)
- 150. Vitamin B<sub>12</sub> forms coenzymes known as**  
(A) Cobamide (B) Transcobalamin I  
(C) Transcobalamin II (D) Both (B) and (C)
- 151. Methylcobalamin is required for formation of**  
(A) Serin from glycine  
(B) Glycine from serine  
(C) Methionine from homocysteine  
(D) All of these
- 152. Absorption of Vitamin B<sub>12</sub> requires the presence of**  
(A) Pepsin (B) Hydrochloric acid  
(C) Intrinsic factor (D) Both (B) and (C)
- 153. Intrinsic factor is chemically a**  
(A) Protein  
(B) Glycoprotein  
(C) Mucopolysaccharide  
(D) Peptide
- 154. Chemically, Extrinsic Factor of Castle is a**  
(A) Mucoprotein  
(B) Glycoprotein  
(C) Mucopolysaccharide  
(D) Cyanocobalamin
- 155. Vitamin B<sub>12</sub> is**  
(A) Not stored in the body  
(B) Stored in bone marrow  
(C) Stored in liver  
(D) Stored in RE cells

- 156. Vitamin B<sub>12</sub> is transported in blood by**  
(A) Albumin (B) Transcortin  
(C) Transcobalamin I (D) Transcobalamin II
- 157. Vitamin B<sub>12</sub> is synthesized by**  
(A) Bacteria only (B) Plants only  
(C) Animals only (D) Both (A) and (C)
- 158. Deficiency of vitamin B<sub>12</sub> can occur because of**  
(A) Decreased intake of vitamin B<sub>12</sub>  
(B) Atrophy of gastric mucosa  
(C) Intestinal malabsorption  
(D) All of these
- 159. Deficiency of vitamin B<sub>12</sub> can be diagnosed by**  
(A) Carr-Price reaction  
(B) Ames assay  
(C) Watson-Schwartz test  
(D) Schilling test
- 160. Gastrectomy leads to megaloblastic anaemia within a few**  
(A) Days (B) Weeks  
(C) Months (D) Years
- 161. Ascorbic acid is required to synthesise all of the following except**  
(A) Collagen (B) Bile acids  
(C) Bile pigments (D) Epinephrine
- 162. Vitamin C enhances the intestinal absorption of**  
(A) Potassium (B) Iodine  
(C) Iron (D) None of these
- 163. Vitamin C activity is present in**  
(A) D-Ascorbic acid  
(B) D-Dehydroascorbic acid  
(C) L-Ascorbic acid  
(D) Both A and B
- 164. Vitamin C is required for the synthesis of**  
(A) Bile acids from cholesterol  
(B) Bile salts from bile acids  
(C) Vitamin D from cholesterol  
(D) All of these
- 165. Deficiency of vitamin C causes**  
(A) Beriberi  
(B) Pellagra  
(C) Pernicious anaemia  
(D) Scurvy
- 166. An early diagnosis of vitamin C deficiency can be made by**  
(A) Measuring plasma ascorbic acid  
(B) Measuring urinary ascorbic acid  
(C) Ascorbic acid saturation test  
(D) All of these
- 167. Daily requirement of vitamin C in adults is about**  
(A) 100 mg (B) 25 mg  
(C) 70 mg (D) 100 mg
- 168. The vitamin having the highest daily requirement among the following is**  
(A) Thiamin (B) Riboflavin  
(C) Pyridoxine (D) Ascorbic acid
- 169. Anaemia can occur due to the deficiency of all the following except**  
(A) Thiamin (B) Pyridoxine  
(C) Folic acid (D) Cyanocobalamin
- 170. A vitamin which can be synthesized by human beings is**  
(A) Thiamin (B) Niacin  
(C) Folic acid (D) Cyanocobalamin
- 171. Laboratory diagnosis of vitamin B<sub>12</sub> deficiency can be made by measuring the urinary excretion of**  
(A) Xanthurenic acid  
(B) Formiminoglutamic acid  
(C) Methylmalonic acid  
(D) Homogentisic acid
- 172. The molecule of vitamin A<sub>1</sub> contains**  
(A) Benzene ring (B)  $\beta$ -Ionone ring  
(C)  $\beta$ -Carotene ring (D) None of these
- 173. Precursor of Vitamin A is**  
(A)  $\alpha$ -Carotene (B)  $\beta$ -Carotene  
(C)  $\gamma$ -Carotene (D) All of these

- 174. Two molecules of vitamin A can be formed from 1 molecule of**  
(A)  $\alpha$ -Carotene (B)  $\beta$ -Carotene  
(C)  $\gamma$ -Carotene (D) All of these
- 175. Conversion of  $\beta$ -carotene into retinal requires the presence of**  
(A)  $\beta$ -Carotene dioxygenase  
(B) Bile salts  
(C) Molecular oxygen  
(D) All of these
- 176. Conversion of retinal into ritonal requires the presence of**  
(A) NADH (B) NADPH  
(C) FADH<sub>2</sub> (D) Lipoic acid
- 177. Retinal is converted into retinoic acid in the presence of**  
(A) Retinal oxidase (B) Retinal carboxylase  
(C) Retinene reductase (D) Spontaneously
- 178. Vitamin A absorbed in intestine is released into**  
(A) Portal circulation (B) Lacteals  
(C) Both (A) and (B) (D) None of these
- 179. Vitamin A is stored in the body in**  
(A) Liver  
(B) Adipose tissue  
(C) Reticuloendothelial cells  
(D) All of these
- 180. Rhodopsin contains opsin and**  
(A) 11-cis-retinal (B) 11-trans-retinal  
(C) All-cis-retinal (D) All trans-retinal
- 181. When light falls on rod cells**  
(A) All-cis-retinal is converted into all-trans-retinal  
(B) 11-cis-retinal is converted into 11-trans-retinal  
(C) 11-trans-retinal is converted into all-trans-retinal  
(D) 11-cis-retinal is converted into all-trans-retinal
- 182. Conversion of all-trans-retinal into all-trans-retinol requires**  
(A) NAD (B) NADH  
(C) NADP (D) NADPH
- 183. Retinol isomerase is present in**  
(A) Retina (B) Liver  
(C) Both (A) and (B) (D) None of these
- 184. Anti-oxidant activity is present in**  
(A)  $\beta$ -Carotene (B) Retinol  
(C) Retinoic acid (D) All of these
- 185. One international Unit of vitamin A is the activity present in**  
(A) 0.3  $\mu$ g of  $\beta$ -Carotene  
(B) 0.3  $\mu$ g of retinol  
(C) 0.6  $\mu$ g of retinoic acid  
(D) All of these
- 186. Daily requirement of vitamin A in an adult man can be expressed as**  
(A) 400 IU (B) 1,000 IU  
(C) 5,000 IU (D) 10,000 IU
- 187. Vitamin B<sub>6</sub> includes**  
(A) Pyridoxal (B) Pyridoxamine  
(C) Pyridoxine (D) All of these
- 188. An early effect of vitamin a deficiency is**  
(A) Xerophthalmia  
(B) Keratomalacia  
(C) Prolonged dark adaptation time  
(D) Follicular hyperkeratosis
- 189. Nyctalopia is**  
(A) Drying of eyes  
(B) Destruction of cornea  
(C) Blindness  
(D) Inability to see in dimlight
- 190. Rod cells possess a trans-membrane protein which is**  
(A) Adenylate cyclase (B) Transducin  
(C) Rhodopsin (D) B as well as C
- 191. Provitamins A include**  
(A) Retinal (B) Retionic acid  
(C) Carotenes (D) All of these
- 192. Retinoic acid can**  
(A) Act as a photo receptor  
(B) Support growth and differentiation  
(C) Act as an anti-oxidant  
(D) None of these

- 193. Prosthetic group in cone cell photoreceptors is**  
 (A) Iodine (B) Opsin  
 (C) 11-cis-retinal (D) all-trans-retinal
- 194. Retinoic acid is involved in the synthesis of**  
 (A) Rhodopsin (B) Iodopsin  
 (C) Porphyrinopsin (D) Glycoproteins
- 195. Transducin is a**  
 (A) Signal transducer (B) Stimulatory G-protein  
 (C) Trimer (D) All of these
- 196. Provitamin D<sub>3</sub> is**  
 (A) Cholecalciferol  
 (B) Ergosterol  
 (C) 7-Dehydrocholesterol  
 (D) Ergocaliferol
- 197. Ergosterol is found in**  
 (A) Animals (B) Plants  
 (C) Bacteria (D) All of these
- 198. A provitamin D synthesized in human beings is**  
 (A) Ergosterol  
 (B) 7-Dehydrocholesterol  
 (C) Cholecalciferol  
 (D) 25-Hydroxycholecalciferol
- 199. 25-Hydroxylation of vitamin D occurs in**  
 (A) Skin (B) Liver  
 (C) Kidneys (D) Intestinal mucosa
- 200. Tubular reabsorption of calcium is increased by**  
 (A) Cholecalciferol  
 (B) 25-Hydroxycholecalciferol  
 (C) Calcitriol  
 (D) All of these
- 201. Parathormone is required for the conversion of**  
 (A) Cholecalciferol into 1-hydroxycholecalciferol  
 (B) Cholecalciferol into 25-hydroxycholecalciferol  
 (C) 25-Hydroxycholecalciferol into calcitriol  
 (D) Cholesterol into 7-dehydrocholesterol
- 202. Calcitriol inhibits the conversion of**  
 (A) Cholesterol into 7-dehydrocholesterol  
 (B) Cholecalciferol into 1-hydroxycholecalciferol  
 (C) Cholecalciferol into 25-hydroxycholecalciferol  
 (D) 25-Hydroxycholecalciferol into 1,25-dihydroxycholecalciferol
- 203. Bowlegs and knock-knees can occur in**  
 (A) Rickets (B) Osteomalacia  
 (C) Both A and B (D) Hypervitaminosis D
- 204. Calcification of soft tissues can occur in**  
 (A) Osteomalacia  
 (B) Rickets  
 (C) Hypervitaminosis D  
 (D) None of these
- 205. Levels of serum calcium and inorganic phosphorus are increased in**  
 (A) Hypervitaminosis D  
 (B) Hypoparathyroidism  
 (C) Hypovitaminosis D  
 (D) None of these
- 206. Requirement of vitamin E increases with the increasing intake of**  
 (A) Calories (B) Proteins  
 (C) PUFA (D) Cholesterol
- 207. In human beings, vitamin E prevents**  
 (A) Sterility  
 (B) Hepatic necrosis  
 (C) Muscular dystrophy  
 (D) None of these
- 208. Vitamin E protects**  
 (A) Polyunsaturated fatty acids against aeroxidation  
 (B) Vitamin A and carotenes against oxidation  
 (C) Lung tissue against atmospheric pollutants  
 (D) All of these
- 209. Intestinal bacteria can synthesise**  
 (A) Phyllogquinone (B) Farnoquinone  
 (C) Both (A) and (B) (D) Menadione

- 210. A water soluble form of vitamin K is**  
(A) Phylloquinone (B) Farnoquinone  
(C) Menadione (D) None of these
- 211. Prothrombin time is prolonged in**  
(A) Vitamin K deficiency  
(B) Liver damage  
(C) Both (A) and (B)  
(D) None of these
- 212. A synthetic form of vitamin K is**  
(A) Menadione (B) Farnoquinone  
(C) Phylloquinone (D) None of these
- 213. Retinal is reduced to retinol by retinene reductase in presence of the coenzyme**  
(A) NAD<sup>+</sup> (B) NADP<sup>+</sup>  
(C) NADH + H<sup>+</sup> (D) NADPH + H<sup>+</sup>
- 214. Retinal exists as an ester with higher fatty acids in the**  
(A) Liver (B) Kidney  
(C) Lung (D) All of these
- 215. Retinol is transported to the blood as retinol attached to**  
(A)  $\alpha_1$ -globulin (B)  $\alpha_2$ -globulin  
(C)  $\beta$ -globulin (D)  $\gamma$ -globulin
- 216. Carotenes are transported with the**  
(A) Minerals (B) Proteins  
(C) Lipids (D) Lipoproteins
- 217. The drugs that form complexes with pyridoxal are**  
(A) Isoniazid (B) Penicillamine  
(C) Rifampicin (D) Both (A) and (B)
- 218. In the blood the vitamin esters are attached to**  
(A)  $\alpha_1$ -lipoproteins (B)  $\alpha_2$ -lipoproteins  
(C)  $\beta$ -lipoproteins (D)  $\gamma$ -lipoproteins
- 219. The percentage of Vitamin A in the form of esters is stored in the liver:**  
(A) 80 (B) 85  
(C) 90 (D) 95
- 220. The performed Vitamin A is supplied by foods such as**  
(A) Butter (B) Eggs  
(C) Fish liver oil (D) All of these
- 221. The non-protein part of rhodopsin is**  
(A) Retinal (B) Retinol  
(C) Carotene (D) Repsin
- 222. Lumirhodopsin is stable only at a temperature below**  
(A) -35°C (B) -40°C  
(C) -45°C (D) -50°C
- 223. The normal concentration of vitamin A in blood in I.V/dl:**  
(A) 20-55 (B) 24-60  
(C) 30-65 (D) 35-70
- 224. Continued intake of excessive amounts of vitamin A especially in children produces**  
(A) Irritability (B) Anorexia  
(C) Headache (D) All of these
- 225. Vitamin D<sub>2</sub> is also said to be**  
(A) Activated ergosterol  
(B) Fergocalciferol  
(C) Viosterol  
(D) All of these
- 226. The poor sources of vitamin D:**  
(A) Eggs (B) Butter  
(C) Milk (D) Liver
- 227. The activity of tocopherols is destroyed by**  
(A) Oxidation (B) Reduction  
(C) Conjugation (D) All of these
- 228. Some tocopherols are**  
(A) Terpenoid in structure  
(B) Dional in structure  
(C) Isoprenoid in structure  
(D) Farnesyl in structure
- 229. The methyl groups in the aromatic nucleus of a tocopherols are**  
(A) 2 (B) 3  
(C) 4 (D) 5

- 230. Vitamin E stored in**  
(A) Mitochondria (B) Microsomes  
(C) Both (A) and (B) (D) None of these
- 231. Vitamin E protects the polyunsaturated fatty acids from oxidation by molecular oxygen in the formation of**  
(A) Superoxide (B) Peroxide  
(C) Trioxide (D) All of these
- 232. The tocopherols prevent the oxidation of**  
(A) Vitamin A (B) Vitamin D  
(C) Vitamin K (D) Vitamin C
- 233. Vitamin E protects enzymes from destruction in**  
(A) Muscles (B) Nerves  
(C) Gonads (D) All of these
- 234. Vitamin K regulates the synthesis of blood clotting factors:**  
(A) VII (B) IX  
(C) X (D) All of these
- 235. Ascorbic acid can reduce**  
(A) 2, 4-dinitro benzene  
(B) 2, 6-Dichlorophenol Indophenol  
(C) 2, 4-dibromobenzene  
(D) 2, 6-dibromo benzene
- 236. Sterilized milk is devoid of**  
(A) Vitamin A (B) Vitamin B<sub>1</sub>  
(C) Vitamin C (D) Vitamin D
- 237. The symptoms of scurvy are**  
(A) Poor healing of wounds  
(B) Loosening of teeth  
(C) Anaemia  
(D) All of these
- 238. Kwashiorkor results from**  
(A) Vitamin A deficiency  
(B) Vitamin D deficiency  
(C) Deficiency of minerals in diet  
(D) Protein and caloric deficiency in diet
- 239. Which among the following fatty acids is an essential fatty acid for man?**  
(A) Palmitic acid (B) Oleic acid  
(C) Linoleic acid (D) None of these
- 240. The number of nutritionally essential amino acids for man is**  
(A) 6 (B) 8  
(C) 10 (D) 12
- 241. Avidin is present in**  
(A) Cow's milk  
(B) Raw egg  
(C) Green leafy vegetables  
(D) Carrots
- 242. Marasmus is due to malnutrition of**  
(A) Proteins  
(B) Proteins and calories  
(C) Proteins and vitamins  
(D) Proteins and minerals
- 243. Energy value in kilocalorie per gram of fat in the body is**  
(A) 1 (B) 4  
(C) 9 (D) 18
- 244. Which among the following is an essential amino acid for man?**  
(A) Alanine (B) Serine  
(C) Valine (D) Glutamic acid
- 245. Under what condition to basal metabolic rate goes up?**  
(A) Cold environment  
(B) Hot environment  
(C) Intake of base forming foods  
(D) Hypothyroidism
- 246. What is the major form of caloric storage in human body?**  
(A) ATP  
(B) Glycogen  
(C) Creatine phosphate  
(D) triacylglycerol
- 247. The phosphoprotein of milk is**  
(A) Lactalbumin (B) Lactoglobulin  
(C) Vitellin (D) Casein
- 248. Dietary deficiency of this vitamin leads to night blindness:**  
(A) Retinol (B) Niacin  
(C) Ascorbic acid (D) Cholecalciferol

- 249. A non essential amino acid is not**  
(A) Absorbed in the intestines  
(B) Required in the diet  
(C) Incorporated into the protein  
(D) Metabolized by the body
- 250. The deficiency of Vitamin B<sub>12</sub> leads to**  
(A) Pernicious anaemia  
(B) Megaloblastic anaemia  
(C) Both (A) and (B)  
(D) None of these
- 251. Which among the following is a nutritionally essential amino acid for man?**  
(A) Alanine (B) Glycine  
(C) Tyrosine (D) Isoleucine
- 252. The maximum specific dynamic action of food stuff is exerted by**  
(A) carbohydrates (B) fats  
(C) proteins (D) vitamins
- 253. The essential amino acids**  
(A) must be supplied in the diet because the organism has lost the capacity to aminate the corresponding ketoacids  
(B) must be supplied in the diet because the human has an impaired ability to synthesize the carbon chain of the corresponding ketoacids  
(C) are identical in all species studied  
(D) are defined as these amino acids which cannot be synthesized by the organism at a rate adequate to meet metabolic requirements
- 254. Fibre in the diet is beneficial in**  
(A) Hyper glycaemia  
(B) Hyper cholesteraemia  
(C) Colon cancer  
(D) All of these
- 255. Sucrose intolerance leads to**  
(A) Hyper glycaemia (B) Glycosuria  
(C) Diarrhoea (D) Hypoglycaemia
- 256. There can be intolerance with respect to the following sugar:**  
(A) Glucose (B) Lactose  
(C) Maltose (D) Xylose
- 257. Milk contains very poor amounts of**  
(A) Calcium (B) Phosphate  
(C) Iron (D) Riboflavin
- 258. Egg contains very little**  
(A) Fat  
(B) Proteins  
(C) Carbohydrates  
(D) Calcium and phosphorus
- 259. BMR (Basal Metabolic rate) is elevated in**  
(A) Hyper thyroidism (B) Under nutrition  
(C) Starvation (D) Hypothyroidism
- 260. Soyabean proteins are rich in**  
(A) Lysine (B) Alanine  
(C) Glycine (D) Aspartic acid
- 261. Corn and gliadin are low in**  
(A) Lysine (B) Alanine  
(C) Glycine (D) Aspartic acid
- 262. What is the disease caused by thiamine deficiency?**  
(A) Nyctalopia (B) Scurvy  
(C) Rickets (D) Beriberi
- 263. Retinol and retinol-binding protein (RBP) bound with this protein:**  
(A) Albumin (B) Prealbumin  
(C)  $\alpha_2$ -globulin (D)  $\beta$ -globulin
- 264. Megaloblastic anemia is caused by the deficiency of**  
(A) Folic acid (B) Vitamin B<sub>6</sub>  
(C) Iron (D) Protein
- 265. This vitamin acts as anti-oxidant:**  
(A) Vitamin A (B) Vitamin D  
(C) Vitamin E (D) Vitamin K
- 266. Calcitriol is**  
(A) 1-OH-cholecalciferol  
(B) 25-OH-cholecalciferol  
(C) 24, 25-diOH cholecalciferol  
(D) 1, 25-diOH cholecalciferol
- 267. 1-hydroxylation of 25-OH vitamin D<sub>3</sub> takes place in**  
(A) Liver (B) Kidneys  
(C) Intestine (D) Pancreas

- 268. 25-hydroxylation of vitamin D<sub>3</sub> takes place in**  
 (A) Liver (B) Kidneys  
 (C) Intestine (D) Pancreas
- 269. Hydroxylation of 25-hydroxy cholecalciferol is promoted by**  
 (A) Cytochrome - a (B) Parathyroid hormone  
 (C) Cytochrome-b (D) CAMP
- 270. The egg injury factor in raw egg white is**  
 (A) Biotin (B) Avidin  
 (C) Albumin (D) Calcium salts
- 271. The following has cyanide:**  
 (A) Vitamin B<sub>12</sub>  
 (B) Adenyl cobamide  
 (C) Benzimidazole cobamide  
 (D) Methyl cobamide
- 272. The human species can biosynthesize**  
 (A) Vitamin C (B) Vitamin B<sub>12</sub>  
 (C) Thiamine (D) Niacin
- 273. Retina contains this photosensitive pigment:**  
 (A) Rhodopsin (B) Opsin  
 (C) Retinol (D) Melanin
- 274. Anti xerophthalmic vitamin is**  
 (A) Vitamin B<sub>1</sub> (B) Vitamin B<sub>2</sub>  
 (C) Vitamin B<sub>6</sub> (D) Vitamin A
- 275. One of the following is not a symptom of Addison's disease.**  
 (A) Hypoglycemia (B) Hyponatremia  
 (C) Hypokalemia (D) Hypochloremia
- 276. Gammmaxane is an antimetabolite of**  
 (A) Thiamine (B) Riboflavin  
 (C) Pyridoxin (D) Inositol
- 277. Pyridoxin deficiency may lead to convulsions as it is needed for the synthesis of**  
 (A) GABA (B) PABA  
 (C) EFA (D) SAM
- 278. Sulpha drugs are antimetabolites of**  
 (A) Vitamin K (B) Pyridoxin  
 (C) Folic acid (D) Vitamin B<sub>2</sub>
- 279. This abnormal metabolite may be responsible for the neurological manifestation of pernicious anemia:**  
 (A) Taurine (B) Methyl malonic acid  
 (C) Xantherunic acid (D) Phenyl pyruvic acid
- 280. The vitamin in leafy vegetables:**  
 (A) D (B) K  
 (C) A (D) Both (B) and (C)
- 281. Isonicotinic acid hydrazide given in the treatment of tuberculosis may lead to a deficiency of**  
 (A) Vitamin A (B) Pyridoxin  
 (C) Folate (D) Inositol
- 282. Biotin is required for the reaction of CO<sub>2</sub> with**  
 (A) Water  
 (B) Acetyl CoA  
 (C) NH<sub>3</sub>  
 (D) Incorporation of carbon δ in purine
- 283. A deficiency of folate leads to**  
 (A) Megaloblastic anemia  
 (B) Aplastic anemia  
 (C) Pernicious anemia  
 (D) Hypochromic microcytic anemia
- 284. A deficiency of Iron leads to**  
 (A) Megaloblastic anemia  
 (B) Aplastic anemia  
 (C) Pernicious anemia  
 (D) Hypochromic microcytic anemia
- 285. Corninoid coenzymes are coenzymes of**  
 (A) Vitamin B<sub>12</sub> (B) Vitamin B<sub>6</sub>  
 (C) Vitamin B<sub>2</sub> (D) Vitamin B<sub>1</sub>
- 286. Vitamin B<sub>12</sub> initially binds to the proteins known as**  
 (A) Transcobalamin I  
 (B) R-Proteins  
 (C) Transcobalamin II  
 (D) Intrinsic factor of castle
- 287. Extrinsic factor of castle is**  
 (A) Vitamin B<sub>12</sub> (B) Glycoprotein  
 (C) R-Proteins (D) Sigma protein

- 288. Intrinsic factor of castle is**  
(A) Vitamin B<sub>12</sub> (B) Glycoprotein  
(C) R-Proteins (D) Sigma protein
- 289. Pernicious means**  
(A) Prolonged (B) Dangerous  
(C) Intermittent (D) Idiopathic
- 290. Reduction of D-ribonucleotides to D-deoxy ribonucleotides in prokaryotes requires**  
(A) 5, 6 dimethyl benzimidazole cobamide  
(B) Thioredoxin  
(C) Tetra hydrobiopterin  
(D) Tetra hydrofolate
- 291. Biotin is also known as**  
(A) Anti egg white injury factor  
(B) Rutin  
(C) Both (A) and (B)  
(D) None of these
- 292. Angular stomatosis is due to**  
(A) Ariboflavinoses  
(B) Deficiency of Vitamin C  
(C) Deficiency of Vitamin B<sub>1</sub>  
(D) Deficiency of folate
- 293. One of the main functions of Vitamin K is cofactor for**  
(A) Carboxylate for the formation of  $\gamma$  carboxyglutamate  
(B) Methylation of  $\delta$ -adenosyl methionine  
(C) Carboxylation of biotin  
(D) One carbon transfer by tetrahydrofolate
- 294. Prothrombin time is prolonged by administering**  
(A) Vitamin K (B) Dicoumarol  
(C) Calcium (D) Prothrombin
- 295. This vitamin acts as antioxidant.**  
(A) Vitamin A (B) Vitamin D  
(C) Vitamin E (D) Vitamin K
- 296. This is a photo-labile vitamin.**  
(A) Thiamine (B) Riboflavin  
(C) Niacin (D) Cholecalciferol
- 297. Convulsive episodes occur when there is a severe deficiency of**  
(A) Pyridoxine (B) Folic acid  
(C) Thiamine (D) Riboflavin
- 298. Metastatic classification is seen in hyper-vitaminosis:**  
(A) A (B) K  
(C) D (D) E
- 299. The anti vitamin for para aminobenzoic acid is**  
(A) Aminopterin (B) Dicoumarol  
(C) Sulphonamides (D) Thiopanic acid
- 300. Several pantothenic acid deficiency in man has been reported to cause**  
(A) Burning feet syndrome  
(B) Scurvy  
(C) Cataract  
(D) Xerophthalmia
- 301. Cholesterol is a precursor in the biogenesis of**  
(A) Vitamin A (B) Vitamin D  
(C) Vitamin E (D) None of these
- 302. This vitamin is a potent antioxidant of vitamin A:**  
(A) Vitamin C (B) Vitamin E  
(C) Vitamin K (D) Vitamin D
- 303. In retinal rickets, the following hydroxylation of Vitamin D<sub>3</sub> does not take place:**  
(A) 25 (B) 1  
(C) 24 (D) 7
- 304. The following does not have phosphorous:**  
(A) Riboflavin (B) TPP  
(C) NAD<sup>+</sup> (D) COASH
- 305. Convulsions and delirium could be caused by a severe deficiency of**  
(A) Thiamine (B) Glutamate  
(C) Niacin (D) Magnesium
- 306. Rice polishings contain this vitamin:**  
(A) Riboflavin (B) Niacin  
(C) Thiamine (D) Vitamin B<sub>12</sub>

- 307. In beri beri there will be accumulation of \_\_\_\_\_ in blood.**  
 (A) Aceto acetic acid (B)  $\beta$ -OH butyric acid  
 (C) Pyruvic acid (D) Methyl malonic acid
- 308. Symptoms of pellagra are**  
 (A) Dermatitis and diarrhea only  
 (B) Dermatitis and dementia only  
 (C) Diarrhea, dermatitis and dementia  
 (D) Diarrhea and elements only
- 309. Pyridoxine deficiency leads to**  
 (A) Megaloblastic anemia  
 (B) Aplastic anemia  
 (C) Hypochromic microcytic anemia  
 (D) Pernicious anemia
- 310. The significant ocular lesion in arbo flavinosis:**  
 (A) Keratomalacia  
 (B) Bitot's spots  
 (C) Vascularisation of the cornea  
 (D) lachrymal metaplasia
- 311. Irradiation of foods raises the content of**  
 (A) Vitamin A (B) Vitamin D  
 (C) Vitamin E (D) Vitamin K
- 312. An anti-vitamin for folic acid is**  
 (A) Amethoptesin (B) Dicoumarol  
 (C) Pyriothamine (D) Isoniazid
- 313. Thymine is**  
 (A) Water soluble vitamin  
 (B) Fat soluble vitamin  
 (C) Purine base  
 (D) Pyrimidine base
- 314. The anti-vitamin for para amino benzoic acid is**  
 (A) Aminopterrin (B) Dicoumarol  
 (C) INH (D) Sulphonamides
- 315. The sulphur-containing vitamins among the following B-Vitamin is**  
 (A) Thiamine (B) Riboflavin  
 (C) Niacin (D) Pyridoxine
- 316. Taurinuria may be encountered in**  
 (A) Pernicious anemia (B) Beriberi  
 (C) Pellegra (D) Folate deficiency
- 317. The three vitamins which are specially required for proper nerve functions are acid:**  
 (A) Thiamine, niacin and riboflavin  
 (B) Thiamine, folic acid, choline  
 (C) Thiamine, riboflavin, pantothenic acid  
 (D) Thiamine, pyridoxin, vitamin B<sub>12</sub>
- 318. This is a rich source for vitamin C.**  
 (A) Rice (B) Milk  
 (C) Egg (D) Lemon
- 319. The following vitamin is involved in coenzyme function in transaminations:**  
 (A) Nicotinamide (B) Pyridoxine  
 (C) Thiamine (D) Riboflavin
- 320. Methyl malonic aciduria is seen in the deficiency of**  
 (A) Vitamin B<sub>6</sub> (B) Folic acid  
 (C) Thiamine (D) Vitamin B<sub>12</sub>
- 321. Deficiency of Vitamin C leads to**  
 (A) Rickets (B) Scurvy  
 (C) Night blindness (D) All of these
- 322. If no primer DNA was given, the following scientist could not have synthesized DNA.**  
 (A) Ochoa (B) Okazaki  
 (C) Kornberg (D) Monod
- 323. Antisterility vitamin is**  
 (A) Vitamin B<sub>1</sub> (B) Vitamin B<sub>2</sub>  
 (C) Vitamin E (D) Vitamin K
- 324. All the following vitamins give rise to cofactors that are phosphorylated in the active form except**  
 (A) Vitamin A (B) Vitamin B<sub>1</sub>  
 (C) Vitamin D (D) Vitamin E
- 325. Molecular Iron, Fe, is**  
 (A) Stored in the body in combination with Ferritin  
 (B) Stored primarily in the spleen  
 (C) Excreted in the urine as Fe<sup>2+</sup>  
 (D) absorbed in the intestine by albumin

- 326. Humans most easily tolerate a lack of which of the following nutrients?**  
(A) Protein (B) Iodine  
(C) Carbohydrate (D) Lipid
- 327. A deficiency of vitamin B<sub>12</sub> causes**  
(A) Cheliosis (B) Beriberi  
(C) Pernicious anemia (D) Scurvy
- 328. In adults a severe deficiency of vitamin D causes**  
(A) Night blindness (B) Osteomalacia  
(C) Rickets (D) Skin cancer
- 329. Which of the following vitamins would most likely become deficient in a person who develops a completely carnivorous life style?**  
(A) Thiamine (B) Niacin  
(C) Cobalamine (D) Vitamin C
- 330. Which of the following statements regarding Vitamin A is true?**  
(A) It is not an essential Vitamin  
(B) It is related to tocopherol  
(C) It is a component of rhodopsin  
(D) It is also known as Opsin
- 331. Fully activated pyruvate carboxylase depends upon the presence of**  
(A) Malate and Niacin  
(B) Acetyl CoA and biotin  
(C) Acetyl CoA and thiamine pyrophosphate  
(D) Oxaloacetate and biotin
- 332. Pantothenic acid is a constituent of coenzyme involved in**  
(A) Acetylation (B) Decarboxylation  
(C) Dehydrogenation (D) Oxidation
- 333. Biotin is involved in which of the following types of reactions?**  
(A) Hydroxylation (B) Carboxylation  
(C) Decarboxylation (D) Deamination
- 334. Which of the following vitamins is the precursor of CoA?**  
(A) Riboflavin (B) Pantothenate  
(C) Thiamine (D) Cobamide
- 335. Vitamins that function as dinucleotide derivatives include all the following except**  
(A) Thiamine (B) Niacin  
(C) Nicotinate (D) Vitamin B<sub>2</sub>
- 336. Methyl malonic aciduria is seen in a deficiency of**  
(A) Vitamin B<sub>6</sub> (B) Folic acid  
(C) Thiamine (D) Vitamin B<sub>12</sub>
- 337. What is the disease caused by thiamine deficiency?**  
(A) Nyctalopia (B) Scurvy  
(C) Rickets (D) Beriberi
- 338. Retinol and Retinol binding protein are bound with this protein:**  
(A) Albumin (B) Prealbumin  
(C)  $\alpha$ -globulin (D)  $\beta$ -globulin
- 339. Megaloblastic anemia is caused by the deficiency of**  
(A) Folic acid (B) Vitamin B<sub>6</sub>  
(C) Iron (D) Protein
- 340. This vitamin acts as anti oxidant.**  
(A) Vitamin A (B) Vitamin D  
(C) Vitamin E (D) Vitamin K
- 341. Calcitriol is**  
(A) 1-hydroxy cholecalciferol  
(B) 25-hydroxy cholecalciferol  
(C) 24, 25-dihydroxy cholecalciferol  
(D) 1, 25-dihydroxy cholecalciferol
- 342. 1-hydroxylation of 25-hydroxy Vitamin D<sub>3</sub> takes place in**  
(A) Liver (B) Kidneys  
(C) Intestine (D) Pancreas
- 343. 25-hydroxylation of Vitamin D<sub>3</sub> takes place in**  
(A) Liver (B) Kidneys  
(C) Intestines (D) Pancreas
- 344. Hydroxylation of 25-hydroxy cholecalciferol is promoted by**  
(A) Cytochrome A (B) Panthyroid hormone  
(C) Cytochrome b (D) cAMP

- 345. The egg injury factor in raw egg white is**  
 (A) Biotin (B) Avidin  
 (C) Albumin (D) Calcium salts
- 346. The following has cyanide:**  
 (A) Vitamin B<sub>12</sub>  
 (B) Adenyl cobamide  
 (C) Benzimidazole cobamide  
 (D) Methyl cobamide
- 347. The human species can biosynthesize**  
 (A) Vitamin C (B) Vitamin B<sub>12</sub>  
 (C) Thiamine (D) Niacin
- 348. Retina contains this photo sensitive pigment.**  
 (A) Rhodopsin (B) Opsin  
 (C) Retinol (D) Malanin
- 349. Antixerophthalmic vitamin is**  
 (A) Vitamin B<sub>1</sub> (B) Vitamin B<sub>2</sub>  
 (C) Vitamin B<sub>6</sub> (D) Vitamin A
- 350. One of the following is not symptom of Addison's disease:**  
 (A) Hypoglycemia (B) Hyponatremia  
 (C) Hypokalemia (D) Hypochloremia
- 351. Gammaxine is an antimetabolite of**  
 (A) Thiamine (B) Riboflavin  
 (C) Pyridoxin (D) Inositol
- 352. Pyridoxine deficiency may lead to convulsions as it is needed for the synthesis of**  
 (A) GABA (B) PABA  
 (C) EFA (D) SAM
- 353. Sulpha drugs are antimetabolites of**  
 (A) PABA (B) Pyridoxin  
 (C) Vitamin B<sub>2</sub> (D) Pantothenic acid
- 354. This abnormal metabolite may be responsible for the neurological manifestation of pernicious anemia.**  
 (A) Taurine (B) Methyl malonic acid  
 (C) Xanthurenic acid (D) Phenyl pyruvic acid
- 355. Choline is not required for the formation of**  
 (A) Lecithins (B) Acetyl choline  
 (C) Sphingomyelin (D) Cholic acid
- 356. Isonicotinic acid hydrazide given in the treatment of tuberculosis may lead to a deficiency of**  
 (A) Vitamin A (B) Pyridoxin  
 (C) Folate (D) Inositol
- 357. Steroidal prohormone is**  
 (A) Vitamin A (B) Vitamin C  
 (C) Vitamin D (D) None of these
- 358. A deficiency of folate leads to**  
 (A) Megaloblastic anemia  
 (B) Aplastic anemia  
 (C) Pernicious anemia  
 (D) Hypochromic microcytic anemia
- 359. Deficiency of Iron leads to**  
 (A) Megaloblastic anemia  
 (B) Aplastic anemia  
 (C) Pernicious anemia  
 (D) Hypochromic microcytic anemia
- 360. Corrinoid coenzymes are coenzymes of**  
 (A) Vitamin B<sub>6</sub> (B) Vitamin B<sub>12</sub>  
 (C) Vitamin B<sub>2</sub> (D) Vitamin B<sub>1</sub>
- 361. Vitamin B<sub>12</sub> initially binds to the proteins known as**  
 (A) Transcobalamin I  
 (B) R-proteins  
 (C) Transcobalamin II  
 (D) Intrinsic factor of castle
- 362. Extrinsic factor of castle is**  
 (A) Vitamin B<sub>12</sub> (B) Glycoprotein  
 (C) R-proteins (D) Sigma protein
- 363. Intrinsic factor of castle is**  
 (A) Vitamin B<sub>12</sub> (B) Glycoprotein  
 (C) R-proteins (D) Sigma protein
- 364. Pernicious means**  
 (A) Prolonged (B) Dangerous  
 (C) Intermittent (D) Idiopathic
- 365. Reduction of D-ribonucleotides to D-deoxy ribonucleotides in prokaryotes requires**  
 (A) 5, 6 dimethyl benzimidazole cobamide  
 (B) Thiredoxin  
 (C) Tetra hydrobiopterin  
 (D) Tetra hydrofolate

- 366. Antirachitic vitamin is**  
(A) Vitamin A (B) Vitamin D  
(C) Vitamin E (D) Vitamin K
- 367. Angular stomatitis is due to**  
(A) Ariboflavinosis  
(B) Deficiency of Vitamin C  
(C) Deficiency of Vitamin B<sub>1</sub>  
(D) Deficiency of folate
- 368. One of the main functions of Vitamin K is the cofactor for**  
(A) Carboxylase for the formation of  $\gamma$ -carboxy glutamate  
(B) Methylation by S-adenosyl methionine  
(C) Carboxylation by biotin  
(D) One carbon transfer by tetra hydrofolate
- 369. Prothrombin time is prolonged by administering**  
(A) Vitamin K (B) Dicoumarol  
(C) Calcium (D) Prothrombin
- 370. This Vitamin acts as antioxidant:**  
(A) Vitamin A (B) Vitamin D  
(C) Vitamin E (D) Vitamin K
- 371. This is photo labile vitamin:**  
(A) Thiamine (B) Riboflavin  
(C) Niacin (D) Cholecalciferol
- 372. Convulsive episodes occur when there is a severe deficiency of:**  
(A) Pyridoxine (B) Folic acid  
(C) Thiamine (D) Riboflavin
- 373. Metastatic calcification is seen in hyper-vitaminosis:**  
(A) A (B) K  
(C) D (D) E
- 374. The anti-vitamin for para amino benzoic acid is**  
(A) Aminopterin (B) Dicoumasol  
(C) Sulphanomides (D) Thiopamic acid
- 375. Severe pathothemic acid deficiency in man has been reported to cause**  
(A) Burning feet syndrome  
(B) Scurvy  
(C) Cataract  
(D) Xerophthalmia
- 376. Cholesterol is a precursor in the biogenesis of**  
(A) Vitamin A (B) Vitamin D  
(C) Vitamin E (D) None of these
- 377. Which of the vitamins is a potent anti-oxidant of Vitamin A?**  
(A) Vitamin C (B) Vitamin E  
(C) Vitamin K (D) Vitamin D
- 378. In renal rickets, the following hydroxylation of Vitamin D<sub>3</sub> does not take place:**  
(A) 25 (B) 1  
(C) 24 (D) 7
- 379. Which of the following does not have phosphorous?**  
(A) Riboflavin (B) TPP  
(C) NAD<sup>+</sup> (D) CaASH
- 380. Rice-polishings contain which of the following Vitamin?**  
(A) Riboflavin (B) Niacin  
(C) Thiamine (D) Vitamin B<sub>12</sub>
- 381. In beri beri there will be accumulation of \_\_\_\_\_ in blood.**  
(A) Aceto acetic acid  
(B)  $\beta$ -hydroxy butyric acid  
(C) Pyruvic acid  
(D) Methyl malonic acid
- 382. Symptoms of pellagra are**  
(A) Dermatitis and diarrhea only  
(B) Dermatitis and Dermentia only  
(C) Diarrhea and dermentia only  
(D) Diarrhea, Dermatitis and dementia
- 383. Pyridoxine deficiency leads to**  
(A) Megaloblastic anemia  
(B) Aplastic anemia  
(C) Hypochromic microcytic anemia  
(D) Pernicious anemia
- 384. The significant ocular lesion in a riboflavinosis is**  
(A) Keratomalacia  
(B) Bitot's spots  
(C) Vascularisation of the cornea  
(D) Lachrynal metaplasia

- 385. An anti-vitamin for folic acid is**  
 (A) Aminopterin (B) Dicoumarol  
 (C) Pyriothiamine (D) Isoniazid
- 386. Thiamine is**  
 (A) Water-soluble vitamin  
 (B) Fat soluble vitamin  
 (C) Purine base  
 (D) Pyrimidine base
- 387. The anti-vitamin for para amino benzoic acid is**  
 (A) Aminopterin (B) Dicoumarol  
 (C) INH (D) Sulphanomides
- 388. The sulphur containing vitamins among the following B Vitamin is**  
 (A) Thiamine (B) Riboflavin  
 (C) Niacin (D) Pyridoxine
- 389. Taurinuria may be encountered in**  
 (A) Pernicious anemia (B) Beriberi  
 (C) Pellagra (D) Folate deficiency
- 390. The three vitamins which are specially required for proper nerve functions are**  
 (A) Thiamine, Niacin and Riboflavin  
 (B) Thiamin, Folic acid, Choline  
 (C) Thiamine, Riboflavin, Pantothenic acid  
 (D) Thiamine, Pyridoxin, Vitamin B<sub>12</sub>
- 391. This is a rich source for Vitamin C:**  
 (A) Rice (B) Milk  
 (C) Egg (D) Lemon
- 392. Which of the following vitamin is involved in coenzyme function in transaminations?**  
 (A) Nicotinamide (B) Pyridoxine  
 (C) Thiamine (D) Riboflavin
- 393. Methyl malonic aciduria is seen in a deficiency of**  
 (A) Vitamin B<sub>6</sub> (B) Folic acid  
 (C) Thiamine (D) Vitamin B<sub>12</sub>
- 394. In pernicious anemia, Urine contains high amounts of**  
 (A) Methyl malonic acid (B) FIGLU  
 (C) VMA (D) 5 HIAA
- 395. Anti sterility Vitamin is**  
 (A) Vitamin B<sub>1</sub> (B) Vitamin B<sub>2</sub>  
 (C) Vitamin E (D) Vitamin K
- 396. Biotin deficiency is characterized by the following except**  
 (A) Muscular pain (B) Anaemia  
 (C) Nausea (D) Dermatitis
- 397. Deficiency of thiamine causes**  
 (A) Beri beri (B) Scurvy  
 (C) Night blindness (D) Rickets
- 398. Deficiency of Vitamin D leads to**  
 (A) Rickets (B) Osteomalacia  
 (C) Xerophthalmia (D) Both (A) and (B)
- 399. The vitamin that is useful in cancer is**  
 (A) A (B) B complex  
 (C) C (D) E
- 400. Vitamin A over dosage causes injury to**  
 (A) Mitochondria (B) Microtubules  
 (C) Lysosomes (D) E.R
- 401. Which is a pro vitamin or vitamin that has antioxidant properties?**  
 (A) Beta carotene (B) Vitamin E  
 (C) Vitamin C (D) Vitamin D
- 402. The vitamin required for carboxylation reaction is**  
 (A) Vitamin B<sub>2</sub> (B) Vitamin B<sub>6</sub>  
 (C) Biotin (D) Vitamin B<sub>12</sub>
- 403. Biological activity of tocopherols has been attributed in part to their action as**  
 (A) Antioxidant  
 (B) Anticoagulents  
 (C) Provitamin  
 (D) Carriers in electron transport system
- 404. Biotin is essential for**  
 (A) Translation (B) Carboxylation  
 (C) Hydroxylation (D) Transamination
- 405. Which of the following vitamin act as a respiratory catalyst?**  
 (A) B<sub>2</sub> (B) Pyridoxine  
 (C) B<sub>12</sub> (D) C

- 406. Metal in Vitamin B<sub>12</sub> is**  
(A) Copper (B) Cobalt  
(C) Iron (D) Zinc
- 407. Whole wheat is an excellent source of**  
(A) Vitamin D (B) Vitamin C  
(C) Vitamin A (D) Thiamine
- 408. Vitamin used in the treatment of homocystinuria is**  
(A) B<sub>1</sub> (B) B<sub>5</sub>  
(C) B<sub>12</sub> (D) B<sub>6</sub>
- 409. Which of the following is not a component of coenzyme A?**  
(A) Pantothenic acid (B) Adenylic acid  
(C) Acetic acid (D) Sulfhydryl group
- 410. The most active form of Vitamin D is**  
(A) 25-Hydroxycholecalciferol  
(B) 1, 25-dihydroxycholecalciferol  
(C) 25-dihydroxyergocalciferol  
(D) None of these
- 411. The important part in the structure of flavoprotein is**  
(A) Vitamin B<sub>6</sub> (B) Vitamin B<sub>2</sub>  
(C) Vitamin B<sub>1</sub> (D) Vitamin A
- 412. Vitamin essential for transamination is**  
(A) B<sub>1</sub> (B) B<sub>2</sub>  
(C) B<sub>6</sub> (D) B<sub>12</sub>
- 413. The action of Vitamin K in formation of clotting factor is through**  
(A) Post transcription  
(B) Post translation  
(C) Golgi complex  
(D) Endoplasmic reticulum
- 414. Vitamin necessary for CoA synthesis:**  
(A) Pantothenic acid (B) Vitamin C  
(C) B<sub>6</sub> (D) B<sub>12</sub>
- 415. Cofactor for transamination is**  
(A) Thymine (B) Riboflavin  
(C) Pyridoxine (D) Niacin
- 416. During deficiency of thiamine the concentration of the following compound rises in blood and intracellular fluid:**  
(A) Glycogen (B) Sugar  
(C) Amino acids (D) Pyruvic acid
- 417. The conversion of carotenoids to Vitamin A takes place in**  
(A) Intestine (B) Liver  
(C) Kidney (D) Skin
- 418. Man cannot synthesize vitamin:**  
(A) A (B) B  
(C) C (D) D
- 419. Vitamin A is required for the formation of a light receptor protein known as**  
(A) Globulin (B) Lycoprotein  
(C) Chromoprotein (D) Rhodospin
- 420. Excessive vitamin A in children produces**  
(A) Irritability (B) Anorexia  
(C) Headache (D) All of these
- 421. Tocopherols prevent the oxidation of**  
(A) Vitamin A (B) Vitamin D  
(C) Vitamin K (D) Vitamin C
- 422. Vitamin K regulates the synthesis of blood clotting factors.**  
(A) VII (B) IX  
(C) X (D) All of these
- 423. The colour of cyanomethemoglobin is**  
(A) Pale yellow (B) Pink  
(C) Brown (D) Bright red
- 424. Transketolase activity is affected in**  
(A) Biotin deficiency  
(B) Pyridoxine deficiency  
(C) PABA deficiency  
(D) Thiamine deficiency
- 425. The hydrolysis of glucose-6-PO<sub>4</sub> is catalyzed by a phosphatase that is not found in which of the following?**  
(A) Liver (B) Kidney  
(C) Muscle (D) Small intestine

**426. Vitamin K<sub>2</sub> was originally isolated from**

- (A) Soyabean            (B) Putrid fishmeal  
(C) Alfa alfa            (D) Oysters

**427. The following form of vitamin A is used in the visual cycle:**

- (A) Retinol            (B) Retinoic acid  
(C) Retinaldehyde    (D) Retinyl acetate

**428. Increased carbohydrate consumption increases the dietary requirement for**

- (A) Thiamine            (B) Riboflavine  
(C) Pyridoxine        (D) Folic acid

**429. Increased protein intake is accompanied by an increased dietary requirement for**

- (A) Thiamine            (B) Riboflavine  
(C) Folic acid            (D) Nicotinic acid

**430. The deficiency of which one of the following vitamin causes creatinuria?**

- (A) Vitamin E            (B) Vitamin K  
(C) Vitamin A            (D) Vitamin B<sub>6</sub>

**431. A biochemical indication of vitamin B<sub>12</sub> deficiency can be obtained by measuring the urinary excretion of**

- (A) Pyruvic acid  
(B) Malic acid  
(C) Methyl malonic acid  
(D) Urocanic acid

**ANSWERS**

1. A	2. B	3. A	4. A	5. A	6. A
7. D	8. A	9. D	10. A	11. B	12. B
13. A	14. D	15. B	16. C	17. A	18. A
19. A	20. A	21. B	22. D	23. A	24. C
25. C	26. A	27. A	28. A	29. C	30. A
31. D	32. A	33. C	34. C	35. B	36. A
37. C	38. B	39. A	40. D	41. D	42. D
43. A	44. A	45. B	46. C	47. A	48. C
49. B	50. A	51. D	52. C	53. C	54. C
55. D	56. B	57. C	58. A	59. A	60. D
61. B	62. B	63. B	64. B	65. A	66. A
67. B	68. C	69. D	70. A	71. A	72. C
73. C	74. B	75. C	76. A	77. A	78. A
79. C	80. D	81. A	82. D	83. C	84. A
85. C	86. A	87. C	88. A	89. D	90. C
91. A	92. A	93. D	94. A	95. A	96. A
97. C	98. D	99. C	100. B	101. B	102. B
103. D	104. C	105. C	106. B	107. C	108. D
109. A	110. D	111. A	112. D	113. B	114. D
115. A	116. D	117. D	118. C	119. C	120. B
121. C	122. A	123. D	124. D	125. C	126. C
127. A	128. A	129. C	130. D	131. A	132. A
133. D	134. C	135. D	136. D	137. B	138. C
139. C	140. B	141. B	142. B	143. D	144. D
145. C	146. D	147. D	148. B	149. D	150. A
151. C	152. D	153. B	154. D	155. C	156. D
157. A	158. D	159. D	160. D	161. C	162. C
163. C	164. A	165. D	166. C	167. C	168. D
169. A	170. B	171. C	172. B	173. D	174. B
175. D	176. B	177. D	178. B	179. A	180. A
181. D	182. D	183. B	184. A	185. B	186. C
187. D	188. C	189. D	190. C	191. C	192. B
193. C	194. D	195. D	196. C	197. B	198. B
199. B	200. C	201. C	202. D	203. A	204. C
205. A	206. C	207. D	208. D	209. B	210. C
211. C	212. A	213. C	214. D	215. A	216. D
217. D	218. C	219. D	220. D	221. A	222. D
223. B	224. D	225. D	226. C	227. A	228. A
229. B	230. C	231. B	232. A	233. D	234. D
235. B	236. C	237. B	238. D	239. C	240. B
241. B	242. B	243. C	244. C	245. A	246. C

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247. D	248. A	249. B	250. C	251. D	252. C
253. B	254. D	255. C	256. B	257. C	258. C
259. A	260. B	261. D	262. D	263. B	264. A
265. C	266. D	267. B	268. A	269. B	270. B
271. A	272. D	273. A	274. D	275. C	276. D
277. A	278. C	279. A	280. D	281. D	282. B
283. B	284. A	285. D	286. B	287. B	288. A
289. B	290. B	291. A	292. B	293. A	294. A
295. B	296. C	297. B	298. A	299. C	300. C
301. A	302. B	303. B	304. A	305. D	306. D
307. C	308. C	309. C	310. B	311. C	312. A
313. D	314. D	315. A	316. A	317. D	318. D
319. B	320. D	321. C	322. C	323. C	324. B
325. A	326. C	327. C	328. B	329. D	330. C
331. B	332. A	333. B	334. B	335. A	336. D
337. D	338. B	339. A	340. D	341. D	342. B
343. A	344. B	345. B	346. A	347. D	348. A
349. D	350. C	351. D	352. A	353. A	354. B
355. D	356. B	357. C	358. A	359. D	360. B
361. B	362. A	363. B	364. B	365. A	366. B
367. A	368. A	369. B	370. C	371. B	372. A
373. C	374. C	375. A	376. B	377. B	378. B
379. A	380. C	381. C	382. D	383. C	384. C
385. A	386. D	387. D	388. A	389. A	390. D
391. D	392. B	393. D	394. A	395. C	396. B
397. A	398. D	399. A	400. C	401. B	402. C
403. B	404. B	405. A	406. B	407. D	408. D
409. C	410. A	411. B	412. C	413. B	414. A
415. C	416. D	417. A	418. C	419. D	420. D
421. A	422. D	423. D	424. D	425. C	426. B
427. C	428. A	429. A	430. C	431. C	

**EXPLANATIONS FOR THE ANSWERS**

7. D The four fat soluble vitamins (A, D, E, K) are soluble in fats, oils and fat solvents (alcohol, acetone etc.). Their occurrence in the diet, absorption and transport are associated with fat. All the fat soluble vitamins contain one or more of isoprene units (5 carbon units). They can be stored in liver and adipose tissue.
40. D Vitamin A is essential to maintain healthy epithelial tissues and proper immunity. Retinol and retinoic acid functions like steroid hormones. They regulate protein synthesis and thus are involved in cell growth and differentiation.  $\beta$ -Carotene functions as an antioxidant and reduces the risk for heart attack, cancers etc.
77. A The recommended dietary allowances for vitamin D is around 400 I.U. In countries with good sunlight (like India), it is much lower. *i.e.*, 200 I.U. The good sources include fatty fish, fish liver oils, egg yolk.
110. D The earliest symptoms of thiamin deficiency include constipation, appetite suppression, nausea as well as mental depression, peripheral neuropathy and fatigue. Chronic thiamin deficiency leads to more severe neurological symptoms including ataxia, mental confusion and loss of eye coordination. Other clinical symptoms of prolonged thiamin deficiency are related to cardiovascular and muscular defects. The severe thiamin deficiency disease is known as Beriberi.
149. D Riboflavin deficiency is often seen in chronic alcoholics due to their poor diabetic habits. Symptoms associated with riboflavin deficiency include, glossitis, seborrhea, angular stomatitis, cheilosis and photophobia. Riboflavin decomposes when exposed to visible light.
187. D Pyridoxal, pyridoxamine and pyridoxine are collectively known as vitamin B<sub>6</sub>. All three compounds are efficiently converted to the biologically active form of vitamin B<sub>6</sub>, pyridoxal phosphate. This conversion is catalyzed by the ATP requiring enzyme, pyridoxal kinase.
217. D Isoniazid (anti-tuberculosis drug) and penicillamine (used to treat rheumatoid arthritis and cystinurias) are two drugs that complex with pyridoxal and pyridoxal phosphate resulting in a deficiency in this vitamin.
250. C The liver can store up to six years worth of vitamin B<sub>12</sub>, hence deficiencies in this vitamin are rare. Pernicious anemia is a megaloblastic anemia resulting from vitamin B<sub>12</sub> deficiency that develops as a result a lack of intrinsic factor in the stomach leading to malabsorption of the vitamin.
291. A Biotin is also called anti-egg white injury factor because, egg white contains a protein called avidin, which combines with biotin in the intestinal tract and prevents absorption of biotin from intestines.
321. B Deficiency in Vitamin C leads to the disease scurvy due to the role of the vitamin in the post-translational modification of collagens. Scurvy is characterized by easily bruised skin, muscle fatigue, soft swollen gums, decreased wound healing and hemorrhaging, osteoporosis and anemia.
357. C Vitamin D is a steroid prohormone. It is represented by steroids that occur in animals, plants and yeast. Active form of the hormone is 1, 25-dihydroxy vitamin D<sub>3</sub> (1, 25-(OH)<sub>2</sub>D<sub>3</sub>, also termed calcitriol). Calcitriol functions primarily to regulate calcium and phosphorous homeostasis.
398. D The main symptom of vitamin D deficiency in children is rickets and in adults is osteomalacia. Rickets is characterized by improper mineralization during the development of the bones resulting in soft bones. Osteomalacia is characterized by demineralization of previously formed bone leading to increased softness and susceptibility to fracture.

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## CHAPTER 6

# ENZYMES

- The compound which has the lowest density is**  
(A) Chylomicron (B)  $\beta$ -Lipoprotein  
(C)  $\alpha$ -Lipoprotein (D) pre  $\beta$ -Lipoprotein
- Non steroidal anti inflammatory drugs, such as aspirin act by inhibiting the activity of the enzyme:**  
(A) Lipoxygenase (B) Cyclooxygenase  
(C) Phospholipase A<sub>2</sub> (D) Lipoprotein lipase
- From arachidonate, synthesis of prostaglandins is catalysed by**  
(A) Cyclooxygenase  
(B) Lipoxygenase  
(C) Thromboxane synthase  
(D) Isomerase
- A Holoenzyme is**  
(A) Functional unit (B) Apo enzyme  
(C) Coenzyme (D) All of these
- Gaucher's disease is due to the deficiency of the enzyme:**  
(A)  $\alpha$ -Fucosidase (B)  $\beta$ -Galactosidase  
(C)  $\beta$ -Glucosidase (D) Sphingomyelinase
- Neimann-Pick disease is due to the deficiency of the enzyme:**  
(A) Hexosaminidase A and B  
(B) Ceramidase  
(C) Ceramide lactosidase  
(D) Sphingomyelinase
- Krabbe's disease is due to the deficiency of the enzyme:**  
(A) Ceramide lactosidase  
(B) Ceramidase  
(C)  $\beta$ -Galactosidase  
(D) GM1  $\beta$ -Galactosidase
- Fabry's disease is due to the deficiency of the enzyme:**  
(A) Ceramide trihexosidase  
(B) Galactocerebrosidase  
(C) Phytanic acid oxidase  
(D) Sphingomyelinase
- Farber's disease is due to the deficiency of the enzyme:**  
(A)  $\alpha$ -Galactosidase  
(B) Ceramidase  
(C)  $\beta$ -Glucocerebrosidase  
(D) Arylsulphatase A.
- A synthetic nucleotide analogue, used in organ transplantation as a suppressor of immunologic rejection of grafts is**  
(A) Theophylline  
(B) Cytarabine  
(C) 4-Hydroxypyrazolopyrimidine  
(D) 6-Mercaptopurine

**11. Example of an extracellular enzyme is**

- (A) Lactate dehydrogenase
- (B) Cytochrome oxidase
- (C) Pancreatic lipase
- (D) Hexokinase

**12. Enzymes, which are produced in inactive form in the living cells, are called**

- (A) Papain
- (B) Lysozymes
- (C) Apoenzymes
- (D) Proenzymes

**13. An example of ligases is**

- (A) Succinate thiokinase
- (B) Alanine racemase
- (C) Fumarase
- (D) Aldolase

**14. An example of lyases is**

- (A) Glutamine synthetase
- (B) Fumarase
- (C) Cholinesterase
- (D) Amylase

**15. Activation or inactivation of certain key regulatory enzymes is accomplished by covalent modification of the amino acid:**

- (A) Tyrosine
- (B) Phenylalanine
- (C) Lysine
- (D) Serine

**16. The enzyme which can add water to a carbon-carbon double bond or remove water to create a double bond without breaking the bond is**

- (A) Hydratase
- (B) Hydroxylase
- (C) Hydrolase
- (D) Esterase

**17. Fischer's 'lock and key' model of the enzyme action implies that**

- (A) The active site is complementary in shape to that of substance only after interaction.
- (B) The active site is complementary in shape to that of substance
- (C) Substrates change conformation prior to active site interaction
- (D) The active site is flexible and adjusts to substrate

**18. From the Lineweaver-Burk plot of Michaelis-Menten equation,  $K_m$  and  $V_{max}$  can be determined when  $V$  is the reaction velocity at substrate concentration  $S$ , the X-axis experimental data are expressed as**

- (A)  $1/V$
- (B)  $V$
- (C)  $1/S$
- (D)  $S$

**19. A sigmoidal plot of substrate concentration ( $[S]$ ) versus reaction velocity ( $V$ ) may indicate**

- (A) Michaelis-Menten kinetics
- (B) Co-operative binding
- (C) Competitive inhibition
- (D) Non-competitive inhibition

**20. The  $K_m$  of the enzyme giving the kinetic data as below is**

- (A)  $-0.50$
- (B)  $-0.25$
- (C)  $+0.25$
- (D)  $+0.33$

**21. The kinetic effect of purely competitive inhibitor of an enzyme**

- (A) Increases  $K_m$  without affecting  $V_{max}$
- (B) Decreases  $K_m$  without affecting  $V_{max}$
- (C) Increases  $V_{max}$  without affecting  $K_m$
- (D) Decreases  $V_{max}$  without affecting  $K_m$

**22. If curve X in the graph (below) represents no inhibition for the reaction of the enzyme with its substrates, the curve representing the competitive inhibition, of the same reaction is**

- (A) A
- (B) B
- (C) C
- (D) D

**23. An inducer is absent in the type of enzyme:**

- (A) Allosteric enzyme
- (B) Constitutive enzyme
- (C) Co-operative enzyme
- (D) Isoenzymic enzyme

**24. A demonstrable inducer is absent in**

- (A) Allosteric enzyme
- (B) Constitutive enzyme
- (C) Inhibited enzyme
- (D) Co-operative enzyme

- 25. In reversible non-competitive enzyme activity inhibition**
- (A)  $V_{max}$  is increased
  - (B)  $K_m$  is increased
  - (C)  $K_m$  is decreased
  - (D) Concentration of active enzyme is reduced
- 26. In reversible non-competitive enzyme activity inhibition**
- (A) Inhibitor bears structural resemblance to substrate
  - (B) Inhibitor lowers the maximum velocity attainable with a given amount of enzyme
  - (C)  $K_m$  is increased
  - (D)  $K_m$  is decreased
- 27. In competitive enzyme activity inhibition**
- (A) The structure of inhibitor generally resembles that of the substrate
  - (B) Inhibitor decreases apparent  $K_m$
  - (C)  $K_m$  remains unaffected
  - (E) Inhibitor decreases  $V_{max}$  without affecting  $K_m$
- 28. In enzyme kinetics  $V_{max}$  reflects**
- (A) The amount of an active enzyme
  - (B) Substrate concentration
  - (C) Half the substrate concentration
  - (D) Enzyme substrate complex
- 29. In enzyme kinetics  $K_m$  implies**
- (A) The substrate concentration that gives one half  $V_{max}$
  - (B) The dissociation constant for the enzyme substrate complex
  - (C) Concentration of enzyme
  - (D) Half of the substrate concentration required to achieve  $V_{max}$
- 30. In competitive enzyme activity inhibition**
- (A) Apparent  $K_m$  is decreased
  - (B) Apparent  $K_m$  is increased
  - (C)  $V_{max}$  is increased
  - (D)  $V_{max}$  is decreased
- 31. In non competitive enzyme activity inhibition, inhibitor**
- (A) Increases  $K_m$
  - (B) Decreases  $K_m$
  - (C) Does not effect  $K_m$
  - (D) Increases  $K_m$
- 32. An enzyme catalyzing oxidoreduction, using oxygen as hydrogen acceptor is**
- (A) Cytochrome oxidase
  - (B) Lactate dehydrogenase
  - (C) Malate dehydrogenase
  - (D) Succinate dehydrogenase
- 33. The enzyme using some other substance, not oxygen as hydrogen acceptor is**
- (A) Tyrosinase
  - (B) Succinate dehydrogenase
  - (C) Uricase
  - (D) Cytochrome oxidase
- 34. An enzyme which uses hydrogen acceptor as substrate is**
- (A) Xanthine oxidase
  - (B) Aldehyde oxidase
  - (C) Catalase
  - (D) Tryptophan oxygenase
- 35. Enzyme involved in joining together two substrates is**
- (A) Glutamine synthetase
  - (B) Aldolase
  - (C) Guanine deaminase
  - (D) Arginase
- 36. The pH optima of most of the enzymes is**
- (A) Between 2 and 4
  - (B) Between 5 and 9
  - (C) Between 8 and 12
  - (D) Above 12
- 37. Coenzymes are**
- (A) Heat stable, dialyzable, non protein organic molecules
  - (B) Soluble, colloidal, protein molecules
  - (C) Structural analogue of enzymes
  - (D) Different forms of enzymes
- 38. An example of hydrogen transferring coenzyme is**
- (A) CoA
  - (B)  $NAD^+$
  - (C) Biotin
  - (D) TPP
- 39. An example of group transferring coenzyme is**
- (A)  $NAD^+$
  - (B)  $NADP^+$
  - (C) FAD
  - (D) CoA

- 40. Cocarboxylase is**  
 (A) Thiamine pyrophosphate  
 (B) Pyridoxal phosphate  
 (C) Biotin  
 (D) CoA
- 41. A coenzyme containing non aromatic hetero ring is**  
 (A) ATP (B) NAD  
 (C) FMN (D) Biotin
- 42. A coenzyme containing aromatic hetero ring is**  
 (A) TPP (B) Lipoic acid  
 (C) Coenzyme Q (D) Biotin
- 43. Isoenzymes are**  
 (A) Chemically, immunologically and electrophoretically different forms of an enzyme  
 (B) Different forms of an enzyme similar in all properties  
 (C) Catalysing different reactions  
 (D) Having the same quaternary structures like the enzymes
- 44. Isoenzymes can be characterized by**  
 (A) Proteins lacking enzymatic activity that are necessary for the activation of enzymes  
 (B) Proteolytic enzymes activated by hydrolysis  
 (C) Enzymes with identical primary structure  
 (D) Similar enzymes that catalyse different reaction
- 45. The isoenzymes of LDH**  
 (A) Differ only in a single amino acid  
 (B) Differ in catalytic activity  
 (C) Exist in 5 forms depending on M and H monomer contents  
 (D) Occur as monomers
- 46. The normal value of CPK in serum varies between**  
 (A) 4–60 IU/L (B) 60–250 IU/L  
 (C) 4–17 IU/L (D) > 350 IU/L
- 47. Factors affecting enzyme activity:**  
 (A) Concentration (B) pH  
 (C) Temperature (D) All of these
- 48. The normal serum GOT activity ranges from**  
 (A) 3.0–15.0 IU/L (B) 4.0–17.0 IU/L  
 (C) 4.0–60.0 IU/L (D) 0.9–4.0 IU/L
- 49. The normal GPT activity ranges from**  
 (A) 60.0–250.0 IU/L (B) 4.0–17.0 IU/L  
 (C) 3.0–15.0 IU/L (D) 0.1–14.0 IU/L
- 50. The normal serum acid phosphatase activity ranges from**  
 (A) 5.0–13.0 KA units/100 ml  
 (B) 1.0–5.0 KA units/100 ml  
 (C) 13.0–18.0 KA units/100 ml  
 (D) 0.2–0.8 KA units/100 ml
- 51. The normal serum alkaline phosphatase activity ranges from**  
 (A) 1.0–5.0 KA units/100 ml  
 (B) 5.0–13.0 KA units/100 ml  
 (C) 0.8–2.3 KA units/100 ml  
 (D) 13.0–21.0 KA units/100 ml
- 52. In early stages of myocardial ischemia the most sensitive indicator is the measurement of the activity of**  
 (A) CPK (B) SGPT  
 (C) SGOT (D) LDH
- 53. Serum acid phosphatase level increases in**  
 (A) Metastatic carcinoma of prostate  
 (B) Myocardial infarction  
 (C) Wilson's disease  
 (D) Liver diseases
- 54. Serum alkaline phosphatase level increases in**  
 (A) Hypothyroidism  
 (B) Carcinoma of prostate  
 (C) Hyperparathyroidism  
 (D) Myocardial ischemia
- 55. Serum lipase level increases in**  
 (A) Paget's disease (B) Gaucher's disease  
 (C) Acute pancreatitis (D) Diabetes mellitus
- 56. Serum ferroxidase level decreases in**  
 (A) Gaucher's disease (B) Cirrhosis of liver  
 (C) Acute pancreatitis (D) Wilson's disease

- 57. The isoenzymes LDH<sub>5</sub> is elevated in**  
(A) Myocardial infarction  
(B) Peptic ulcer  
(C) Liver disease  
(D) Infectious diseases
- 58. On the third day of onset of acute myocardial infarction the enzyme elevated is**  
(A) Serum AST (B) Serum CK  
(C) Serum LDH (D) Serum ALT
- 59. LDH<sub>1</sub> and LDH<sub>2</sub> are elevated in**  
(A) Myocardial infarction  
(B) Liver disease  
(C) Kidney disease  
(D) Brain disease
- 60. The CK isoenzymes present in cardiac muscle is**  
(A) BB and MB (B) MM and MB  
(C) BB only (D) MB only
- 61. In acute pancreatitis, the enzyme raised in first five days is**  
(A) Serum amylase  
(B) Serum lactic dehydrogenase  
(C) Urinary lipase  
(D) Urinary amylase
- 62. Acute pancreatitis is characterised by**  
(A) Lack of synthesis of zymogen enzymes  
(B) Continuous release of zymogen enzymes into the gut  
(C) Premature activation of zymogen enzymes  
(D) Inactivation of zymogen enzymes
- 63. An example of functional plasma enzyme is**  
(A) Lipoprotein lipase  
(B) Amylase  
(C) Aminotransferase  
(D) Lactate dehydrogenase
- 64. A non-functional plasma enzyme is**  
(A) Pseudocholinesterase  
(B) Lipoprotein lipase  
(C) Proenzyme of blood coagulation  
(D) Lipase
- 65. The pH optima for salivary amylase is**  
(A) 6.6–6.8 (B) 2.0–7.5  
(C) 7.9 (D) 8.6
- 66. The pH optima for pancreatic amylase is**  
(A) 4.0 (B) 7.1  
(C) 7.9 (D) 8.6
- 67. The pH optima for sucrase is**  
(A) 5.0–7.0 (B) 5.8–6.2  
(C) 5.4–6.0 (D) 8.6
- 68. The pH optima for maltase is**  
(A) 1.0–2.0 (B) 5.2–6.0  
(C) 5.8–6.2 (D) 5.4–6.0
- 69. The pH optima for lactase is**  
(A) 1.0–2.0 (B) 5.4–6.0  
(C) 5.0–7.0 (D) 5.8–6.2
- 70. The substrate for amylase is**  
(A) Cane sugar (B) Starch  
(C) Lactose (D) Ribose
- 71. The ion which activates salivary amylase activity is**  
(A) Chloride (B) Bicarbonate  
(C) Sodium (D) Potassium
- 72. The pancreatic amylase activity is increased in the presence of**  
(A) Hydrochloric acid (B) Bile salts  
(C) Thiocyanate ions (D) Calcium ions
- 73. A carbohydrate which can not be digested in human gut is**  
(A) Cellulose (B) Starch  
(C) Glycogen (D) Maltose
- 74. The sugar absorbed by facilitated diffusion and requiring Na independent transporter is**  
(A) Glucose (B) Fructose  
(C) Galactose (D) Ribose
- 75. In the intestine the rate of absorption is highest for**  
(A) Glucose and galactose  
(B) Fructose and mannose  
(C) Fructose and pentose  
(D) Mannose and pentose

- 76. Glucose absorption is promoted by**  
 (A) Vitamin A (B) Thiamin  
 (C) Vitamin C (D) Vitamin K
- 77. The hormone acting directly on intestinal mucosa and stimulating glucose absorption is**  
 (A) Insulin (B) Glucagon  
 (C) Thyroxine (D) Vasopressin
- 78. Given that the standard free energy change ( $\Delta G^\circ$ ) for the hydrolysis of ATP is  $-7.3$  Kcal/mol and that for the hydrolysis of Glucose 6-phosphate is  $-3.3$  Kcal/mol, the  $\Delta G^\circ$  for the phosphorylation of glucose is  $\text{Glucose} + \text{ATP} \rightarrow \text{Glucose 6-Phosphate} + \text{ADP}$ .**  
 (A)  $-10.6$  Kcal/mol (B)  $-7.3$  Kcal/mol  
 (C)  $-4.0$  Kcal/mol (D)  $+4.0$  Kcal/mol
- 79. At low blood glucose concentration, brain but not liver will take up glucose. It is due to the**  
 (A) Low  $K_m$  of hexokinase  
 (B) Low  $K_m$  of glucokinase  
 (C) Specificity of glucokinase  
 (D) Blood brain barrier
- 80. In the reaction below, NuTP stands for  $\text{NuTP} + \text{glucose} \rightarrow \text{Glucose 6-Phosphate} + \text{NuDP}$ .**  
 (A) ATP (B) CTP  
 (C) GTP (D) UTP
- 81. In the figures shown below, fructose 1,6-biphosphate is located at point:**  
 (A) A (B) B  
 (C) C (D) D
- 82. The enzyme of the glycolic pathway, sensitive to inhibition by fluoride ions is**  
 (A) Hexokinase (B) Aldolase  
 (C) Enolase (D) Pyruvate kinase
- 83. In glycolytic pathway, iodacetate inhibits the activity of the enzyme:**  
 (A) Phosphotriose isomerase  
 (B) Glyceraldehyde-3-phosphate dehydrogenase  
 (C) Pyruvate kinase  
 (D) Phosphofructokinase
- 84. In the glycolytic pathway, enolpyruvate is converted to ketopyruvate by**  
 (A) Pyruvate kinase  
 (B) Phosphoenolpyruvate  
 (C) Pyruvate dehydrogenase  
 (D) Spontaneously
- 85. In erythrocytes, 2, 3-biphosphoglycerate is derived from the intermediate:**  
 (A) Glyceraldehyde-3-phosphate  
 (B) 1, 3-Biphosphoglycerate  
 (C) 3-Phosphoglycerate  
 (D) 2-Phosphoglycerate
- 86. 2, 3-Biphosphoglycerate in high concentrations, combines with hemoglobin, causes**  
 (A) Displacement of the oxyhemoglobin dissociation curve to the left  
 (B) Displacement of the oxyhemoglobin dissociation curve to the right  
 (C) No change in oxy hemoglobin dissociation curve  
 (D) Increased affinity for oxygen
- 87. Erythrocytes under normal conditions and microorganisms under anaerobic conditions may accumulate**  
 (A) NADPH  
 (B) Pyruvate  
 (C) Phosphoenolpyruvate  
 (D) Lactate
- 88. Enzymes leading to the high energy phosphorylation of substrates during glycolysis include which of the following?**  
 (A) Phosphoglycerate kinase  
 (B) Enolase  
 (C) Pyruvate Kinase  
 (D) Glyceraldehyde-3-phosphate dehydrogenase
- 89. Lineweaver - Burk double reciprocal plot is related to**  
 (A) Substrate concentration  
 (B) Enzyme activity  
 (C) Temperature  
 (D) Both (A) and (B)

- 90. Phosphofructokinase key enzyme in glycolysis is inhibited by**  
(A) Citrate and ATP (B) AMP  
(C) ADP (D) TMP
- 91. One of the enzymes regulating glycolysis is**  
(A) Phosphofructokinase  
(B) Glyceraldehyde-3-phosphate dehydrogenase  
(C) Phosphotriose isomerase  
(D) Phosphohexose isomerase
- 92. Hexokinase is inhibited in an allosteric manner by**  
(A) Glucose-6-Phosphate  
(B) Glucose-1-Phosphate  
(C) Fructose-6-phosphate  
(D) Fructose-1, 6-biphosphate
- 93. A reaction which may be considered an isomerisation is**  
(A) Glucose 6-Phosphate  $\rightleftharpoons$  fructose 6 phosphate  
(B) 3-Phosphoglycerate  $\rightleftharpoons$  2-phosphoglycerate  
(C) 2-phosphoglycerate  $\rightleftharpoons$  phosphoenolpyruvate  
(D) Pyruvate  $\rightleftharpoons$  Lactate
- 94. The net number of ATP formed per mole of glucose in anaerobic glycolysis is**  
(A) 1 (B) 2  
(C) 6 (D) 8
- 95. Pyruvate dehydrogenase a multienzyme complex is required for the production of**  
(A) Acetyl-CoA  
(B) Lactate  
(C) Phosphoenolpyruvate  
(D) Enolpyruvate
- 96. Dietary deficiency of thiamin inhibits the activity of the enzyme:**  
(A) Pyruvate kinase  
(B) Pyruvate dehydrogenase  
(C) Phosphofructokinase  
(D) Enolase
- 97. Pyruvate dehydrogenase activity is inhibited by**  
(A) Mercury (B) Zinc  
(C) Calcium (D) Sodium
- 98. In the normal resting state of humans, most of the blood glucose burned as fuel is consumed by**  
(A) Liver (B) Adipose tissue  
(C) Muscle (D) Brain
- 99. All the enzymes of glycolysis pathway are found in**  
(A) Extramitochondrial soluble fraction of the cell  
(B) Mitochondria  
(C) Nucleus  
(D) Endoplasmic reticulum
- 100. Most major metabolic pathways are considered mainly either anabolic or catabolic. Which of the following pathway is most correctly considered to be amphibolic?**  
(A) Citric acid cycle (B) Gluconeogenesis  
(C) Lipolysis (D) Glycolysis
- 101. The enzymes of the citric acid cycle are located in**  
(A) Mitochondrial matrix  
(B) Extramitochondrial soluble fraction of the cell  
(C) Nucleus  
(D) Endoplasmic reticulum
- 102. The initial step of the citric acid cycle is**  
(A) Conversion of pyruvate to acetyl-CoA  
(B) Condensation of acetyl-CoA with oxaloacetate  
(C) Conversion of citrate to isocitrate  
(D) Formation of  $\alpha$ -ketoglutarate catalysed by isocitrate dehydrogenase
- 103. The substance which may be considered to play a catalytic role in citric acid cycle is**  
(A) Oxaloacetate (B) Isocitrate  
(C) Malate (D) Fumarate
- 104. An enzyme of the citric acid cycle also found outside the mitochondria is**  
(A) Isocitrate dehydrogenase  
(B) Citrate synthetase  
(C)  $\alpha$ -Ketoglutarate dehydrogenase  
(D) Malate dehydrogenase

- 105. The reaction catalysed by  $\alpha$ -ketoglutarate dehydrogenase in the citric acid cycle requires**
- (A) NAD (B) NADP  
(C) ADP (D) ATP
- 106. If all the enzymes, intermediates and cofactors of the citric acid cycle as well as an excess of the starting substrate acetyl-CoA are present and functional in an organelle free solution at the appropriate pH, which of the following factors of the citric acid cycle would prove to be rate limiting?**
- (A) Molecular oxygen  
(B) Half life of enzyme  
(C) Turnover of intermediates  
(D) Reduction of cofactors
- 107. In TCA cycle, oxalosuccinate is converted to  $\alpha$ -ketoglutarate by the enzyme:**
- (A) Fumarase  
(B) Isocitrate dehydrogenase  
(C) Aconitase  
(D) Succinase
- 108. The enzyme -ketoglutarate dehydrogenase in the citric acid cycle requires**
- (A) Lipoate (B) Folate  
(C) Pyridoxine (D) Inositol
- 109. The example of generation of a high energy phosphate at the substrate level in the citric acid cycle is the reaction:**
- (A) Isocitrate  $\xrightarrow{+H^+}$   $\alpha$ -Ketoglutarate  
(B) Succinate  $\xrightarrow{+H^+}$   $\alpha$ -fumarate  
(C) Malate  $\xrightarrow{+H^+}$   $\alpha$ -oxaloacetate  
(D) Succinyl CoA  $\xrightarrow{+H^+}$   $\alpha$ -Succinate
- 110. Fluoroacetate inhibits the reaction of citric acid cycle:**
- (A) Isocitrate  $\xrightarrow{+H^+}$   $\alpha$ -Ketoglutarate  
(B) Fumarate  $\xrightarrow{+H^+}$   $\alpha$ -Malate  
(C) Citrate  $\xrightarrow{+H^+}$   $\alpha$ -cis-aconitate  
(D) Succinate  $\xrightarrow{+H^+}$   $\alpha$ -fumarate
- 111. Formation of succinyl-CoA from  $\alpha$ -Keto-glutarate is inhibited by**
- (A) Fluoroacetate (B) Arsenite  
(C) Fluoride (D) Iodoacetate
- 112. The number of ATP molecules generated for each turn of the citric acid cycle is**
- (A) 8 (B) 12  
(C) 24 (D) 38
- 113. Oxidation of one molecule of glucose yields**
- (A) 12 ATP (B) 24 ATP  
(C) 38 ATP (D) 38 ATP
- 114. Which of the following intermediates of metabolism can be both a precursor and a product of glucose?**
- (A) Lactate (B) Pyruvate  
(C) Alanine (D) Acetyl-CoA
- 115. Mitochondrial membrane is freely permeable to**
- (A) Pyruvate (B) Malate  
(C) Oxaloacetate (D) Fumarate
- 116. The reaction of Kreb's cycle which does not require cofactor of vitamin B group is**
- (A) Citrate  $\xrightarrow{+H^+}$  isocitrate  
(B)  $\alpha$ -Ketoglutarate  $\xrightarrow{+H^+}$  succinate  
(C) Malate  $\xrightarrow{+H^+}$  oxaloacetate  
(D) Succinate  $\xrightarrow{+H^+}$  fumarate
- 117. The coenzyme not involved in the formation of acetyl-CoA from pyruvate is**
- (A) TPP (B) Biotin  
(C) NAD (D) FAD
- 118. A carrier molecule in the citric acid cycle is**
- (A) Acetyl-CoA (B) Citrate  
(C) Oxaloacetate (D) Malate
- 119. A specific inhibitor for succinate dehydrogenase is**
- (A) Arsenine (B) Arsenite  
(C) Citrate (D) Fluoride

- 120. The rate of citric acid cycle is controlled by the allosteric enzyme:**
- (A) Aconitase  
(B) Fumarase  
(C) Fumarate hydratase  
(D) Malate dehydrogenase
- 121. In the erythrocytes, the net production of ATP molecules by the Rapoport-Leubering pathway is**
- (A) 0 (B) 2  
(C) 4 (D) 8
- 122. The ratio that most closely approximates the number of net molecules of ATP formed per mole of glucose utilized under aerobic conditions to the net number formed under anaerobic conditions is**
- (A) 4:1 (B) 13:1  
(C) 18:1 (D) 24:1
- 123. The pathway of glycogen biosynthesis involves a special nucleotide of glucose. In the reaction below, NuDP stands for**
- $$\text{NuDP Glucose} + \text{glycogen}_n \rightarrow \text{NuDP} + \text{glycogen}_{n+1}$$
- (A) ADP (B) GDP  
(C) UDP (D) CDP
- 124. Glucose 6-phosphate is converted to glucose 1-phosphate in a reaction catalysed by the enzyme phosphoglucomutase, which is**
- (A) Phosphorylated  
(B) Dephosphorylated  
(C) Phosphorylated-dephosphorylated  
(D) Phosphorylated-dephosphorylated-rephosphorylated
- 125. The glycogen content of the liver is upto**
- (A) 6% (B) 8%  
(C) 10% (D) 12%
- 126. In glycogenesis a branch point in the molecule is established by the enzyme**
- (A) Amylo[1→4][1→6] transglucosidase  
(B) α [1→4] α [1→4] Glucan transferase  
(C) Amylo [1→6] glucosidase  
(D) Glycogen synthase
- 127. In glycogenolysis, the enzyme which transfers a trisaccharide unit from one branch to the other exposing 1→6 branch point is**
- (A) Phosphorylase  
(B) α-[1→4]→α-[1→4]→ Glucan transferase  
(C) Amylo [1→6] glucosidase  
(D) Amylo[1→4]→ [1→6] transglucosidase
- 128. In the synthesis of glycogen from glucose the reversible step is**
- (A) Glucose → glucose 6-phosphate  
(B) Glucose 6-phosphate → glucose 1-phosphate  
(C) Glucose 1-phosphate → UDP glucose  
(D) UDP glucose → glycogen
- 129. The enzyme glucose-6-phosphatase which catalyses the conversion of glucose 6-phosphate to glucose is not found in**
- (A) Liver (B) Muscle  
(C) Intestine (D) Kidney
- 130. Allosteric activator of glycogen synthase is**
- (A) Glucose (B) Glucose-6-Phosphate  
(C) UTP (D) Glucose-1-phosphate
- 131. Action of glycogen synthase is inhibited by**
- (A) Insulin (B) Glucose  
(C) Mg<sup>2+</sup> (D) Cyclic AMP
- 132. The hormone activating the glycogen synthase activity is**
- (A) Insulin (B) Glucagon  
(C) Epinephrine (D) ACTH
- 133. Characteristic features of active site are**
- (A) Flexible in nature (B) Site of binding  
(C) Acidic (D) Both (A) and (B)
- 134. Von Gierke's disease is characterized by the deficiency of**
- (A) Glucose-6-phosphatase  
(B) α-1 → 4 Glucosidase  
(C) 1 → 6 Glucosidase  
(D) Liver phosphorylase

- 135. Cori disease (Limit dextrinosis) is caused due to absence of**
- (A) Branching enzyme
  - (B) Debranching enzyme
  - (C) Glycogen synthase
  - (D) Phosphorylase
- 136. Mc Ardle's syndrome is characterized by the absence of**
- (A) Liver phosphorylase
  - (B) Muscle phosphorylase
  - (C) Branching enzyme
  - (D) Debranching enzyme
- 137. Pompe's disease is caused due to deficiency of**
- (A) Lysosomal  $\alpha$ -1 $\rightarrow$ 4 and 1 $\rightarrow$ 6-glucosidase
  - (B) Glucose-6-phosphatase
  - (C) Glycogen synthase
  - (D) Phosphofructokinase
- 138. Amylopectinosis is caused due to absence of**
- (A) Debranching enzyme
  - (B) Branching enzyme
  - (C) Acid maltase
  - (D) Glucose-6-phosphatase
- 139. Her's disease is characterized by deficiency of**
- (A) Muscle phosphorylase
  - (B) Liver phosphorylase
  - (C) Debranching enzyme
  - (D) Glycogen synthase
- 140. Tarui disease is characterized by the deficiency of the enzyme:**
- (A) Liver phosphorylase
  - (B) Muscle phosphorylase
  - (C) Muscle and erythrocyte phosphofructokinase
  - (D) Lysosomal acid maltase
- 141. The hexose monophosphate pathway includes the enzyme:**
- (A) Maltase dehydrogenase
  - (B) Hexokinase
  - (C)  $\alpha$ -Ketoglutarate dehydrogenase
  - (D) Glucose-6-phosphate dehydrogenase
- 142. The hydrogen acceptor used in pentose phosphate pathway is**
- (A) NAD
  - (B) NADP
  - (C) FAD
  - (D) FMN
- 143. The enzymes of the pentose phosphate pathway are found in the**
- (A) Cytosol
  - (B) Mitochondria
  - (C) Nucleus
  - (D) Endoplasmic reticulum
- 144. In pentose phosphate pathway, D-ribulose-5-phosphate is converted to D-ribose-5-phosphate by the enzyme:**
- (A) Fumarase
  - (B) Ketoisomerase
  - (C) G-6-PD
  - (D) Epimerase
- 145. The transketolase enzyme in the pentose phosphate pathway requires the B vitamin.**
- (A) Pantothenic acid
  - (B) Thiamin
  - (C) Riboflavin
  - (D) Nicotinic acid
- 146. Xylulose-5-phosphate serves as a donor of active glycolaldehyde, the acceptor is**
- (A) Erythrose 4-phosphate
  - (B) Ribose 5-phosphate
  - (C) Glyceraldehyde 3-phosphate
  - (D) Sedoheptulose 7-phosphate
- 147. Pentose phosphate pathway is of significance because it generates**
- (A) NADPH for reductive synthesis
  - (B) Regenerates glucose 6-phosphate
  - (C) Generates fructose 6-phosphate
  - (D) Forms glyceraldehyde 3-phosphate
- 148. The pentose phosphate pathway protects erythrocytes against hemolysis by assisting the enzyme:**
- (A) Superoxide dismutase
  - (B) Catalase
  - (C) Glutathionic peroxidase
  - (D) Cytochrome oxidase

- 149. Hemolytic anemia is caused by the deficiency of certain enzymes of the pentose phosphate pathway, the principal enzyme involved is**
- (A) Glucose-6-phosphate dehydrogenase  
(B) Aldolase  
(C) Fructose 1, 6-bisphosphatase  
(D) Phosphohexose isomerase
- 150. The sites for gluconeogenesis are**
- (A) Liver and kidney  
(B) Skin and pancreas  
(C) Lung and brain  
(D) Intestine and lens of eye
- 151. An enzyme involved in gluconeogenesis is**
- (A) Pyruvate kinase  
(B) Pyruvate carboxylase  
(C) Hexokinase  
(D) Phosphohexose isomerase
- 152. The enzyme pyruvate carboxylase is present in**
- (A) Cytosol (B) Mitochondria  
(C) Nucleus (D) Golgi bodies
- 153. The enzyme phosphoenolpyruvate carboxykinase catalyses the conversion of oxaloacetate to phosphoenolpyruvate requires**
- (A) ATP (B) ADP  
(C) AMP (D) GTP
- 154. The enzyme glucose 6-phosphatase is present in**
- (A) Liver (B) Muscle  
(C) Adipose tissue (D) Brain
- 155. In gluconeogenesis, an allosteric activator required in the synthesis of oxaloacetate from bicarbonate and pyruvate, which is catalysed by the enzyme pyruvate carboxylase is**
- (A) Acetyl CoA (B) Succinate  
(C) Isocitrate (D) Citrate
- 156. The number of ATP molecules required to convert 2 molecules of lactate into glucose in mammalian liver is**
- (A) 2 (B) 4  
(C) 5 (D) 6
- 157. For conjugation with many endogenous and exogenous substances before elimination in urine, the uronic acid pathway provides**
- (A) Active glucuronate (B) Gulonate  
(C) Xylulose (D) Xylitol
- 158. UDP glucose is converted to UDP glucurronate, a reaction catalysed by UDP glucose dehydrogenase requires**
- (A) NAD<sup>+</sup> (B) FAD  
(C) NADP (D) FMN
- 159. Pentosuria is a rare hereditary disease is characterized by increased urinary excretion of**
- (A) L-xylulose  
(B) Xylitol  
(C) Xylulose 5-phosphate  
(D) Ribose 5-phosphate
- 160. The enzyme involved in essential pentosuria is**
- (A) Reductase (B) Hydroxylase  
(C) Isomerase (D) Racemase
- 161. Galactose is synthesized from glucose in**
- (A) Mammary gland (B) Intestine  
(C) Kidney (D) Adipose tissue
- 162. Galactose is readily converted to glucose in**
- (A) Liver (B) Intestine  
(C) Kidney (D) Adipose tissue
- 163. Galactose 1-phosphate is converted to uridine diphosphate galactose, the reaction is catalysed by the enzyme:**
- (A) Galactokinase  
(B) Galactose 1-phosphate uridyl transferase  
(C) Uridine diphospho galactose 4-epimerase  
(D) UDP glucose pyrophosphorylase
- 164. The best known cause of galactosemia is the deficiency of**
- (A) Galactose 1-phosphate and uridyl transferase  
(B) Phosphoglucomutase  
(C) Galactokinase  
(D) Lactose synthase

- 165. Conversion of fructose to sorbitol is catalysed by the enzyme:**
- (A) Sorbitol dehydrogenase
  - (B) Aldose reductase
  - (C) Fructokinase
  - (D) Hexokinase
- 166. A specific fructokinase present in liver has a very high affinity for its substrate because**
- (A)  $K_m$  for fructose is very high
  - (B)  $K_m$  for fructose is very low
  - (C) Activity is affected by fasting
  - (D) Activity is affected by insulin
- 167. Insulin has no effect on the activity of the enzyme:**
- (A) Glycogen synthetase
  - (B) Fructokinase
  - (C) Pyruvate kinase
  - (D) Pyruvate dehydrogenase
- 168. The pathogenesis of diabetic cataract involves accumulation of**
- (A) Galactose
  - (B) Mannitol
  - (C) Sorbitol
  - (D) Pyruvate
- 169. Hereditary fructose intolerance involves the absence of the enzyme:**
- (A) Aldalose B
  - (B) Fructokinase
  - (C) Triokinase
  - (D) Phosphotriose isomerase
- 170. Essential fructosuria is characterized by the lack of the hepatic enzyme:**
- (A) Phosphohexose isomerase
  - (B) Aldalose A
  - (C) Aldolase B
  - (D) Fructokinase
- 171. In normal individuals glycosuria occurs when the venous blood glucose concentration exceeds**
- (A) 5–6 mmol/L
  - (B) 7–8 mmol/L
  - (C) 8.5–9 mmol/L
  - (D) 9.5–10 mmol/L
- 172. Phlorizin inhibits**
- (A) Renal tubular reabsorption of glucose
  - (B) Glycolysis
  - (C) Gluconeogenesis
  - (D) Glycogenolysis
- 173. Renal glycosuria is characterized by**
- (A) Hyperglycemia
  - (B) Hyperglycemia with glycosuria
  - (C) Normal blood glucose level with glycosuria
  - (D) Hyperglycemia with ketosis
- 174. Acute hemolytic anemia in person's sensitive to the Fava beans is due to the deficiency of the enzyme:**
- (A) Pyruvate dehydrogenase
  - (B) G-6-PD
  - (C) Aconitase
  - (D) Transketolase
- 175. Acute hemolytic episode after administration of antimalarial, primaquin, is due to deficiency of the enzyme:**
- (A) 6-Phosphogluconate dehydrogenase
  - (B) Glucose-6-phosphate dehydrogenase
  - (C) Epimerase
  - (D) Transketolase
- 176. The pH optima of gastric lipase is**
- (A) 3.0–6.0
  - (B) 1.0–2.0
  - (C) 8.0
  - (D) 8.6
- 177. The optimum pH of pancreatic lipase is**
- (A) 2.0
  - (B) 4.0
  - (C) 6.0
  - (D) 8.0
- 178. Gastric lipase is activated in the presence of**
- (A) Bile salts
  - (B)  $\text{Cu}^{++}$
  - (C)  $\text{K}^+$
  - (D)  $\text{Na}^+$
- 179. An example of enzyme inhibition:**
- (A) Reversible inhibition
  - (B) Irreversible inhibition
  - (C) Allosteric inhibition
  - (D) All of these

- 180. The formation of  $\Delta^2$ -trans-enoyl-CoA from acyl-CoA requires the enzyme:**  
(A) Acyl-CoA synthetase  
(B) Acyl-CoA dehydrogenase  
(C) 3-Hydroxy acyl-CoA dehydrogenase  
(D) Thiolase
- 181. In  $\beta$ -oxidation 3-ketoacyl-CoA is splitted at the 2, 3 position by the enzyme:**  
(A) Hydratase (B) Dehydrogenase  
(C) Reductase (D) Thiolase
- 182. Fatty acids with odd number of carbon atoms yield acetyl-CoA and a molecule of**  
(A) Succinyl-CoA (B) Propionyl-CoA  
(C) Malonyl-CoA (D) Acetoacetyl-CoA
- 183. For each of the first 7-acetyl-CoA molecules formed by  $\alpha$ -oxidation of palmitic acid, the yield of high energy phosphates is**  
(A) 12 (B) 24  
(C) 30 (D) 35
- 184. The net gain of ATP/mol of palmitic acid on complete oxidation is**  
(A) 88 (B) 105  
(C) 129 (D) 135
- 185.  $\omega$ -oxidation is normally a very minor pathway and is brought by hydroxylase enzymes involving**  
(A) Cytochrome a (B) Cytochrome b  
(C) Cytochrome c (D) Cytochrome p-450
- 186.  $\alpha$ -Oxidation i.e., the removal of one carbon at a time from the carboxyl end of the molecule has been detected in**  
(A) Brain tissue (B) Liver  
(C) Adipose tissue (D) Intestine
- 187. In  $\beta$ -oxidation, the coenzyme for acyl-CoA dehydrogenase is**  
(A) FMN (B) NAD  
(C) NADP (D) FAD
- 188. The coenzyme involved in dehydrogenation of 3-hydroxy acyl-CoA is**  
(A) FAD (B) FMN  
(C) NAD (D) NADP
- 189. The concentration of ketone bodies in the blood does not normally exceed**  
(A) 0.2 mmol/L (B) 0.4 mmol/L  
(C) 1 mmol/L (D) 2 mmol/L
- 190. In humans under normal conditions loss of ketone bodies via urine is usually less than**  
(A) 1 mg/24 hr (B) 4 mg/24 hr  
(C) 8 mg/24 hr (D) 10 mg/24 hr
- 191. The structure which appears to be the only organ to add significant quantities of ketone bodies to the blood is**  
(A) Brain (B) Erythrocytes  
(C) Liver (D) Skeletal muscle
- 192. The starting material for ketogenesis is**  
(A) Acyl-CoA (B) Acetyl-CoA  
(C) Acetoacetyl-CoA (D) Malonyl-CoA
- 193. Enzymes responsible for ketone body formation are associated mainly with the**  
(A) Mitochondria  
(B) Endoplasmic reticulum  
(C) Nucleus  
(D) Golgi apparatus
- 194. The synthesis of 3-hydroxy-3-methyl-glutaryl-CoA can occur**  
(A) Only in mitochondria of all mammalian tissues  
(B) Only in the cytosol of all mammalian tissue  
(C) In both cytosol and mitochondria  
(D) In lysosomes
- 195. In the pathway leading to biosynthesis of acetoacetate from acetyl-CoA in liver, the immediate precursor of acetoacetate is**  
(A) Acetoacetyl-CoA  
(B) 3-Hydroxybutyryl-CoA  
(C) 3-Hydroxy-3-methyl-glutaryl-CoA  
(D) 3-Hydroxybutyrate
- 196. Ketone bodies serve as a fuel for**  
(A) Extrahepatic tissues  
(B) Hepatic tissues  
(C) Erythrocytes  
(D) Mitochondria

- 197. In extra hepatic tissues, one mechanism for utilization of acetoacetate involves**  
 (A) Malonyl-CoA (B) Succinyl-CoA  
 (C) Propionyl-CoA (D) Acetyl-CoA
- 198. Ketosis reflects**  
 (A) Increased hepatic glucose liberation  
 (B) Increased fatty acid oxidation  
 (C) Increased carbohydrate utilisation  
 (D) Increased gluconeogenesis
- 199. Ketosis is associated with the disease:**  
 (A) Nephritis  
 (B) Diabetes mellitus  
 (C) Edema  
 (D) Coronary artery diseases
- 200. The main pathway for denovo synthesis of fatty acids occur in**  
 (A) Cytosol (B) Mitochondria  
 (C) Microsomes (D) Nucleus
- 201. Chain elongation of fatty acids in mammalian liver occurs in**  
 (A) Nucleus (B) Ribosomes  
 (C) Lysosomes (D) Microsomes
- 202. Acetyl-CoA is the principal building block of fatty acids. It is produced within the mitochondria and does not diffuse readily into cytosol. The availability of acetyl CoA involves**  
 (A) Carnitine acyl transferase  
 (B) Pyruvate dehydrogenase  
 (C) Citrate lyase  
 (D) Thiolase
- 203. The synthesis of fatty acids is often termed reductive synthesis.**  
 (A) NADP<sup>+</sup> (B) NADH  
 (C) FADH<sub>2</sub> (D) NADPH
- 204. The protein, which is in fact a multifunctional enzyme complex in higher organism is**  
 (A) Acetyl transacylase  
 (B) Malonyl transacylase  
 (C) 3-Hydroxy acyl-ACP dehydratase  
 (D) Fatty acid synthase
- 205. The fatty acid synthase complex catalyses**  
 (A) 4 sequential enzymatic steps  
 (B) 6 sequential enzymatic steps  
 (C) 7 sequential enzymatic steps  
 (D) 8 sequential enzymatic steps
- 206. The main source of reducing equivalents (NADPH) for lipogenesis is**  
 (A) Pentose phosphate pathway  
 (B) Citric acid cycle  
 (C) Glycolysis  
 (D) Glycogenolysis
- 207. In fatty acids synthase of both bacteria and mammals, ACP (acyl carrier protein) contain the vitamin:**  
 (A) Thiamin (B) Pyridoxine  
 (C) Riboflavin (D) Pantothenic acid
- 208. Carboxylation of acetyl-CoA to malonyl-CoA requires the enzyme:**  
 (A) Acetyl-CoA carboxylase  
 (B) Pyruvate carboxylase  
 (C) Acetyl transacylase  
 (D) Acyl CoA-synthetase
- 209. The rate limiting reaction in the lipogenic pathway is**  
 (A) Acetyl-CoA carboxylase step  
 (B) Ketoacyl synthase step  
 (C) Ketoacyl reductase step  
 (D) Hydratase step
- 210. Conversion of fatty acyl-CoA to an acyl-CoA derivative having 2 more carbon atoms involves as acetyl donor:**  
 (A) Acetyl-CoA (B) Succinyl-CoA  
 (C) Propionyl-CoA (D) Malonyl-CoA
- 211. A cofactor required for the conversion of acetyl-CoA to malonyl-CoA in extramitochondrial fatty acid synthesis is**  
 (A) Biotin (B) FMN  
 (C) NAD (D) NADP
- 212. The glycerol for fatty acid esterification in adipocytes is**  
 (A) For the most part, derived from glucose  
 (B) Obtained primarily from phosphorylation of glycerol by glycerol kinase  
 (C) Formed from gluconeogenesis  
 (D) Formed from glycogenolysis

- 213. In the biosynthesis of triglycerides from glycerol 3-phosphate and acyl-CoA, the first intermediate formed is**
- (A) 2-Monoacylglycerol
  - (B) 1, 2-Diacylglycerol
  - (C) Lysophosphatidic acid
  - (D) Phosphatidic acid
- 214. The enzyme glycerol kinase is low activity in**
- (A) Liver
  - (B) Kidney
  - (C) Intestine
  - (D) Adipose tissue
- 215. The common precursor in the biosynthesis of triacylglycerol and phospholipids is**
- (A) 1, 2-Diacylglycerol phosphate
  - (B) 1-Acylglycerol 3-phosphate
  - (C) Glycerol 3-phosphate
  - (D) Dihydroxyacetone phosphate
- 216. Synthesis of polyunsaturated fatty acids involves the enzyme systems:**
- (A) Acyl transferase and hydratase
  - (B) Desaturase and elongase
  - (C) Ketoacyl-CoA reductase and hydratase
  - (D) Dihydroxyacetone phosphate
- 217. The desaturation and chain elongation system of polyunsaturated fatty acid are enhanced by**
- (A) Insulin
  - (B) Glucagon
  - (C) Epinephrine
  - (D) Thyroxine
- 218. Higher rate of lipogenesis is associated with**
- (A) High proportion of carbohydrate in diet
  - (B) Restricted caloric intake
  - (C) High fat diet
  - (D) Deficiency of insulin
- 219. Example of enzyme specificity:**
- (A) Stereo specificity
  - (B) Reaction specificity
  - (C) Substrate specificity
  - (D) All of these
- 220. Phospholipase C attacks the ester bond liberating 1, 2-diacylglycerol and a phosphoryl base at position**
- (A) 1
  - (B) 2
  - (C) Both (A) and (B)
  - (D) 3
- 221. Synthesis of phosphatidylinositol by transfer of inositol to CDP diacylglycerol is catalysed by the enzyme:**
- (A) CTP phosphatidate cytidyl transferase
  - (B) Phosphatidate phosphohydrolase
  - (C) CDP-diacylglycerol inositol transferase
  - (D) Choline kinase
- 222. Synthesis of sphingosine requires the cofactor**
- (A) NAD
  - (B) NADP
  - (C) NADPH<sup>+</sup>
  - (D) ATP
- 223. Ceramide is formed by the combination of sphingosine and**
- (A) Acetyl-CoA
  - (B) Acyl-CoA
  - (C) Malonyl-CoA
  - (D) Propionyl-CoA
- 224. The amino alcohol sphingosine is synthesized in**
- (A) Mitochondria
  - (B) Cytosol
  - (C) Nucleus
  - (D) Endoplasmic reticulum
- 225. The output of free fatty acids from adipose tissue is reduced by**
- (A) Insulin
  - (B) Glucagon
  - (C) Growth hormone
  - (D) Epinephrine
- 226. The principal action of insulin in adipose tissue is to inhibit the activity of the**
- (A) Hormone sensitive lipoprotein lipase
  - (B) Glycerol phosphate acyltransferase
  - (C) Acetyl-CoA carboxylase
  - (D) Pyruvate dehydrogenase
- 227. In non shivering thermogenesis**
- (A) Glucose is oxidized to lactate
  - (B) Fatty acids uncouple oxidative phosphorylation
  - (C) Ethanol is formed
  - (D) ATP is burned for heat production
- 228. Brown adipose tissue is**
- (A) A prominent tissue in human
  - (B) Characterised by high content of mitochondria
  - (C) Associated with high activity of ATP synthase
  - (D) Characterised by low content of cytochromes

- 229. Fatty liver is caused due to accumulation of**  
 (A) Fatty acids (B) Cholesterol  
 (C) Phospholipids (D) Triacylglycerol
- 230. A lipotropic factor is**  
 (A) Choline (B) Palmitic acid  
 (C) Calcium (D) Vitamin C
- 231. Fatty liver is also caused by**  
 (A) CH<sub>3</sub>Cl (B) CCl<sub>4</sub>  
 (C) Na<sub>2</sub>SO<sub>4</sub> (D) Riboflavin
- 232. All the enzymes involved in the synthesis of cholesterol are found in**  
 (A) Mitochondria  
 (B) Golgi apparatus  
 (C) Nucleus  
 (D) Endoplasmic reticulum and cytosol
- 233. The source of all the carbon atoms in cholesterol is**  
 (A) Acetyl-CoA (B) Bicarbonate  
 (C) Propionyl-CoA (D) Succinyl-CoA
- 234. Two molecules of acetyl-CoA condense to form acetoacetyl-CoA catalysed by**  
 (A) Thiolase (B) Kinase  
 (C) Reductase (D) Isomerase
- 235. Acetoacetyl-CoA condenses with one more molecule of acetyl-CoA to form**  
 (A) Mevalonate  
 (B) Acetoacetate  
 (C)  $\beta$ -Hydroxybutyrate  
 (D) 3-Hydroxy 3-methyl-glutaryl-CoA
- 236. HMG-CoA is converted to mevalonate by reduction catalysed by**  
 (A) HMG-CoA synthetase  
 (B) HMG-CoA reductase  
 (C) Mevalonate kinase  
 (D) Thiolase
- 237. For reduction enzyme HMG-CoA reductase requires cofactor:**  
 (A) NADPH (B) NADP  
 (C) NAD (D) FAD
- 238. In the biosynthesis of cholesterol, the step which controls the rate and locus of metabolic regulation is**  
 (A) Geranyl pyrophosphate farnesyl pyrophosphate  
 (B) Squalene  $\rightarrow$  lanosterol  
 (C) HMG CoA  $\rightarrow$  mevalonate  
 (D) Lanosterol  $\rightarrow$  1, 4-desmethyl lanosterol
- 239. The cyclisation of squalene in mammals results in the direct formation of the sterol.**  
 (A) Cholesterol (B) Lanosterol  
 (C) Sistolsterol (D) Zymosterol
- 240. In the biosynthesis of cholesterol, the rate limiting enzyme is**  
 (A) Mevalonate kinase  
 (B) HMG-CoA synthetase  
 (C) HMG-CoA reductase  
 (D) Cis-prenyl transferase
- 241. Cholesterol by a feed back mechanism inhibits the activity of**  
 (A) HMG-CoA synthetase  
 (B) HMG-CoA reductase  
 (C) Thilase  
 (D) Mevalonate kinase
- 242. The activity of HMG-CoA reductase is inhibited by**  
 (A) A fungal inhibitor mevastatin  
 (B) Probuocol  
 (C) Nicotinic acid  
 (D) Clofibrate
- 243. Hypolipidemic drugs reduce serum cholesterol and triacylglycerol. The effect of clofibrate is attributed to**  
 (A) Block in absorption from G.I.T.  
 (B) Decrease in secretion of triacylglycerol and cholesterol containing VLDL by liver  
 (C) Block in the reabsorption of bile acids  
 (D) Decreased synthesis of cholesterol
- 244. In biosynthesis of cholesterol triparanol inhibits the activity of the enzyme:**  
 (A)  $\Delta^{24}$  Reductase  
 (B) Oxidosqualene-lanosterol cyclase  
 (C) Isomerase  
 (D) Squalene epoxidase

- 245. HMG-CoA reductase activity is increased by administration of the hormone:**  
(A) Insulin (B) Glucagon  
(C) Epinephrine (D) Glucocorticoids
- 246. The principal sterol excreted in feces is**  
(A) Coprostanol (B) Zymosterol  
(C) Lanosterol (D) Desmosterol
- 247. The principal rate limiting step in the biosynthesis of bile acids is at the**  
(A) 7-Hydroxylase reaction  
(B) 12  $\alpha$ -Hydroxylase reaction  
(C) Conjugation reaction  
(D) Deconjugation reaction
- 248. Hypercholesterolemia is found in**  
(A) Xanthomatosis  
(B) Thyrotoxicosis  
(C) Hemolytic jaundice  
(D) Malabsorption syndrom
- 249. Hypocholesterolemia is found in**  
(A) Thyrotoxicosis  
(B) Diabetes mellitus  
(C) Obstructive jaundice  
(D) Nephrotic syndrome
- 250. The major source of extracellular cholesterol for human tissue is**  
(A) Very low density lipoprotein  
(B) High density lipoprotein  
(C) Low density lipoprotein  
(D) Albumin
- 251. Correct ordering of lipoprotein molecules from lowest to the greater density is**  
(A) LDL, IDL, VLDL, chylomicron  
(B) Chylomicron, VLDL, IDL, LDL  
(C) VLDL, IDL, LDL, chylomicron  
(D) LDL, VLDL, IDL, chylomicron
- 252. In Hurler's syndrome, urine shows the presence of**  
(A) Keratan sulphate I  
(B) Chondroitin sulphate  
(C) Dermatan sulphate and heparan sulphate  
(D) Keratan sulphate II
- 253. Defective enzyme in Hunter's syndrome is**  
(A)  $\alpha$ -L-iduronidase (B) Iduronate sulphatase  
(C) Arylsulphatase B (D) C-acetyl transferase
- 254. In Hunter's syndrome**  
(A) There is progressive corneal opacity  
(B) Keratan sulphate is excreted in the urine  
(C) Enzyme defective is arylsulphatase B  
(D) Hearing loss is perceptive
- 255. An important feature of Von-Gierke's disease is**  
(A) Muscle cramps (B) Cardiac failure  
(C) Hypoglycemia (D) Respiratory alkalosis
- 256. The affected organ in Mc Ardle's syndrome is**  
(A) Liver (B) Kidney  
(C) Liver and Heart (D) Skeletal muscle
- 257. Refsum's disease is due to deficiency of the enzyme:**  
(A) Pyrantate- $\alpha$ -oxidase  
(B) Glucocerebrosidase  
(C) Galactocerebrosidase  
(D) Ceramide trihexosidase
- 258. An important finding in Refsum's disease is**  
(A) Accumulation of ceramide trihexoside in the kidney  
(B) Accumulation of phytanic acid in the blood and tissues  
(C) Accumulation of gangliosides in brain and spleen  
(D) Skin eruptions
- 259.  $\alpha$ -Galactosidase enzyme is defective in**  
(A) Tay-sach's disease  
(B) Refsum's disease  
(C) Sandhoff's disease  
(D) Fabry's disease
- 260. The hypothesis to explain enzyme-substrate complex formation:**  
(A) Lock and key model  
(B) Induced fit theory  
(C) Proenzyme theory  
(D) Both (A) and (B)

- 261. An important finding in Tay-sach's disease is**
- (A) Renal failure
  - (B) Accumulation of gangliosides in brain and spleen
  - (C) Cardiac failure
  - (D) Anemia
- 262. The enzyme deficient in Krabbe's disease is**
- (A) Hexosaminidase A (B) Arylsuphatase A
  - (C)  $\beta$ -Galactosidase (D)  $\alpha$ -Fucosidase
- 263. The enzyme ceramidase is deficient in**
- (A) Farber's disease (B) Fabry's disease
  - (C) Sandhoff's disease (D) Refsum's disease
- 264. Niemann-Pick disease is due to deficiency of the enzyme**
- (A) Ceramidase
  - (B) Glucocerebrosidase
  - (C) Galactocerebrosidase
  - (D) Sphingomyelinase
- 265. Wolman's disease is due to deficiency of**
- (A) Cholesteryl ester hydrolase
  - (B) Hexosaminidase A
  - (C)  $\alpha$ -Fucosidase
  - (D) Arylsulphatase A
- 266. The enzyme deficient in Sandhoff's disease is**
- (A)  $\alpha$ -Fucosidase
  - (B) Hexosaminidase A and B
  - (C)  $\beta$ -Galactosidase
  - (D)  $\beta$ -Glucosidase
- 267. Jamaican vomiting sickness is due to inactivation of the enzyme**
- (A) Pyruvate carboxylase
  - (B) Acyl-Co-A synthetase
  - (C) Acyl-Co-A dehydrogenase
  - (D) Thiolase
- 268. Zellweger's syndrome is due to inherited absence of**
- (A) Peroxisomes
  - (B) Phospholipase A<sub>1</sub>
  - (C) Acyl-Co-A dehydrogenase
  - (D) Thiolase
- 269. Bassen-Kornzweig syndrome is due to**
- (A) Absence of Apo-C-II
  - (B) Defect in Apo-B synthesis
  - (C) Absence of Apo-E
  - (D) Absence of Apo-D
- 270. Enzyme deficient in Hyperammonemia type II is**
- (A) Glutamine synthetase
  - (B) Glutaminase
  - (C) Ornithine transcarbamoylase
  - (D) Carbamoylphosphate synthetase
- 271. An important finding in Hyperammonemia type II is**
- (A) Increased serum glutamine level
  - (B) Enlarged liver
  - (C) Mental retardation
  - (D) Increased carbamoyl phosphate synthetase level
- 272. Absence of the enzyme argininosuccinate synthetase causes**
- (A) Argininosuccinic aciduria
  - (B) Hyperargininemia
  - (C) Tricorhhexis nodosa
  - (D) Citrullinemia
- 273. Tricorhhexis nodosa is a characteristic finding of**
- (A) Argininosuccinic aciduria
  - (B) Citrullinemia
  - (C) Phenylketonuria
  - (D) Hyperargininemia
- 274. Elevated blood argininosuccinate level is found in**
- (A) Hyperargininemia
  - (B) Argininosuccinic aciduria
  - (C) Citrullinemia
  - (D) Tyrosinosis
- 275. Hyperargininemia, a defect in urea synthesis develops due to deficiency of the enzyme:**
- (A) Ornithine transcarbamoylase
  - (B) Argininosuccinase
  - (C) Arginase
  - (D) Argininosuccinate synthetase

- 276. Albinism is due to deficiency of the enzyme:**  
(A) Phenylalanine hydroxylase  
(B) Tyrosinase  
(C) p-Hydroxyphenylpyruvic acid oxidase  
(D) Tyrosine dehydrogenase
- 277. Neonatal tyrosinemia is due to deficiency of the enzyme:**  
(A) p-Hydroxyphenylpyruvate hydroxylase  
(B) Fumarylacetoacetate hydrolase  
(C) Phenylalanine hydroxylase  
(D) Tyrosine dehydrogenase
- 278. Which of the following is a substrate-specific enzyme?**  
(A) Hexokinase (B) Thiokinase  
(C) Lactase (D) Aminopeptidase
- 279. Coenzymes combine with**  
(A) Proenzymes (B) Apoenzymes  
(C) Holoenzymes (D) Antienzymes
- 280. Coenzymes are required in which of the following reactions?**  
(A) Oxidation-reduction  
(B) Transamination  
(C) Phosphorylation  
(D) All of these
- 281. Which of the following coenzyme takes part in hydrogen transfer reactions?**  
(A) Tetrahydrofolate (B) Coenzyme A  
(C) Coenzyme Q (D) Biotin
- 282. Which of the following coenzyme takes part in oxidation-reduction reactions?**  
(A) Pyridoxal phosphate  
(B) Lipoic acid  
(C) Thiamin diphosphate  
(D) None of these
- 283. In conversion of glucose to glucose-6-phosphate, the coenzyme is**  
(A) Mg<sup>++</sup>  
(B) ATP  
(C) Both (A) and (B)  
(D) None of these
- 284. A coenzyme required in transamination reactions is**  
(A) Coenzyme A (B) Coenzyme Q  
(C) Biotin (D) Pyridoxal phosphate
- 285. Coenzyme A contains a vitamin which is**  
(A) Thiamin (B) Ascorbic acid  
(C) Pantothenic acid (D) Niacinamide
- 286. Cobamides contain a vitamin which is**  
(A) Folic acid (B) Ascorbic acid  
(C) Pantothenic acid (D) Vitamin B<sub>12</sub>
- 287. A coenzyme required in carboxylation reactions is**  
(A) Lipoic acid (B) Coenzyme A  
(C) Biotin (D) All of these
- 288. Which of the following coenzyme takes part in tissue respiration?**  
(A) Coenzyme Q (B) Coenzyme A  
(C) NADP (D) Cobamide
- 289. The enzyme hexokinase is a**  
(A) Hydrolase (B) Oxidoreductase  
(C) Transferase (D) Ligase
- 290. Which of the following is a proteolytic enzyme?**  
(A) Pepsin (B) Trypsin  
(C) Chymotrypsin (D) All of these
- 291. Enzymes which catalyse binding of two substrates by covalent bonds are known as**  
(A) Lyases (B) Hydrolases  
(C) Ligases (D) Oxidoreductases
- 292. The induced fit model of enzyme action was proposed by**  
(A) Fischer (B) Koshland  
(C) Mitchell (D) Markert
- 293. Allosteric inhibition is also known as**  
(A) Competitive inhibition  
(B) Non-competitive inhibition  
(C) Feedback inhibition  
(D) None of these

- 294. An allosteric enzyme is generally inhibited by**
- (A) Initial substrate of the pathway  
 (B) Substrate analogues  
 (C) Product of the reaction catalysed by allosteric enzyme  
 (D) Product of the pathway
- 295. When the velocity of an enzymatic reaction equals  $V_{max}$ , substrate concentration is**
- (A) Half of  $K_m$  (B) Equal to  $K_m$   
 (C) Twice the  $K_m$  (D) Far above the  $K_m$
- 296. In Lineweaver-Burk plot, the y-intercept represents**
- (A)  $V_{max}$  (B)  $K_m$   
 (C)  $K_m$  (D)  $1/K_m$
- 297. In competitive inhibition, the inhibitor**
- (A) Competes with the enzyme  
 (B) Irreversibly binds with the enzyme  
 (C) Binds with the substrate  
 (D) Competes with the substrate
- 298. Competitive inhibitors**
- (A) Decrease the  $K_m$  (B) Decrease the  $V_{max}$   
 (C) Increase the  $K_m$  (D) Increase the  $V_{max}$
- 299. Competitive inhibition can be relieved by raising the**
- (A) Enzyme concentration  
 (B) Substrate concentration  
 (C) Inhibitor concentration  
 (D) None of these
- 300. Physostigmine is a competitive inhibitor of**
- (A) Xanthine oxidase  
 (B) Cholinesterase  
 (C) Carbonic anhydrase  
 (D) Monoamine oxidase
- 301. Carbonic anhydrase is competitively inhibited by**
- (A) Allopurinol (B) Acetazolamide  
 (C) Aminopterin (D) Neostigmine
- 302. Serum lactate dehydrogenase rises in**
- (A) Viral hepatitis  
 (B) Myocardial infarction  
 (C) Carcinomatosis  
 (D) All of these
- 303. Which of the following serum enzyme rises in myocardial infarction:**
- (A) Creatine kinase (B) GOT  
 (C) LDH (D) All of these
- 304. From the following myocardial infarction, the earliest serum enzyme to rise is**
- (A) Creatine Kinase (B) GOT  
 (C) GPT (D) LDH
- 305. Proenzymes:**
- (A) Chymotrypsinogen (B) Pepsinogen  
 (C) Both (A) and (B) (D) None of these
- 306. Alkaline phosphatase is present in**
- (A) Liver (B) Bones  
 (C) Placenta (D) All of these
- 307. Which of the following isoenzyme of lactate dehydrogenase is raised in serum in myocardial infarction:**
- (A) LD<sub>1</sub> (B) LD<sub>2</sub>  
 (C) LD<sub>1</sub> and LD<sub>2</sub> (D) LD<sub>5</sub>
- 308. Enzymes which are always present in an organism are known as**
- (A) Inducible enzymes  
 (B) Constitutive enzymes  
 (C) Functional enzymes  
 (D) Apoenzymes
- 309. Inactive precursors of enzymes are known as**
- (A) Apoenzymes (B) Coenzymes  
 (C) Proenzymes (D) Holoenzymes
- 310. Which of the following is a proenzyme?**
- (A) Carboxypeptidase  
 (B) Aminopeptidase  
 (C) Chymotrypsin  
 (D) Pepsinogen

- 311. Allosteric enzymes regulate the formation of products by**  
(A) Feedback inhibition  
(B) Non-competitive inhibition  
(C) Competitive inhibition  
(D) Repression-derepression
- 312. Regulation of some enzymes by covalent modification involves addition or removal of**  
(A) Acetate (B) Sulphate  
(C) Phosphate (D) Coenzyme
- 313. Covalent modification of an enzyme generally requires a**  
(A) Hormone (B) cAMP  
(C) Protein kinase (D) All of these
- 314. An inorganic ion required for the activity of an enzyme is known as**  
(A) Activator (B) Cofactor  
(C) Coenzyme (D) None of these
- 315. The first enzyme found to have iso-enzymes was**  
(A) Alkaline Phosphatase  
(B) Lactate dehydrogenase  
(C) Acid Phosphatase  
(D) Creatine kinase
- 316. Lactate dehydrogenase is located in**  
(A) Lysosomes (B) Mitochondria  
(C) Cytosol (D) Microsomes
- 317. Lactate dehydrogenase is a**  
(A) Monomer (B) Dimer  
(C) Tetramer (D) Hexamer
- 318. Ceruloplasmin is absent in**  
(A) Cirrhosis of liver (B) Wilson's disease  
(C) Menke's disease (D) Copper deficiency
- 319. Ceruloplasmin oxidizes**  
(A) Copper (B) Iron  
(C) Both (A) and (B) (D) None of these
- 320. Creatine kinase is present in all of the following except**  
(A) Liver (B) Myocardium  
(C) Muscles (D) Brain
- 321. Alkaline phosphatase is present in**  
(A) Liver (B) Bones  
(C) Intestinal mucosa (D) All of these
- 322. All of the following are zinc-containing enzymes except**  
(A) Acid Phosphatase  
(B) Alkaline Phosphatase  
(C) Carbonic anhydrase  
(D) RNA polymerase
- 323. All of the following are iron-containing enzymes except**  
(A) Carbonic anhydrase  
(B) Catalase  
(C) Peroxidase  
(D) Cytochrome oxidase
- 324. Biotin is a coenzyme for**  
(A) Pyruvate dehydrogenase  
(B) Pyruvate carboxylase  
(C) PEP carboxykinase  
(D) Glutamate pyruvate transminase
- 325. Enzymes accelerate the rate of reactions by**  
(A) Increasing the equilibrium constant of reactions  
(B) Increasing the energy of activation  
(C) Decreasing the energy of activation  
(D) Decreasing the free energy change of the reaction
- 326. Kinetics of an allosteric enzyme are explained by**  
(A) Michaelis-Menten equation  
(B) Lineweaver-Burk plot  
(C) Hill plot  
(D) All of these
- 327. Covalent modification of an enzyme usually involves phosphorylation / dephosphorylation of**  
(A) Serine residue  
(B) Proline residue  
(C) Hydroxylysine residue  
(D) Hydroxyproline residue

- 328.  $V_{\max}$  of an enzyme may be affected by**
- (A) pH
  - (B) Temperature
  - (C) Non-competitive inhibitors
  - (D) All of these
- 329. In enzyme assays, all the following are kept constant except**
- (A) Substrate concentration
  - (B) Enzyme concentration
  - (C) pH
  - (D) Temperature
- 330. If the substrate concentration is much below the  $K_m$  of the enzyme, the velocity of the reaction is**
- (A) Directly proportional to substrate concentration
  - (B) Not affected by enzyme concentration
  - (C) Nearly equal to  $V_{\max}$
  - (D) Inversely proportional to substrate concentration
- 331. Enzymes requiring NAD as co-substrate can be assayed by measuring change in absorbance at**
- (A) 210 nm                      (B) 290 nm
  - (C) 340 nm                      (D) 365 nm
- 332. Different isoenzymes of an enzyme have the same**
- (A) Amino acid sequence
  - (B) Michaelis constant
  - (C) Catalytic activity
  - (D) All of these
- 333. From the pentapeptide, phe-ala-leu-lys-arg, phenylalanine residue is split off by**
- (A) Trypsin                      (B) Chymotrypsin
  - (C) Aminopeptidase          (D) Carboxypeptidase
- 334. A high-energy phosphate among the following is**
- (A) Glucose-6-phosphate
  - (B) Glucose-1-phosphate
  - (C) 1, 3-Biphoglycerate
  - (D) All of these
- 335. The highest energy level is present amongst the following in**
- (A) 1, 3-Biphosphoglycerate
  - (B) Creatine phosphate
  - (C) Carbamoyl phosphate
  - (D) Phosphoenol pyruvate
- 336. Daily urinary urobilinogen excretion in adult men is**
- (A) 0–4 mg                      (B) 5–8 mg
  - (C) 9–12 mg                      (D) 13–20 mg
- 337. In obstructive jaundice, faecal urobilinogen is**
- (A) Absent                      (B) Decreased
  - (C) Increased                      (D) Normal
- 338. Acetyl-CoA can be formed from**
- (A) Pyruvate                      (B) Fatty acids
  - (C) ketone bodies              (D) All of these
- 339. Pyruvate is converted into acetyl-CoA by**
- (A) Decarboxylation
  - (B) Dehydrogenation
  - (C) Oxidative decarboxylation
  - (D) Oxidative deamination
- 340. Conversion of pyruvate into acetyl CoA is catalysed by**
- (A) Pyruvate dehydrogenase
  - (B) Didrolipoyl acetyl transferase
  - (C) Dihydrolipoyl dehydrogenase
  - (D) All the 3 acting in concert
- 341. Pyruvate dehydrogenase complex is located in**
- (A) Cytosol
  - (B) Lysosomes
  - (C) Mitochondria
  - (D) Endoplasmic reticulum
- 342. A flavoprotein in pyruvate dehydrogenase complex is**
- (A) Pyruvate dehydrogenase
  - (B) Didrolipoyl acetyl transferase
  - (C) Dihydrolipoyl dehydrogenase
  - (D) None of these

- 343. Pyruvate dehydrogenase complex is regulated by**  
(A) Covalent modification  
(B) Allosteric regulation  
(C) Both (A) and (B)  
(D) None of these
- 344. An allosteric inhibitor of pyruvate dehydrogenase is**  
(A) Acetyl CoA (B) ATP  
(C) NADH (D) Pyruvate
- 345. Ribozymes:**  
(A) RNA enzyme (B) Non-protein enzymes  
(C) Catalyst function (D) All of these
- 346. In citric acid cycle, NAD is reduced in**  
(A) One reactions (B) Two reactions  
(C) Three reactions (D) Four reactions
- 347. Among citric acid cycle enzymes, a flavo-protein is**  
(A) Malate  
(B) Fumarase  
(C) Succinate dehydrogenase  
(D) Isocitrate dehydrogenase
- 348. In citric acid cycle, GDP is phosphorylated by**  
(A) Succinate dehydrogenase  
(B) Aconitase  
(C) Succinate thiokinase  
(D) Fumarase
- 349. Malonate is an inhibitor of**  
(A) Malate dehydrogenase  
(B)  $\alpha$ -Ketoglutarate dehydrogenase  
(C) Succinate dehydrogenase  
(D) Isocitrate dehydrogenase
- 350. Isocitrate dehydrogenase is allosterically inhibited by**  
(A) Oxalosuccinate (B)  $\alpha$ -Ketoglutarate  
(C) ATP (D) NADH
- 351. All of the following are allosteric enzymes except**  
(A) Citrate synthetase  
(B)  $\alpha$ -Ketoglutarate dehydrogenase  
(C) Succinate thiokinase  
(D) Succinate dehydrogenase
- 352. All of the following are intermediates of citric acid cycle except**  
(A) Oxalosuccinate (B) Oxaloacetate  
(C) Pyruvate (D) Fumarate
- 353. All of the following intermediates of citric acid cycle can be formed from amino acids except**  
(A)  $\alpha$ -Ketoglutarate (B) Fumarate  
(C) Malate (D) Oxaloacetate
- 354. Glycolytic pathway is located in**  
(A) Mitochondria (B) Cytosol  
(C) Microsomes (D) Nucleus
- 355. End product of aerobic glycolysis is**  
(A) Acetyl CoA (B) Lactate  
(C) Pyruvate (D)  $\text{CO}_2$  and  $\text{H}_2\text{O}$
- 356. During fasting, glucose is phosphorylated mainly by**  
(A) Hexokinase (B) Glucokinase  
(C) Both (A) and (B) (D) None of these
- 357. Glucokinase is found in**  
(A) Muscles (B) Brain  
(C) Liver (D) All of these
- 358. In anaerobic glycolysis, energy yield from each molecule of glucose is**  
(A) 2 ATP equivalents (B) 8 ATP equivalents  
(C) 30 ATP equivalents (D) 38 ATP equivalents
- 359. Which of the following is an allosteric enzyme?**  
(A) Phosphohexose isomerase  
(B) Phosphotriose isomerase  
(C) Lactate dehydrogenase  
(D) Phosphofructokinase
- 360. Glycolysis is anaerobic in**  
(A) Liver (B) Brain  
(C) Kidneys (D) Erythrocytes
- 361. Phosphofructokinase is allosterically inhibited by**  
(A) Fructose-1, 6-biphosphate  
(B) Lactate  
(C) Pyruvate  
(D) Citrate

- 362. Glucose-6-phosphate is an allosteric inhibitor of**  
 (A) Glucokinase  
 (B) Hexokinase  
 (C) Phosphohexose isomerase  
 (D) None of these
- 363. ATP is a co-substrate as well as an allosteric inhibitor of**  
 (A) Phosphofructokinase  
 (B) Hexokinase  
 (C) Glucokinase  
 (D) None of these
- 364. Complete oxidation of one molecule of glucose into CO<sub>2</sub> and H<sub>2</sub>O yields**  
 (A) 8 ATP equivalents  
 (B) 15 ATP equivalents  
 (C) 30 ATP equivalents  
 (D) 38 ATP equivalents
- 365. A unique by-product of glycolysis in erythrocytes is**  
 (A) Lactate  
 (B) 1, 3-Biphosphoglycerate  
 (C) 2, 3-Biphosphoglycerate  
 (D) All of these
- 366. Which of the following enzymes incorporates inorganic phosphate into the substrate?**  
 (A) Phosphoglycerate kinase  
 (B) Glyceraldehyde-3-phosphate dehydrogenase  
 (C) Pyruvate kinase  
 (D) Enolase
- 367. Rapoport-Luebering cycle is located in**  
 (A) Liver (B) Muscles  
 (C) Brain (D) Erythrocytes
- 368. Glycerol can enter glycolytic pathway via**  
 (A) Dihydroxyacetone phosphate  
 (B) 1, 3-Biphosphoglycerate  
 (C) 3-Phosphoglycerate  
 (D) 2-Phosphoglycerate
- 369. HMP shunt is present in**  
 (A) Erythrocytes (B) Liver  
 (C) Testes (D) All of these
- 370. Glucose-6-phosphate dehydrogenase is induced by**  
 (A) 6-Phosphogluconolactone  
 (B) Glucose-6-phosphate  
 (C) Ribose-5-phosphate  
 (D) Insulin
- 371. The decarboxylation reaction in HMP shunt is catalysed by**  
 (A) Gluconolactone hydrolase  
 (B) 6-Phosphogluconate dehydrogenase  
 (C) 6-Phosphogluconate decarboxylase  
 (D) Transaldolase
- 372. The first pentose formed in HMP shunt is**  
 (A) Ribose-5-phosphate (B) Ribulose-5-phosphate  
 (C) Xylose-5-phosphate (D) Xylulose-5-phosphate
- 373. The regulatory enzyme in HMP shunt is**  
 (A) Glucose-6-phosphate dehydrogenase  
 (B) 6-Phosphogluconate dehydrogenase  
 (C) Both (A) and (B)  
 (D) None of these
- 374. The rate of HMP shunt reactions is**  
 (A) Increased by Insulin  
 (B) Increased in diabetes mellitus  
 (C) Increased by glucagons  
 (D) Increased in starvation
- 375. Glycogenesis requires**  
 (A) GTP (B) CTP  
 (C) UTP (D) None of these
- 376. Glycogen synthetase catalyses the formation of**  
 (A)  $\alpha$ -1, 4-Glycosidic bonds  
 (B)  $\alpha$ -1, 6-Glycosidic bonds  
 (C) Both (A) and (B)  
 (D) None of these
- 377. Glycogenolysis is increased by**  
 (A) Glucagon (B) Insulin  
 (C) Epinephrine (D) cAMP
- 378. Hepatic glycogenolysis is increased by**  
 (A) Insulin (B) Glucagon  
 (C) Epinephrine (D) Glucocorticoids

- 379. Glycogen phosphorylase liberates the following from glycogen**  
(A) Glucose  
(B) Glucose-6-phosphate  
(C) Glucose-1-phosphate  
(D) Maltose
- 380. After the action of phosphorylase, glycogen is converted into**  
(A) Amylopectin (B) dextrin  
(C) Amylose (D) Maltose
- 381. Glucose-1-phosphate liberated from glycogen cannot be converted into free glucose in**  
(A) Liver (B) Kidneys  
(C) Muscles (D) Brain
- 382. A coenzyme present in phosphorylase is**  
(A) NAD  
(B) Pyridoxal phosphate  
(C) Thiamin pyrophosphate  
(D) Coenzyme A
- 383. If glucose-1-phosphate formed by glycogenolysis in muscles is oxidized to  $\text{CO}_2$  and  $\text{H}_2\text{O}$ , the energy yield will be**  
(A) 2 ATP equivalents (B) 3 ATP equivalents  
(C) 4 ATP equivalents (D) 8 ATP equivalents
- 384. A molecule of phosphorylase kinase is made up of**  
(A) 4 subunits (B) 8 subunits  
(C) 12 subunits (D) 16 subunits
- 385. Cyclic AMP binds to**  
(A) Catalytic subunits of protein kinase  
(B) Regulatory subunits of protein kinase  
(C) Catalytic subunits of phosphorylase kinase  
(D) Regulatory subunits of phosphorylase kinase
- 386. Glucose is the only source of energy for**  
(A) Myocardium (B) Kidneys  
(C) Erythrocytes (D) Thrombocytes
- 387. Glycerol-3-phosphate for the synthesis of triglycerides in adipose tissue is derived from**  
(A) Phosphatidic acid (B) Diacylglycerol  
(C) Glycerol (D) Glucose
- 388. Gluconeogenesis does not occur in**  
(A) Brain (B) Kidneys  
(C) Muscles (D) Liver
- 389. Glucose cannot be synthesized from**  
(A) Glycerol (B) Lactate  
(C) Alanine (D) Leucine
- 390. Coenzyme for phosphoenolpyruvate carboxykinase is**  
(A) ATP (B) ADP  
(C) GTP (D) GDP
- 391. Therapeutic enzymes:**  
(A) Streptokinase (B) Asparaginase  
(C) Riboflavinase (D) Both (A) and (B)
- 392. A gluconeogenic enzyme among the following is**  
(A) Phosphofructokinase  
(B) Pyruvate kinase  
(C) Phosphoenol pyruvate carboxykinase  
(D) Glucokinase
- 393. Glucose-6-phosphatase and PEP carboxy kinase are regulated by**  
(A) Covalent modification  
(B) Allosteric regulation  
(C) Induction and repression  
(D) All of these
- 394. The maximum possible chain length of fatty acids formed in the pathway of de novo synthesis is**  
(A) 16 Carbon atoms (B) 18 Carbon atoms  
(C) 20 Carbon atoms (D) 24 Carbon atoms
- 395. Acetyl CoA required for de novo synthesis of fatty acids is obtained from**  
(A) Breakdown of existing fatty acids  
(B) Ketone bodies  
(C) Acetate  
(D) Pyruvate
- 396. Formation of acetyl CoA from pyruvate for de novo synthesis of fatty acids requires**  
(A) Pyruvate dehydrogenase complex  
(B) Citrate synthetase  
(C) ATP citrate lyase  
(D) All of these

- 397. The major site for elongation of medium chain fatty acids is**  
 (A) Mitochondria (B) Cytosol  
 (C) Microsomes (D) All of these
- 398.  $\beta$ -oxidation of fatty acids is inhibited by**  
 (A) NADPH (B) Acetyl CoA  
 (C) Malonyl CoA (D) None of these
- 399. The enzyme regulating extramitochondrial fatty acid synthesis is**  
 (A) Thioesterase  
 (B) Acetyl CoA carboxylase  
 (C) Acyl transferase  
 (D) Multi-enzyme complex
- 400. Acetyl CoA carboxylase is activated by**  
 (A) Citrate (B) Insulin  
 (C) Both (A) and (B) (D) None of these
- 401. All the following statements about acetyl CoA carboxylase are true except:**  
 (A) It is activated by citrate  
 (B) It is inhibited by palmitoyl CoA  
 (C) It can undergo covalent modification  
 (D) Its dephosphorylated form is inactive
- 402. All the following statements about acetyl CoA carboxylase are true except**  
 (A) It is required for de novo synthesis of fatty acids  
 (B) It is required for mitochondrial elongation of fatty acids  
 (C) It is required for microsomal elongation of fatty acids  
 (D) Insulin converts its inactive form into its active form
- 403. Both Acyl carrier protein (ACP) of fatty acid synthetase and coenzyme (CoA) are**  
 (A) Contain reactive phosphorylated  
 (B) Contain thymidine  
 (C) Contain phosphopantetheine reactive groups  
 (D) Contain cystine reactive groups
- 404. Which one of the following transfers acyl groups?**  
 (A) Thiamine pyrophosphate  
 (B) Lipomide  
 (C) ATP  
 (D) NADH
- 405. Which one of the following cofactors must be utilized during the conversion of acetyl CoA to malonyl CoA?**  
 (A) TPP (B) ACP  
 (C) NAD<sup>+</sup> (D) Biotin
- 406. Which one of the following enzymes requires a coenzyme derived from the vitamin whose structure is shown below?**  
 (A) Enoyl CoA hydratase  
 (B) Phosphofructokinase  
 (C) Glucose-6-phosphatase  
 (D) Glucose-6-phosphate dehydrogenase
- 407. Coenzymes derived from the vitamin shown below are required by enzymes involved in the synthesis of which of the following?**  
 (A) ATP (B) UTP  
 (C) CTP (D) NADH
- 408. Coenzymes derived from the vitamin shown below are required by which of the following enzymes?**  
 (A) Lactate dehydrogenase  
 (B) Glutamate dehydrogenase  
 (C) Pyruvate dehydrogenase  
 (D) Malate dehydrogenase
- 409. All the following are coenzymes except**  
 (A) Ubiquinone  
 (B) CoA  
 (C) Pyruvate dehydrogenase  
 (D) Lipoic acid
- 410. Which of the following is not a cofactor?**  
 (A) Mg (B) Iron  
 (C) Cu (D) Methylcobalamine
- 411. All the following compounds are members of the electron transport chain except**  
 (A) Ubiquinone (B) Carnitine  
 (C) NAD (D) FAD
- 412. Thiamine is essential for**  
 (A) Pyruvate dehydrogenase  
 (B) Isocitrate dehydrogenase  
 (C) Succinate dehydrogenase  
 (D) Acetyl CoA synthetase

- 413. Adenylate cyclase is activated by**  
 (A) Insulin (B) Glucagon  
 (C) Prostaglandin E<sub>1</sub> (D) Ca<sup>2+</sup> ions
- 414. Maximum enzyme activity is observed at**  
 (A) Acidic pH (B) Neutral pH  
 (C) Basic pH (D) Optimum pH
- 415. Which of the following is known as bone forming enzyme?**  
 (A) Alkaline phosphatase  
 (B) Acid phosphatase  
 (C) Leucine aminopeptidase  
 (D)  $\gamma$ -glutamyl transpeptidase
- 416. Conversion of pepsinogen to pepsin is**  
 (A) Intra molecular rearrangement  
 (B) Breaking of hydrogen bonds  
 (C) Covalent modification  
 (D) Polymerisation
- 417. Which of the following is not having an apoenzyme and coenzyme?**  
 (A) Lactate dehydrogenase  
 (B) Succinate dehydrogenase  
 (C) Malate dehydrogenase  
 (D) Pepsin
- 418. Pyruvate dehydrogenase is a/an**  
 (A) Isomerase (B) Lyase  
 (C) Ligase (D) Oxido reductase
- 419. Homogentisic oxidase is an**  
 (A) Oxidase  
 (B) Monooxygenase  
 (C) Dioxygenase  
 (D) Anaerobic dehydrogenase
- 420. Isocitrate dehydrogenase can use \_\_\_\_\_ as a cofactor.**  
 (A) NAD<sup>+</sup> only (B) NADP<sup>+</sup> only  
 (C) NAD<sup>+</sup> or NADP<sup>+</sup> (D) FMN and FAD
- 421. The rate of most enzyme catalysed reactions changes with pH. As the pH increases, this rate**  
 (A) reaches a minimum, then increases  
 (B) reaches a maximum, then decreases  
 (C) increases  
 (D) decreases
- 422. A substrate for the enzyme aldolase is**  
 (A) galactose-6-phosphate  
 (B) isocitric acid  
 (C) Glucose-1-phosphate  
 (D) Fructose 1, 6 diphosphate
- 423. Decarboxylation of  $\alpha$ -keto acids requires**  
 (A) Thiamine pyrophosphate, FAD, NAD<sup>+</sup>  
 (B) Flavin mononucleotide  
 (C) NADP<sup>+</sup>  
 (D) NAD<sup>+</sup> only
- 424. Coenzyme A contains the vitamin:**  
 (A) Riboflavin (B) Pantothenic acid  
 (C) Pyridoxine (D) Thiamine
- 425. Which of the following is not a component of coenzyme A?**  
 (A) Adenylic acid  
 (B) Pantothenic acid  
 (C)  $\beta$ -mercaptoethylamine  
 (D) Deoxyadenylic acid
- 426. Malic enzyme converts malic acid, in the presence of NADP<sup>+</sup> to Pyruvic acid. This reaction is a/an**  
 (A) Decarboxylation  
 (B) Decarboxylation and Dehydrogenation  
 (C) Dehydrogenation  
 (D) Oxidation
- 427. The following reaction is characteristic of what type of enzymes?**  
 $2\text{H}_2\text{O}_2 \rightarrow 2\text{H}_2\text{O} + \text{O}_2$   
 (A) Peroxides  
 (B) Catalase  
 (C) Dehydrogenase  
 (D) Copper containing oxidases
- 428. Of Which warburg's yellow enzyme contains as a prosthetic group?**  
 (A) Thiamine pyrophosphate  
 (B) Biotin  
 (C) NAD<sup>+</sup>  
 (D) Riboflavin-5-phosphate
- 429. Dehydrogenases utilize, as coenzymes, all of the following except**  
 (A) NAD<sup>+</sup> (B) NADP<sup>+</sup>  
 (C) FAD (D) FH<sub>4</sub>

- 430. Urea is produced physiologically by the action of the enzyme:**  
 (A) Urease (B) Glutaminase  
 (C) Arginase (D) None of these
- 431. Urease is a**  
 (A) Lyase (B) Ligase  
 (C) Isomerase (D) Hydrolase
- 432. Velocity maximum for an enzyme at half the substrate concentration gives**  
 (A) The molecular weight of the enzyme  
 (B) Km value  
 (C) Isoelectric pH  
 (D) Pk value
- 433. Which of the following amino acid has been shown as one of the active site of phosphoglucomutase?**  
 (A) Lysine (B) Tyrosine  
 (C) Serine (D) Histidine
- 434. The inhibition of succinate dehydrogenase by malonate by**  
 (A) Competitive inhibition  
 (B) Non-competitive inhibition  
 (C) Uncompetitive inhibition  
 (D) Feedback inhibition
- 435. Cobamide coenzymes are**  
 (A) Vitamin B<sub>1</sub> (B) Riboflavin  
 (C) Pyridoxine (D) Vitamin B<sub>12</sub>
- 436. The isozyme CK-MB is specifically increased in the blood of patients who had**  
 (A) Skeletal muscle disease  
 (B) Recent myocardial infarction  
 (C) Infective hepatitis  
 (D) Myxoedema
- 437. FAD containing enzyme, catalyzing formation of  $\alpha$ ,  $\beta$  unsaturated fatty acyl CoA derivative.**  
 (A) Acyl CoA dehydrogenase  
 (B) Enoyl hydratase  
 (C)  $\beta$ -OH acyl CoA dehydrogenase  
 (D) Thiolase
- 438. Immobilized enzymes:**  
 (A) Potentiation of activity  
 (B) Presentation of activity  
 (C) Preparation of activity  
 (D) All of these
- 439. This catalyzes formation of CoA derivatives from fatty acid, CoA and ATP:**  
 (A) Acyl CoA dehydrogenase  
 (B) Enoyl hydratase  
 (C)  $\beta$ -OH acyl CoA dehydrogenase  
 (D) Thio kinase
- 440. Fructose 2, 3 bi phosphate is a powerful allosteric activator of**  
 (A) Fructose 1, 6 diphosphatase  
 (B) Phosphofructokinase  
 (C) Hexokinase  
 (D) Fructokinase
- 441. 'Clearing factor' is**  
 (A) Lipoprotein lipase  
 (B) Crotonase  
 (C) 7-dehydro cholesterol  
 (D)  $\beta$ -sitosterol
- 442. Maltase attacks only**  
 (A)  $\alpha$ -glucosides (B)  $\beta$ -glucosides  
 (C) Starch (D) Dextrins
- 443. Pepsin is**  
 (A) Exo-peptidase (B) Endo-peptidase  
 (C) Carboxy peptidase (D) Amino peptidase
- 444. An enzyme in saliva which hydrolyzes starch is**  
 (A) Pepsinogen (B) Chymotrysin  
 (C)  $\alpha$ -Amylase (D) Malate
- 445. If a coenzyme is required in an enzyme reaction, the former usually has the function of**  
 (A) Acting as an acceptor for one of the cleavage products of the substrate  
 (B) Enhancing the specificity of the apo enzyme  
 (C) Increasing the number of receptor sites of the apo enzyme  
 (D) Activating the substrate

**446. The Michaelis-Menten hypothesis:**

- (A) Postulates the formation of an enzyme substrate complex
- (B) Enables us to calculate the isoelectric point of an enzyme
- (C) States that the rate of a chemical reaction may be independent of substrate concentration
- (D) States that the reaction rate is proportional to substrate concentration

**447. Schardinger's enzyme is**

- (A) Lactate dehydrogenase
- (B) Xanthine dehydrogenase
- (C) Uric oxidase
- (D) L amino acid dehydrogenase

**448. Tryptophan pyrolyase is currently known as**

- (A) Tryptophan deaminase
- (B) Tryptophan dioxygenase
- (C) Tryptophan mono oxygenase
- (D) Tryptophan decarboxylase

**449. An enzyme which brings about lysis of bacterial cell wall is**

- (A) Amylase
- (B) Lysozyme
- (C) Trypsin
- (D) Lipase

**450. Trypsin has no action on**

- (A) Hemoglobin
- (B) Albumin
- (C) Histone
- (D) DNA

**451. Multiple forms of the same enzymes are known as**

- (A) Zymogens
- (B) Isoenzymes
- (C) Proenzymes
- (D) Pre-enzymes

**452. In non-competitive enzyme action**

- (A)  $V_{max}$  is increased
- (B) Apparent  $k_m$  is increased
- (C) Apparent  $k_m$  is decreased
- (D) Concentration of active enzyme molecule is reduced

**453. An allosteric enzyme influences the enzyme activity by**

- (A) Competing for the catalytic site with the substrate

- (B) Changing the specificity of the enzyme for the substrate
- (C) Changing the conformation of the enzyme by binding to a site other than catalytic site
- (D) Changing the nature of the products formed

**454. Which of the following regulatory reactions involves a reversible covalent modification of an enzyme?**

- (A) Phosphorylation of serine OH on the enzyme
- (B) Allosteric modulation
- (C) Competitive inhibition
- (D) Non-competitive inhibition

**455. A competitive inhibitor of an enzyme has which of the following properties?**

- (A) It is frequently a feedback inhibitor
- (B) It becomes covalently attached to an enzyme
- (C) It decreases the  $V_{max}$
- (D) It interferes with substrate binding to the enzyme

**456. When  $[s]$  is equal to  $K_m$ , which of the following conditions exist?**

- (A) Half the enzyme molecules are bound to substrate
- (B) The velocity of the reaction is equal to  $V_{max}$
- (C) The velocity of the reaction is independent of substrate concentration
- (D) Enzyme is completely saturated with substrate

**457. Which of the following statements about an enzyme exhibiting allosteric kinetics with cooperative interaction is false?**

- (A) A plot of  $V-V_k [s]$  has a sigmoidal shape
- (B) An inhibitor may increase the apparent  $K_m$
- (C) Line weaver Brnk plot is useful for determining  $K_m$  and  $V_{max}$
- (D) Removal of allosteric inhibitor may result in hyperbolic V-S  $[s]$  plot

**458. Pantothenic acid acts on**

- (A) NADP
- (B) NADPH
- (C) FAD
- (D) CoA

**459. Vitamin deficiency that causes fatty liver includes all except**

- (A) Vitamin E
- (B) Pyridoxine
- (C) Retionic acid
- (D) Pantothenic acid

- 460. In which of the following types of enzymes an inducer is not required?**  
 (A) Inhibited enzyme (B) Cooperative enzyme  
 (C) Allosteric enzyme (D) Constitutive enzyme
- 461. In which of the following types of enzyme water may be added to a C—C double bond without breaking the bond?**  
 (A) Hydrolase (B) Hydratase  
 (C) Hydroxylase (D) Esterase
- 462. 'Lock' and 'Key' model of enzyme action proposed by Fisher implies that**  
 (A) The active site is flexible and adjusts to substrate  
 (B) The active site requires removal of  $\text{PO}_4$  group  
 (C) The active site is complementary in shape to that of the substrate  
 (D) Substrates change conformation prior to active site interaction
- 463. In competitive inhibition of enzyme action**  
 (A) The apparent  $K_m$  is decreased  
 (B) The apparent  $K_m$  is increased  
 (C)  $V_{\max}$  is decreased  
 (D) Apparent concentration of enzyme molecules decreased
- 464. In competitive inhibition which of the following kinetic effect is true ?**  
 (A) Decreases both  $K_m$  and  $V_{\max}$   
 (B) Increases both  $K_m$  and  $V_{\max}$   
 (C) Decreases  $K_m$  without affecting  $V_{\max}$   
 (D) Increases  $K_m$  without affecting  $V_{\max}$
- 465. Enzymes increase the rates of reactions by**  
 (A) Increasing the free energy of activation  
 (B) Decreasing the energy of activation  
 (C) Changing the equilibrium constant of the reaction  
 (D) Increasing the free energy change of the reaction
- 466. The most useful test for the diagnosis of acute hemorrhagic pancreatitis during the first few days is**  
 (A) Urinary lipase test (B) Serum calcium  
 (C) Urinary amylase (D) Serum amylase
- 467. The best test for acute pancreatitis in the presence of mumps is**  
 (A) A serological test for mumps  
 (B) Serum amylase  
 (C) Urinary amylase  
 (D) Serum lipase
- 468. The slow moving fraction of LDH is typically increased in pancreas with**  
 (A) Cerebrovascular accidents  
 (B) Acute myocardial infarction  
 (C) Acute pancreatitis  
 (D) Acute viral hepatitis
- 469. Which of the following enzyme typically elevated in alcoholism?**  
 (A) Serum ALP  
 (B) Serum GOT  
 (C) Serum  $\gamma$ -GT  
 (D) Serum acid phosphatase
- 470. Patients with hepatocellular jaundice, as compared to those with purely obstructive jaundice tend to have**  
 (A) Lower serum ALP, LDH and AST activity  
 (B) Lower serum ALP, Higher LDH and AST activity  
 (C) Higher serum ALP, LDH and AST activity  
 (D) Higher serum ALP, Lower LDH and AST activity
- 471. If results of the serum bilirubin, serum ALP, LDH and AST determinations suggest obstructive jaundice, the best confirmatory test would be the estimation of**  
 (A) Serum ALT  
 (B) Serum 5' nucleotidase  
 (C) Serum Pseudo cholinesterase  
 (D) None of these
- 472. Which enzyme estimation will be helpful in differentiating the elevated serum ALP found in obstructive jaundice as well as bone disorders?**  
 (A) Serum AST (B) Serum ALT  
 (C) Serum LDH (D) Serum  $\gamma$ -GT
- 473. Cardiac muscle contains which of the following CK isoenzyme?**  
 (A) BB only (B) MM and BB only  
 (C) MM, BB and MB (D) MM and MB only

- 474. Liver and skeletal muscle disorders are characterized by an increase in which of the LDH isoenzyme fraction?**  
(A) LDH-1 (B) LDH-1 and LDH-2  
(C) LDH-3 and LDH-4 (D) LDH-2 and LDH-3  
(E) LDH-5
- 475. On the third day following onset of acute myocardial infarction, which enzyme estimation will have the best predictive value?**  
(A) Serum AST (B) Serum CK  
(C) Serum ALT (D) Serum LDH
- 476. Serum AST activity is not characteristically elevated as the result of**  
(A) Myocardial infarction  
(B) Passive congestion of liver  
(C) Muscular dystrophies  
(D) Peptic ulcer
- 477. On which day following acute myocardial infarction the estimation of serum AST will be of greatest significance?**  
(A) First day (B) Second day  
(C) Third day (D) Fourth day
- 478. In which diseases of the following organs, isoenzymes LDH-1 and LDH-2 will be released in plasma?**  
(A) Kidney, R.B.C and Liver  
(B) Heart, Kidney and R.B.C  
(C) Heart, Kidney and Liver  
(D) Heart, Lungs and Brain
- 479. Plasma non-functional enzymes are**  
(A) totally absent  
(B) low concentration in plasma  
(C) important for diagnosis of several disease  
(D) All of these
- 480. Pyruvate dehydrogenase contains all except**  
(A) Biotin (B) NAD  
(C) FAD (D) CoA
- 481. An increase in LDH-5 enzyme is seen in the following except**  
(A) Acute hepatitis (B) Muscular dystrophies  
(C) Breast carcinoma (D) Pulmonary embolism
- 482. Diastase can be used for the hydrolysis of**  
(A) Sucrose (B) Starch  
(C) Cellulose (D) Maltose
- 483. Which of the following statements is true?**  
(A) Enzymes have names ending ase  
(B) Enzymes are highly specific in their action  
(C) Enzymes are living organisms  
(D) Enzymes get activated on heating
- 484. Enzymes activity is controlled by**  
(A) pH of the solution  
(B) Temperature  
(C) Concentration of the enzyme  
(D) Concentration of the substrate  
(E) All of these
- 485. Which of the following is not true regarding enzymes?**  
(A) They catalyze only a particular type of reaction  
(B) They remain active even after separation from the source  
(C) They are destroyed after the completion of the reaction they catalyse  
(D) They are irreversibly destroyed at high temperature  
(E) Their activity depends on the pH of the solution
- 486. The number of enzymes known is about**  
(A) 10,000 (B) 100  
(C) 50 (D) 26
- 487. Nicotine present in tobacco is a/an**  
(A) Alkaloid (B) Terpene  
(C) Steroid (D) Protein
- 488. The poisonous alkaloid present in the oil of hemlock is**  
(A) Cocaine (B) Nicotine  
(C) Quinine (D) Morphine
- 489. Alkaloids are usually purified by extraction with**  
(A) Ether (B) Dil HCl  
(C) NaOH (D) Chloroform

- 490. The number of N-MC groups in alkaloids is best estimate with the help of**  
 (A) HI (B) H<sub>2</sub>SO<sub>4</sub>  
 (C) (CH<sub>3</sub>CO)<sub>2</sub>CO (D) CH<sub>3</sub> Mg I
- 491. A competitive inhibitor of an enzyme**  
 (A) Increases K<sub>m</sub> without affecting V<sub>max</sub>  
 (B) Decreases K<sub>m</sub> without affecting V<sub>max</sub>  
 (C) Increases V<sub>max</sub> without affecting K<sub>m</sub>  
 (D) Decreases both V<sub>max</sub> and K<sub>m</sub>
- 492. The Michaelis constant, K<sub>m</sub> is**  
 (A) Numerically equal to ½ V<sub>max</sub>  
 (B) Dependent on the enzyme concentration  
 (C) Independent of pH  
 (D) Numerically equal to the substrate concentration that gives half maximal velocity
- 493. The rate of an enzyme catalyzed reaction was measured using several substrate concentrations that were much lower than K<sub>m</sub>, the dependence of reaction velocity on substrate concentration can best be described as**  
 (A) Independent of enzyme concentration  
 (B) A constant fraction of V<sub>max</sub>  
 (C) Equal to K<sub>m</sub>  
 (D) Proportional to the substrate concentration
- 494. The presence of a non competitive inhibitor**  
 (A) Leads to both an increase in the V<sub>max</sub> of a reaction and an increase in K<sub>m</sub>  
 (B) Leads to a decrease in the observed V<sub>max</sub>  
 (C) Leads to a decrease in K<sub>m</sub> and V<sub>max</sub>  
 (D) Leads to an increase in K<sub>m</sub> without affecting V<sub>max</sub>
- 495. Which one of the following statements is not characteristic of allosteric enzymes?**  
 (A) They frequently catalyze a committed step early in a metabolic pathway  
 (B) They are often composed of subunits  
 (C) They follow Michaelis-Menten kinetics  
 (D) They frequently show cooperativity for substrate binding
- 496. The abnormal isoenzyme need not**  
 (A) Be an oxidoreductase  
 (B) Have any coenzyme  
 (C) Require ATP  
 (D) Be localized intracellularly  
 (E) Be a catalyst
- 497. LDH assays are most useful in diagnosing diseases of the**  
 (A) Heart (B) Pancreas  
 (C) Brain (D) Kidney
- 498. The chemical forces that bind most coenzymes and substrates to enzymes such as LDH are**  
 (A) Hydrogen bonds (B) Peptide bonds  
 (C) Coordinate bonds (D) Covalent bonds
- 499. How many different proteins may be present in normal LDH?**  
 (A) One (B) Two  
 (C) Three (D) Four
- 500. All the isoenzymes function with the coenzyme:**  
 (A) NADP<sup>+</sup> (B) FAD  
 (C) Lipoate (D) NAD<sup>+</sup>
- 501. 'Lock' and 'Key' theory was proposed by**  
 (A) Sorenson (B) Fischer  
 (C) Mehler (D) Sanger
- 502. Which of the following forms part of a coenzyme?**  
 (A) Zn<sup>2+</sup> (B) Lipase  
 (C) Vitamin B<sub>2</sub> (D) Lysine
- 503. The shape of an enzyme and consequently its activity can be reversibly altered from moment to moment by**  
 (A) Heat (B) Amino acid substrate  
 (C) Allosteric subunits (D) Sulfur substitutions
- 504. Which one of the following regulatory actions involves a reversible covalent modification of the enzyme?**  
 (A) Phosphorylation of ser-OH on the enzyme  
 (B) Allosteric modulation  
 (C) Competitive inhibition  
 (D) Non-competitive inhibition
- 505. An enzyme is a**  
 (A) Carbohydrate (B) Lipid  
 (C) Protein (D) Nucleic acid

- 506. An enzyme promotes a chemical reaction by**
- (A) Lowering the energy of activation
  - (B) Causing the release of heat which acts as a primer
  - (C) Increasing molecular motion
  - (D) Changing the free energy difference between substrate and product
- 507. In most metabolic pathways, all needed enzymes are arranged together in a multienzyme complex within a**
- (A) Solution of ATP
  - (B) Membrane
  - (C) Quaternary protein
  - (D) Coenzyme
- 508. An enzyme catalyzes the conversion of an aldose sugar to a ketose sugar would be classified as one of the**
- (A) Transferases
  - (B) Isomerases
  - (C) Oxidoreductases
  - (D) Hydrolases
- 509. The function of an enzyme is to**
- (A) Cause chemical reactions that would not otherwise take place
  - (B) Change the rates of chemical reactions
  - (C) Control the equilibrium points of reactions
  - (D) Change the directions of reactions
- 510. In which of the following types of enzymes, water may be added to a C—C double bond without breaking the bond?**
- (A) Hydrolase
  - (B) Hydratase
  - (C) Hydroxylase
  - (D) Oxygenase
- 511. Enzymes increase the rate of reactions by**
- (A) Increasing the free energy of activation
  - (B) Decreasing the energy of activation
  - (C) Changing the equilibrium constant of the reaction
  - (D) Increasing the free energy change of the reaction
- 512. The active site of an enzyme is formed by a few of the enzymes:**
- (A) R groups of the amino acids
  - (B) Amino groups of the amino acids
  - (C) Carboxyl group of the amino acids
  - (D) Exposed sulfur bonds
- 513. Allosteric enzymes contain**
- (A) Multiple subunits
  - (B) Single chain
  - (C) Two chains
  - (D) Three chains
- 514. Isoenzymes of lactate dehydrogenase are useful for the diagnosis of**
- (A) Heart disease
  - (B) Kidney disease
  - (C) Liver disease
  - (D) Both (A) and (C)
- 515. IUB has divided enzymes into how many classes?**
- (A) 6
  - (B) 5
  - (C) 8
  - (D) 4
- 516. The first enzyme isolated, purified and crystallized from Jack bean (*Canavalia*) by Sumner in 1926 was**
- (A) Urease
  - (B) Insulin
  - (C) Ribonuclease
  - (D) Zymase
- 517. Who suggested that enzymes are proteinaceous?**
- (A) Buchner
  - (B) Kuhne
  - (C) Sumner
  - (D) Pasteur
- 518. Feedback inhibition of enzyme action is affected by**
- (A) Enzyme
  - (B) Substrate
  - (C) End products
  - (D) None of these
- 519. The enzyme that converts glucose to glucose-6-phosphate is**
- (A) Phosphatase
  - (B) Hexokinase
  - (C) Phosphorylase
  - (D) Glucose synthetase
- 520. Enzymes are required in traces because they**
- (A) Have high turnover number
  - (B) Remain unused at the end of reaction and are re used
  - (C) Show cascade effect
  - (D) All correct
- 521. An organic substance bound to an enzyme and essential for the activity of enzyme is called**
- (A) Holoenzyme
  - (B) Apoenzyme
  - (C) Coenzyme
  - (D) Isoenzyme

**522. Enzyme catalysed reactions occur in**

- (A) Pico seconds      (B) Micro seconds  
(C) Milli seconds      (D) None of these

**523. An enzyme can accelerate a reaction up to**

- (A)  $10^{10}$  times      (B)  $10^1$  times  
(C)  $10^{100}$  times      (D) 10 times

**524. In plants, enzymes occur in**

- (A) Flowers only      (B) Leaves only  
(C) All living cells      (D) Storage organs only

**525. Zymogen is a**

- (A) Vitamin      (B) Enzyme precursor  
(C) Modulator      (D) Hormone

**526. Cofactor (Prosthetic group) is a part of holoenzyme, it is**

- (A) Inorganic part loosely attached  
(B) Accessory non-protein substance attached firmly  
(C) Organic part attached loosely  
(D) None of these

**527. A protein having both structural and enzymatic traits is**

- (A) Myosin      (B) Collagen  
(C) Trypsin      (D) Actin

**528. Enzymes are different from catalysts in**

- (A) Being proteinaceous  
(B) Not used up in reaction  
(C) Functional at high temperature  
(D) Having high rate of diffusion

**529. Enzymes, vitamins and hormones are common in**

- (A) Being proteinaceous  
(B) Being synthesized in the body of organisms  
(C) Enhancing oxidative metabolism  
(D) Regulating metabolism

**530. Dry seeds endure higher temperature than germinating seeds as**

- (A) Hydration is essential for making enzymes sensitive to temperature  
(B) Dry seeds have a hard covering

- (C) Dry seeds have more reserve food  
(D) Seedlings are tender

**531. Coenzymes FMN and FAD are derived from vitamin**

- (A) C      (B)  $B_6$   
(C)  $B_1$       (D)  $B_2$

**532. Template/lock and key theory of enzyme action is supported by**

- (A) Enzymes speed up reaction  
(B) Enzymes occur in living beings and speed up certain reactions  
(C) Enzymes determine the direction of reaction  
(D) Compounds similar to substrate inhibit enzyme activity

**533. Combination of apoenzyme and coenzyme produces**

- (A) Prosthetic group  
(B) Holoenzyme  
(C) Enzyme substrate complex  
(D) Enzyme product complex

**534. Enzyme inhibition caused by a substance resembling substrate molecule is**

- (A) Competitive inhibition  
(B) Non-competitive inhibition  
(C) Feedback inhibition  
(D) Allosteric inhibition

**535. An enzyme brings about**

- (A) Decrease in reaction time  
(B) Increase in reaction time  
(C) Increase in activation energy  
(D) Reduction in activation energy

**536. Feedback inhibition of enzyme is influenced by**

- (A) Enzyme      (B) External factors  
(C) End product      (D) Substrate

**537. Coenzyme is**

- (A) Often a vitamin      (B) Always an inorganic compound  
(C) Always a protein      (D) Often a metal

- 538. Genetic engineering requires enzyme:**  
(A) DNA ase  
(B) Amylase  
(C) Lipase  
(D) Restriction endonuclease
- 539. Which is not true about inorganic catalysts and enzymes?**  
(A) They are specific  
(B) Inorganic catalysts require specific not needed by enzymes  
(C) They are sensitive to pH  
(D) They speed up the rate of chemical reaction
- 540. Key and lock hypothesis of enzyme action was given by**  
(A) Fischer (B) Koshland  
(C) Buchner (D) Kuhne
- 541. An example of feedback inhibition is**  
(A) Allosteric inhibition of hexokinase by glucose- $\delta$ -phosphate  
(B) Cyanide action on cytochrome  
(C) Sulpha drug on folic acid synthesizer bacteria  
(D) Reaction between succinic dehydrogenase and succinic acid
- 542. Feedback term refers to**  
(A) Effect of substrate on rate of enzymatic reaction  
(B) Effect of end product on rate reaction  
(C) Effect of enzyme concentration on rate of reaction  
(D) Effect of external compound on rate of reaction
- 543. Allosteric inhibition**  
(A) Makes active site unfit for substrate  
(B) Controls excess formation and end product  
(C) Both (A) and (B)  
(D) None of these
- 544. The ratio of enzyme to substrate molecules can be as low as**  
(A) 1 : 100,000 (B) 1 : 500,000  
(C) 1 : 10,000 (D) 1 : 1,000
- 545. Vitamin B<sub>2</sub> is component of coenzyme:**  
(A) Pyridoxal phosphate  
(B) TPP  
(C) NAD  
(D) FMN/FAD
- 546. K<sub>m</sub> value of enzyme is substrate concentration at**  
(A)  $\frac{1}{2} V_{\max}$  (B)  $2 V_{\max}$   
(C)  $\frac{1}{2} V_{\max}$  (D)  $4 V_{\max}$
- 547. Part of enzyme which combines with non-protein part to form functional enzyme is**  
(A) Apoenzyme (B) Coenzyme  
(C) Prosthetic group (D) None of these
- 548. Who got Nobel Prize in 1978 for working on enzymes?**  
(A) Koshland (B) Arber and Nathans  
(C) Nass and Nass (D) H.G. Khorana
- 549. Site of enzyme synthesis in a cell is**  
(A) Ribosomes (B) RER  
(C) Golgi bodies (D) All of these
- 550. The fruit when kept is open, tastes bitter after 2 hours because of**  
(A) Loss of water from juice  
(B) Decreased concentration of fructose in juice  
(C) Fermentation by yeast  
(D) Contamination by bacterial enzymes
- 551. Hexokinase (Glucose + ATP  $\rightarrow$  Glucose-6-P + ADP) belongs to the category:**  
(A) Transferases (B) Lysases  
(C) Oxidoreductases (D) Isomerases
- 552. Which enzyme is concerned with transfer of electrons?**  
(A) Desmolase (B) Hydrolase  
(C) Dehydrogenase (D) Transaminase
- 553. The best example of extracellular enzymes (exoenzyme) is**  
(A) Nucleases  
(B) Digestive enzymes  
(C) Succinic dehydrogenase  
(D) None of these

- 554. Which mineral element controls the activity of Nitrate reductase ?**  
 (A) Fe (B) Mo  
 (C) Zn (D) Ca
- 555. Name the enzyme that acts both as carboxylase at one time and oxygenase at another time.**  
 (A) PEP carboxylase  
 (B) RuBP carboxylase  
 (C) Carbonic anhydrase  
 (D) None of these
- 556. A metabolic pathway is a**  
 (A) Route taken by chemicals  
 (B) Sequence of enzyme facilitated chemical reactions  
 (C) Route taken by an enzyme from one reaction to another  
 (D) Sequence of origin of organic molecules
- 557. The energy required to start an enzymatic reaction is called**  
 (A) Chemical energy (B) Metabolic energy  
 (C) Activation energy (D) Potential energy
- 558. Out of the total enzymes present in a cell, a mitochondrion alone has**  
 (A) 4% (B) 70%  
 (C) 95% (D) 50%
- 559. Creatine phosphokinase isoenzyme is a marker for**  
 (A) Kidney disease  
 (B) Liver disease  
 (C) Myocardial infarction  
 (D) None of these
- 560. Which inactivates an enzyme by occupying its active site?**  
 (A) Competitive inhibitor  
 (B) Allosteric inhibitor  
 (C) Non-competitive inhibitor  
 (D) All of these
- 561. Which one is coenzyme?**  
 (A) ATP (B) Vitamin B and C  
 (C) CoQ and CoA (D) All of these
- 562. The active site of an enzyme is formed by**  
 (A) R group of amino acids  
 (B) NH<sub>2</sub> group of amino acids  
 (C) CO group of amino acids  
 (D) Sulphur bonds which are exposed
- 563. Carbonic anhydrase enzyme has maximum turn over number (36 million). Minimum turn over number for an enzyme:**  
 (A) DNA polymerase  
 (B) Lysozyme  
 (C) Penicillase  
 (D) Lactase dehydrogenase
- 564. In cell, digestive enzymes are found mainly in**  
 (A) Vacuoles (B) Lysosomes  
 (C) Ribosomes (D) Lomasomes
- 565. Substrate concentration at which an enzyme attains half its maximum velocity is**  
 (A) Threshold value  
 (B) Michaelis-Menton constant  
 (C) Concentration level  
 (D) None of these
- 566. Which enzyme hydrolyses starch?**  
 (A) Invertase (B) Maltase  
 (C) Sucrase (D) Diastase
- 567. Enzymes functional in cell or mitochondria are**  
 (A) Endoenzymes (B) Exoenzymes  
 (C) Apoenzymes (D) Holoenzymes
- 568. The enzymes present in the membrane of mitochondria are**  
 (A) Flavoproteins and cytochromes  
 (B) Fumarase and lipase  
 (C) Enolase and catalase  
 (D) Hexokinase and zymase
- 569. A mitochondrial marker enzyme is**  
 (A) Aldolase  
 (B) Amylase  
 (C) Succinic dehydrogenase  
 (D) Pyruvate dehydrogenase

- 570. The enzyme used in polymerase chain reaction (PCR) is**  
(A) Taq polymerase (B) RNA polymerase  
(C) Ribonuclease (D) Endonuclease
- 571. Which of the following is a microsomal enzyme inducer?**  
(A) Indomethacin (B) Clofibrate  
(C) Tolbutamide (D) Glutethamide
- 572. Identify the correct molecule which controls the biosynthesis of proteins in living organisms.**  
(A) DNA (B) RNA  
(C) Purines (D) Pyrimidines
- 573. The tear secretion contains an antibacterial enzyme known as**  
(A) Zymase (B) Diastase  
(C) Lysozyme (D) Lipase
- 574. Identify one of the carbonic anhydrase inhibitor that inhibit only luminal carbonic anhydrase enzyme.**  
(A) Methazolamide (B) Acetazolamide  
(C) Dichlorphenamide (D) Benzolamide
- 575. Group transferring Co-enzyme is**  
(A) CoA (B) NAD<sup>+</sup>  
(C) NADP<sup>+</sup> (D) FAD<sup>+</sup>
- 576. The co-enzyme containing an automatic hetero ring in the structure is**  
(A) Biotin (B) TPP  
(C) Sugar Phosphate (D) Co-enzyme
- 577. The example of hydrogen transferring Co-enzyme is:**  
(A) B<sub>5</sub>-PO<sub>4</sub> (B) NADP<sup>+</sup>  
(C) TPP (D) ATP
- 578. Enzyme catalyzed hydrolysis of proteins produces amino acid of the form**  
(A) D (B) DL  
(C) L (D) Racemic
- 579. Transaminase activity needs the Co-enzyme:**  
(A) ATP (B) B<sub>6</sub>-PO<sub>4</sub>  
(C) FADT (D) NAD<sup>+</sup>
- 580. The biosynthesis of urea occurs mainly in the liver:**  
(A) Cytosol (B) Mitochondria  
(C) Microsomes (D) Nuclei
- 581. Bile salts make emulsification with fat for the action of**  
(A) Amylose (B) Lipase  
(C) Pepsin (D) Trypsin
- 582. All of the following compounds are intermediates of TCA cycle except**  
(A) Maleate (B) Pyruvate  
(C) Oxaloacetate (D) Fumarate
- 583. In conversion of lactic acid to glucose, three reactions of glycolytic pathway are circumvented, which of the following enzymes do not participate?**  
(A) Pyruvate carboxylase  
(B) Phosphoenol pyruvate carboxy kinase  
(C) Pyruvate kinase  
(D) Glucose-6-phosphatase
- 584. In the normal resting state of human most of the blood glucose burnt as fuel is consumed by**  
(A) Liver (B) Brain  
(C) Adipose tissue (D) Muscles
- 585. A regulator of the enzyme glucogen synthase is**  
(A) Citric Acid (B) Pyruvate  
(C) Glucose-6-PO<sub>4</sub> (D) GTP
- 586. A specific inhibitor for succinate dehydrogenase is**  
(A) Arsenite (B) Malonate  
(C) Citrate (D) Fluoride

**ANSWERS**

1. A	2. B	3. A	4. D	5. C	6. D
7. C	8. A	9. B	10. D	11. C	12. D
13. A	14. B	15. D	16. A	17. B	18. C
19. B	20. D	21. A	22. A	23. B	24. B
25. D	26. B	27. A	28. A	29. A	30. B
31. C	32. A	33. B	34. C	35. A	36. B
37. A	38. B	39. D	40. C	41. D	42. A
43. A	44. B	45. C	46. A	47. D	48. B
49. C	50. B	51. B	52. A	53. A	54. C
55. C	56. D	57. C	58. C	59. A	60. B
61. A	62. C	63. A	64. D	65. A	66. D
67. A	68. C	69. B	70. B	71. A	72. B
73. A	74. B	75. A	76. B	77. C	78. C
79. A	80. A	81. C	82. C	83. B	84. D
85. B	86. B	87. D	88. D	89. D	90. A
91. A	92. A	93. A	94. B	95. A	96. B
97. A	98. A	99. A	100. A	101. A	102. B
103. A	104. C	105. A	106. D	107. B	108. A
109. D	110. C	111. B	112. B	113. D	114. A
115. B	116. A	117. B	118. C	119. B	120. C
121. A	122. C	123. C	124. D	125. A	126. A
127. B	128. B	129. B	130. B	131. C	132. A
133. D	134. A	135. B	136. B	137. A	138. B
139. B	140. C	141. D	142. B	143. A	144. B
145. B	146. A	147. A	148. C	149. A	150. A
151. B	152. B	153. D	154. A	155. A	156. D
157. A	158. A	159. A	160. A	161. A	162. A
163. B	164. A	165. A	166. B	167. B	168. C
169. A	170. D	171. D	172. A	173. C	174. B
175. B	176. A	177. C	178. A	179. D	180. B
181. D	182. B	183. D	184. C	185. C	186. A
187. D	188. C	189. A	190. A	191. C	192. C
193. A	194. C	195. A	196. A	197. B	198. B
199. B	200. A	201. D	202. C	203. D	204. D
205. B	206. A	207. D	208. A	209. A	210. D
211. A	212. A	213. D	214. D	215. A	216. A
217. A	218. A	219. D	220. D	221. C	222. C
223. B	224. D	225. A	226. A	227. B	228. B
229. D	230. A	231. B	232. D	233. A	234. A
235. D	236. B	237. A	238. C	239. B	240. C
241. B	242. A	243. B	244. A	245. A	246. A
247. A	248. A	249. A	250. C	251. B	252. C

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253. B	254. D	255. C	256. D	257. A	258. B
259. D	260. C	261. B	262. C	263. A	264. D
265. A	266. B	267. C	268. A	269. B	270. C
271. C	272. A	273. D	274. A	275. B	276. C
277. B	278. C	279. B	280. D	281. C	282. B
283. B	284. D	285. C	286. D	287. C	288. A
289. C	290. D	291. C	292. B	293. C	294. D
295. D	296. B	297. D	298. C	299. B	300. B
301. B	302. D	303. D	304. A	305. B	306. D
307. C	308. B	309. C	310. D	311. A	312. C
313. D	314. B	315. B	316. C	317. C	318. B
319. B	320. A	321. D	322. A	323. A	324. B
325. C	326. C	327. A	328. D	329. B	330. A
331. C	332. C	333. C	334. C	335. D	336. A
337. A	338. D	339. C	340. D	341. C	342. C
343. C	344. A	345. D	346. C	347. C	348. C
349. C	350. C	351. C	352. C	353. C	354. B
355. C	356. A	357. C	358. A	359. D	360. D
361. D	362. B	363. A	364. D	365. C	366. A
367. D	368. A	369. D	370. D	371. C	372. B
373. C	374. A	375. C	376. A	377. B	378. B
379. C	380. B	381. C	382. B	383. B	384. D
385. B	386. C	387. D	388. C	389. D	390. C
391. D	392. C	393. C	394. A	395. D	396. D
397. C	398. C	399. B	400. C	401. D	402. B
403. C	404. B	405. D	406. D	407. A	408. C
409. C	410. D	411. B	412. B	413. B	414. D
415. A	416. C	417. D	418. D	419. C	420. C
421. B	422. D	423. A	424. B	425. D	426. B
427. B	428. D	429. D	430. C	431. D	432. B
433. C	434. A	435. D	436. B	437. A	438. B
439. D	440. B	441. A	442. A	443. B	444. C
445. A	446. A	447. B	448. B	449. B	450. D
451. B	452. C	453. C	454. A	455. D	456. A
457. D	458. B	459. C	460. D	461. B	462. C
463. B	464. D	465. B	466. D	467. D	468. D
469. C	470. B	471. B	472. D	473. D	474. C
475. D	476. D	477. B	478. B	479. D	480. A
481. D	482. B	483. B	484. C	485. C	486. C
487. A	488. A	489. B	490. A	491. A	492. D
493. C	494. B	495. C	496. A	497. A	498. D
499. D	500. D	501. D	502. C	503. C	504. A
505. C	506. A	507. B	508. B	509. B	510. A

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511. B	512. C	513. A	514. D	515. A	516. A
517. C	518. C	519. B	520. D	521. C	522. C
523. A	524. C	525. B	526. B	527. A	528. A
529. D	530. A	531. D	532. D	533. B	534. A
535. D	536. C	537. A	538. D	539. B	540. A
541. A	542. B	543. C	544. A	545. D	546. D
547. C	548. A	549. B	550. D	551. C	552. A
553. C	554. A	555. B	556. B	557. C	558. B
559. C	560. A	561. D	562. A	563. B	564. B
565. B	566. D	567. A	568. A	569. C	570. D
571. D	572. A	573. C	574. B	575. A	576. C
577. D	578. C	579. B	580. B	581. B	582. B
583. B	584. B	585. C	586. B		

## EXPLANATIONS FOR THE ANSWERS

4. D The functional unit of an enzyme is referred to as a holoenzyme. It is often made up of an apoenzyme (the protein part) and a coenzyme (the non-protein part).
47. D Concentration of enzyme, concentration of substrate, temperature, pH, presence of products, activators and inhibitors are some of the important factors that influence enzyme activity.
89. D It is a straight line graphic representation depicting the relation between substrate concentration and enzyme velocity. This plot is commonly employed for the calculation of  $K_m$  values for enzymes.
133. D Active site is the small region of an enzyme where substrate binds. It is flexible in nature and it exists due to the tertiary structure of proteins. Acidic, basic and hydroxyl amino acids are frequently found at the active site.
179. D There are three broad categories of enzyme inhibition:
- (a) **Reversible inhibition:** The inhibitor binds non-covalently with the enzyme and the inhibition is reversible. Competitive, non-competitive and uncompetitive come under this category.
- (b) **Irreversible inhibition:** The inhibitor covalently binds with the enzyme which is irreversible.
- (c) **Allosteric inhibition:** Certain enzymes possessing allosteric sites are regulated by allosteric effectors.
219. D Enzymes are highly specific in their action compared with chemical catalysts. Three types of enzyme specificities are well-recognized.
- (a) **Stereospecificity:** The enzymes act only on one isomer and therefore exhibit stereoisomerism. e.g., L-amino acid oxidase on L-amino acids; hexokinase on D-hexose (Note: isomerases do not exhibit stereospecificity).
- (b) **Reaction specificity:** The same substrate can undergo different types of reactions, each catalysed by a separate enzyme e.g., amino acids undergoing transamination, decarboxylation etc.
- (c) **Substrate specificity:** This may be absolute, relative or broad e.g., urease, ligase, hexokinase.
260. D
- (a) **Lock and Key model** (Fischer's Template theory): The substrate fits to active site of an enzyme just as a key fits into a proper lock. Thus, the active site of the enzyme is rigid and pre-shaped where only a specific substrate can bind.
- (b) **Induced fit theory** (Koshland model): As per this, the substrate induces a conformational change in the enzyme resulting in the formation of substrate binding (active) site.
305. C Some enzymes are synthesized in an inactive form which are referred to as proenzymes (or zymogens). They undergo irreversible modification to produce active enzymes. e.g., proenzymes – chymotrypsinogen and pepsinogen are respectively converted to chymotrypsin and pepsin.
345. D The RNAs that can function as enzymes are referred to as ribozymes. They are thus non-protein enzymes. It is believed that RNAs were functioning as catalysts before the occurrence of proteins during evolution.
391. D **Streptokinase** is used for clearing blood clots. **Asparaginase** is employed in the treatment of leukemias.
438. B Certain enzymes can be made to bind to insoluble inorganic matrix (e.g., cyanogens bromide activated sepharose) to preserve their catalytic activity for long periods. Such enzymes are referred to as immobilized enzymes.
479. D These enzymes are either totally absent or present at a low concentration in plasma compared to their levels found in tissues. Estimation of plasma non-functional enzymes is important for the diagnosis and prognosis of several diseases.
514. D Lactate dehydrogenase (LDH) has five distinct isoenzymes ( $LDH_1$  ...  $LDH_5$ ). Each one is an oligomeric protein composed of 4 subunits (N and/ or H). Isoenzymes of LDH are important for the diagnosis of heart and liver related disorders i.e., serum  $LDH_1$  is elevated in myocardial infarction while  $LDH_5$  is increased in liver diseases.
559. C Creatine kinase (CK) or creatine phosphokinase (CPK) exists as 3 isoenzymes. Each isoenzyme is a dimer composed of two subunits (M or B or both). Elevation of CPK2 (MB) in serum is an early reliable diagnostic indication of myocardial infarction.

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## CHAPTER 7

# MINERAL METABOLISM

**1. When ATP forms AMP**

- (A) Inorganic pyrophosphate is produced
- (B) Inorganic phosphorous is produced
- (C) Phosphagen is produced
- (D) No energy is produced

**2. Standard free energy ( $\Delta G^\circ$ ) of hydrolysis of ATP to ADP + Pi is**

- (A)  $-49.3$  KJ/mol
- (B)  $-4.93$  KJ/mol
- (C)  $-30.5$  KJ/mol
- (D)  $-20.9$  KJ/mol

**3. Standard free energy ( $\Delta G^\circ$ ) of hydrolysis of ADP to AMP + Pi is**

- (A)  $-43.3$  KJ/mol
- (B)  $-30.5$  KJ/mol
- (C)  $-27.6$  KJ/mol
- (D)  $-15.9$  KJ/mol

**4. Standard free energy ( $\Delta G^\circ$ ) of hydrolysis of phosphoenolpyruvate is**

- (A)  $-61.9$  KJ/mol
- (B)  $-43.1$  KJ/mol
- (C)  $-14.2$  KJ/mol
- (D)  $-9.2$  KJ/mol

**5. Standard free energy ( $\Delta G^\circ$ ) of hydrolysis of creatine phosphate is**

- (A)  $-51.4$  KJ/mol
- (B)  $-43.1$  KJ/mol
- (C)  $-30.5$  KJ/mol
- (D)  $-15.9$  KJ/mol

**6. The oxidation-reduction system having the highest redox potential is**

- (A) Ubiquinone ox/red
- (B)  $\text{Fe}^{3+}$  cytochrome a/ $\text{Fe}^{2+}$
- (C)  $\text{Fe}^{3+}$  cytochrome b/ $\text{Fe}^{2+}$
- (D)  $\text{NAD}^+/\text{NADH}$

**7. If  $\Delta G^\circ = -2.3RT \log K_{eq}$ , the free energy for the reaction will be**

- A + B  $\rightleftharpoons$  C  
10moles 10moles 10moles
- (A)  $-4.6$  RT
  - (B)  $-2.3$  RT
  - (C)  $+2.3$  RT
  - (D)  $+4.6$  RT

**8. Redox potential ( $E_o$  volts) of  $\text{NAD}^+/\text{NADH}$  is**

- (A)  $-0.67$
- (B)  $-0.32$
- (C)  $-0.12$
- (D)  $+0.03$

**9. Redox potential ( $E_o$  volts) of ubiquinone, ox/red system is**

- (A)  $+0.03$
- (B)  $+0.08$
- (C)  $+0.10$
- (D)  $+0.29$

**10. Redox potential ( $E_o$  volts) of cytochrome C,  $\text{Fe}^{3+}/\text{Fe}^{2+}$  is**

- (A)  $-0.29$
- (B)  $-0.27$
- (C)  $-0.08$
- (D)  $+0.22$

**11. The prosthetic group of aerobic dehydrogenases is**

- (A) NAD
- (B) NADP
- (C) FAD
- (D) Pantothenic acid

**12. Alcohol dehydrogenase from liver contains**

- (A) Sodium
- (B) Copper
- (C) Zinc
- (D) Magnesium

**13. A molybdenum containing oxidase is**

- (A) Cytochrome oxidase  
 (B) Xanthine oxidase  
 (C) Glucose oxidase  
 (D) L-Amino acid oxidase

**14. A copper containing oxidase is**

- (A) Cytochrome oxidase  
 (B) Flavin mononucleotide  
 (C) Flavin adenine dinucleotide  
 (D) Xanthine oxidase

**15. The mitochondrial superoxide dismutase contains**

- (A) Mg<sup>++</sup> (B) Mn<sup>++</sup>  
 (C) Co<sup>++</sup> (D) Zn<sup>++</sup>

**16. Cytosolic superoxide dismutase contains**

- (A) Cu<sup>2+</sup> and Zn<sup>2+</sup> (B) Mn<sup>2+</sup>  
 (C) Mn<sup>2+</sup> and Zn<sup>2+</sup> (D) Cu<sup>2+</sup> and Fe<sup>2+</sup>

**17. Cytochrome oxidase contains**

- (A) Cu<sup>2+</sup> and Zn<sup>2+</sup> (B) Cu<sup>2+</sup> and Fe<sup>2+</sup>  
 (C) Cu<sup>2+</sup> and Mn<sup>2+</sup> (D) Cu<sup>2+</sup>

**18. Characteristic absorption bands exhibited by ferrocytochrome:**

- (A)  $\alpha$  band (B)  $\beta$  band  
 (C)  $\alpha$  and  $\beta$  bands (D)  $\alpha$ ,  $\beta$  and  $\gamma$  bands

**19. Monooxygenases are found in**

- (A) Cytosol (B) Nucleus  
 (C) Mitochondria (D) Microsomes

**20. A component of the respiratory chain in mitochondria is**

- (A) Coenzyme Q  
 (B) Coenzyme A  
 (C) Acetyl coenzyme  
 (D) Coenzyme containing thiamin

**21. The redox carriers are grouped into respiratory chain complex**

- (A) In the inner mitochondrial membrane  
 (B) In mitochondrial matrix  
 (C) On the outer mitochondrial membrane  
 (D) On the inner surface of outer mitochondrial membrane

**22. The sequence of the redox carrier in respiratory chain is**

- (A) NAD—FMN—Q—cyt b—cyt c<sub>1</sub>—cyt c—cyt aa<sub>3</sub>  $\longrightarrow$  O<sub>2</sub>  
 (B) FMN—Q—NAD—cyt b—cyt aa<sub>3</sub>—cyt c<sub>1</sub>—cyt c  $\longrightarrow$  O<sub>2</sub>  
 (C) NAD—FMN—Q—cyt c<sub>1</sub>—cyt c—cyt b—cyt aa<sub>3</sub>  $\longrightarrow$  O<sub>2</sub>  
 (D) NAD—FMN—Q—cyt b—cyt aa<sub>3</sub>—cyt c—cyt c<sub>1</sub>  $\longrightarrow$  O<sub>2</sub>

**23. The correct sequence of cytochrome carriers in respiratory chain is**

- (A) Cyt b—cyt c—cyt c<sub>1</sub>—cyt aa<sub>3</sub>  
 (B) Cyt aa<sub>3</sub>—cyt b—cyt c—cyt c<sub>1</sub>  
 (C) Cyt b—cyt c<sub>1</sub>—cyt c—cyt aa<sub>3</sub>  
 (D) Cyt b—cyt aa<sub>3</sub>—cyt c<sub>1</sub>—cyt c

**24. Reducing equivalents from pyruvate enter the mitochondrial respiratory chain at**

- (A) FMN (B) NAD  
 (C) Coenzyme Q (D) Cyt b

**25. Reducing equivalents from succinate enter the mitochondrial respiratory chain at**

- (A) NAD (B) Coenzyme Q  
 (C) FAD (D) Cyt c

**26. The respiratory chain complexes acting as proton pump are**

- (A) I, II and III (B) I, II and IV  
 (C) I, III and IV (D) I and II

**27. If the reducing equivalents enter from FAD in the respiratory chain, the phosphate/oxygen ratio (P:O) is**

- (A) 2 (B) 1  
 (C) 3 (D) 4

**28. If the reducing equivalents enter from NAD in the respiratory chain, the phosphate/oxygen (P:O) is**

- (A) 1 (B) 2  
 (C) 3 (D) 4

- 29. One of the site of phsosphorylation in mitochondrial respiratory chain is**
- (A) Between FMN and coenzyme Q  
(B) Between coenzyme Q and cyt b  
(C) Between cytochrome b and cytochrome  $c_1$   
(D) Between cytochrome  $c_1$  and cytochrome c
- 30. Rotenone inhibits the respiratory chain at**
- (A) FMN  $\rightarrow$  coenzyme Q  
(B) NAD  $\rightarrow$  FMN  
(C) Coenzyme Q  $\rightarrow$  cyt b  
(D) Cyt b  $\rightarrow$  Cyt  $c_1$
- 31. Activity of cytochrome oxidase is inhibited by**
- (A) Sulphite (B) Sulphate  
(C) Arsenite (D) Cyanide
- 32. Transfer of reducing equivalents from succinate dehydrogenase to coenzyme Q is specifically inhibited by**
- (A) Carboxin (B) Oligomycin  
(C) Piericidin A (D) Rotenone
- 33. Chemiosmotic theory for oxidative phosphorylation has been proposed by**
- (A) Chance and Williams  
(B) Pauling and Corey  
(C) S. Waugh  
(D) P. Mitchell
- 34. The number of ATP produced in the oxidation of 1 molecule of NADPH in oxidative phosphorylation is**
- (A) Zero (B) 2  
(C) 3 (D) 4
- 35. The coupling of oxidation and phosphorylation in intact mitochondria:**
- (A) Puromycin (B) Oligomycin  
(C) Streptomycin (D) Gentamycin
- 36. An uncoupler of oxidative phosphorylation is**
- (A) Carboxin (B) Atractyloside  
(C) Amobarbital (D) Dinitroresol
- 37. The chemical inhibiting oxidative phosphorylation, Adependent on the transport of adenine nucleotides across the inner mitochondrial membrane is**
- (A) Oligomycin (B) Atractyloside  
(C) Dinitrophenol (D) Pentachlorophenol
- 38. Porphyrins are synthesized in**
- (A) Cytosol  
(B) Mitochondria  
(C) Cytosol and mitochondria  
(D) Rough endoplasmic reticulum
- 39. Heme is synthesized from**
- (A) Succinyl-CoA and glycine  
(B) Active acetate and glycine  
(C) Active succinate and alanine  
(D) Active acetate and alanine
- 40. In the biosynthesis of the iron protoporphyrin, the product of the condensation between succinyl-CoA and glycine is**
- (A)  $\alpha$ -Amino  $\beta$ -ketoadipic acid  
(B)  $\delta$ -Aminolevulinate  
(C) Hydroxymethylbilane  
(D) Uroporphyrinogen I
- 41. Porphyrin synthesis is inhibited in**
- (A) Mercury poisoning  
(B) Lead poisoning  
(C) Manganese poisoning  
(D) Barium poisoning
- 42. During synthesis of porphyrins, synthesis of  $\delta$ -amino levulinic acid occurs in**
- (A) Mitochondria  
(B) Cytosol  
(C) Both in mitochondria and cytosol  
(D) Ribosomes
- 43. In the biosynthesis of heme, condensation between succinyl CoA and glycine requires**
- (A) NAD<sup>+</sup> (B) FAD  
(C) NADH + H<sup>+</sup> (D) B<sub>6</sub>-phosphate

- 44. In mammalian liver the rate controlling enzyme in porphyrin biosynthesis is**
- (A) ALA synthase  
(B) ALA hydratase  
(C) Uroporphyrinogen I synthase  
(D) Uroporphyrinogen III cosynthase
- 45. The condensation of 2 molecules of  $\delta$ -aminolevulinate dehydratase contains**
- (A) ALA synthase  
(B) ALA hydratase  
(C) Uroporphyrinogen synthase I  
(D) Uroporphyrinogen synthase III
- 46. The enzyme  $\delta$ -aminolevulinate dehydratase contains**
- (A) Zinc (B) Manganese  
(C) Magnesium (D) Calcium
- 47. A cofactor required for the activity of the enzyme ALA dehydratase is**
- (A) Cu (B) Mn  
(C) Mg (D) Fe
- 48. The number of molecules of porphobilinogen required for the formation of a tetrapyrrole i.e., a porphyrin is**
- (A) 1 (B) 2  
(C) 3 (D) 4
- 49. Conversion of the linear tetrapyrrole hydroxymethylbilane to uroporphyrinogen III**
- (A) Occurs spontaneously  
(B) Catalysed by uroporphyrinogen I synthase  
(C) Catalysed by uroporphyrinogen III cosynthase  
(D) Catalysed by combined action of uroporphyrinogen I synthase and uroporphyrinogen III cosynthase
- 50. Conversion of uroporphyrinogen III to coproporphyrinogen III is catalysed by the enzyme.:**
- (A) Uroporphyrinogen decarboxylase  
(B) Coproporphyrinogen oxidase  
(C) Protoporphyrinogen oxidase  
(D) Ferrochelatase
- 51. The synthesis of heme from protoporphyrin III is catalysed by the enzyme:**
- (A) ALA synthase (B) Ferroreductase  
(C) Ferrooxidase (D) Ferrochelatase
- 52. Many xenobiotics**
- (A) Increase hepatic ALA synthase  
(B) Decrease hepatic ALA synthase  
(C) Increase hepatic ALA dehydratase  
(D) Decrease hepatic ALA dehydratase
- 53. Acute intermittent porphyria (paroxymal porphyria) is caused due to deficiency of**
- (A) Uroporphyrinogen I synthase  
(B) ALA synthase  
(C) Coproporphyrinogen oxidase  
(D) Uroporphyrinogen decarboxylase
- 54. The major symptom of acute intermittent porphyria includes**
- (A) Abdominal pain  
(B) Photosensitivity  
(C) No neuropsychiatric signs  
(D) Dermatitis
- 55. The characteristic urinary finding in acute intermittent porphyria is**
- (A) Increased quantity of uroporphyrin  
(B) Increased quantity of coproporphyrin I  
(C) Increased quantity of coproporphyrin III  
(D) Massive quantities of porphobilinogen
- 56. The enzyme involved in congenital erythropoietic porphyria is**
- (A) Uroporphyrinogen I synthase  
(B) Uroporphyrinogen III cosynthase  
(C) Protoporphyrinogen oxidase  
(D) Ferrochelatase
- 57. Main symptoms of congenital erythropoietic porphyria is**
- (A) Yellowish teeth (B) Photosensitivity  
(C) Abdominal pain (D) Brownish urine
- 58. The probable cause of porphyria cutanea tarda is deficiency of**
- (A) Uroporphyrinogen oxidase  
(B) Coproporphyrinogen oxidase  
(C) Protoporphyrinogen oxidase  
(D) Uroporphyrinogen I synthase

- 59. The characteristic urinary finding in porphyria cutanea tarda is**
- (A) Increased quantity of porphobilinogen  
 (B) Increased quantity of red cell protoporphyrin  
 (C) Increased quantity of uroporphyrin  
 (D) Increased quantity of  $\delta$ -ALA
- 60. Hereditary coproporphyria is caused due to deficiency of**
- (A) Protoporphyrinogen oxidase  
 (B) ALA synthase  
 (C) ALA dehydratase  
 (D) Coproporphyrinogen oxidase
- 61. The enzyme involved in variegate porphyria is**
- (A) Protoporphyrinogen oxidase  
 (B) Coproporphyrinogen oxidase  
 (C) Uroporphyrinogen decarboxylase  
 (D) ALA decarboxylase
- 62. Protoporphyria (erythrohepatic) is characterized by the deficiency of**
- (A) ALA synthase  
 (B) ALA hydratase  
 (C) Protoporphyrinogen oxidase  
 (D) Ferrochelatase
- 63. The amount of coproporphyrins excreted per day in feces is about**
- (A) 10–50  $\mu$ gs      (B) 100–150  $\mu$ gs  
 (C) 200–250  $\mu$ gs      (D) 300–1000  $\mu$ gs
- 64. The immunoglobulins are differentiated and also named on the basis of**
- (A) Electrophoretic mobility  
 (B) Heat stability  
 (C) Molecular weight  
 (D) Sedimentation coefficient like 7 S, 19 S etc.
- 65. The immunoglobulins are classified on the basis of**
- (A) Light chains  
 (B) Heavy chains  
 (C) Carbohydrate content  
 (D) Electrophoretic mobility
- 66. All immunoglobulins contain**
- (A) 4 L chains  
 (B) 4 H chains  
 (C) 3 L chains  
 (D) 2 L chains and 2 H chains
- 67. An immunoglobulin molecule always contains**
- (A) 1  $\kappa$  and 3  $\lambda$  type of chains  
 (B) 2  $\kappa$  and 2  $\lambda$  type of chains  
 (C) 3  $\kappa$  and 1  $\lambda$  type of chains  
 (D) 2  $\kappa$  and 2  $\lambda$  chains
- 68. The number of types of H chains identified in human is**
- (A) 2                      (B) 3  
 (C) 4                      (D) 5
- 69. The number of hypervariable region in L chain is**
- (A) 1                      (B) 2  
 (C) 3                      (D) 4
- 70. The number of hypervariable region in H chain is**
- (A) 1                      (B) 2  
 (C) 3                      (D) 4
- 71. Type  $\gamma$  H chain is present in**
- (A) Ig G                      (B) Ig A  
 (C) Ig M                      (D) Ig D
- 72. Type  $\alpha$  H chain is present in**
- (A) Ig E                      (B) Ig A  
 (C) Ig M                      (D) Ig D
- 73. Type  $\mu$  H chain is present in**
- (A) Ig G                      (B) Ig A  
 (C) Ig M                      (D) Ig D
- 74. Type  $\delta$  H chain is present in**
- (A) Ig G                      (B) Ig A  
 (C) Ig M                      (D) Ig D
- 75. Type  $\epsilon$  H chain is present in**
- (A) Ig A                      (B) Ig M  
 (C) Ig D                      (D) Ig E
- 76. A 'J' chain is present in**
- (A) Ig D                      (B) Ig M  
 (C) Ig G                      (D) Ig E

- 77. A secretory protein T chain (T protein) is present in**  
 (A) Ig A (B) Ig M  
 (C) Ig D (D) Ig E
- 78. A pentamer immunoglobulin is**  
 (A) Ig G (B) Ig A  
 (C) Ig M (D) Ig E
- 79. The portion of the immunoglobulin molecule that binds the specific antigen is formed by**  
 (A) Variable regions of H and L chains  
 (B) Constant region of H chain  
 (C) Constant region of L chain  
 (D) Hinge region
- 80. The class specific function of the different immunoglobulin molecules is constituted by**  
 (A) Variable region of L chain  
 (B) Constant region of H chain  
 (C) Variable region of H chain  
 (D) Constant region particularly  $C_{H2}$  and  $C_{H3}$  of H chain
- 81. Hinge region, the region of Ig molecule which is flexible and more exposed to enzymes is the**  
 (A) Region between first and second constant regions of H chain (domains  $C_{H1}$  and  $C_{H2}$ )  
 (B) Region between second and third constant regions of H chain ( $C_{H2}$  and  $C_{H3}$ )  
 (C) Variable regions of H chain  
 (D) Variable regions of L chain
- 82. The smallest immunoglobulin is**  
 (A) Ig G (B) Ig E  
 (C) Ig D (D) Ig A
- 83. The number of sub classes of Ig G is**  
 (A) 2 (B) 3  
 (C) 4 (D) 8
- 84. Most abundant Ig G subclass in the serum is**  
 (A) Ig  $G_1$  (B) Ig  $G_2$   
 (C) Ig  $G_3$  (D) Ig  $G_4$
- 85. The immunoglobulin which can cross the placenta is**  
 (A) Ig A (B) Ig M  
 (C) Ig G (D) Ig D
- 86. The immunoglobulin possessing lowest concentration of carbohydrate is**  
 (A) Ig A (B) Ig E  
 (C) Ig M (D) Ig G
- 87. The normal serum level of Ig G is**  
 (A) 1200 mg% (B) 500 mg%  
 (C) 300 mg% (D) 200 mg%
- 88. The half life of Ig G is**  
 (A) 2–8 days (B) 1–4 days  
 (C) 19–24 days (D) 6 days
- 89. Most heat labile immunoglobulin is**  
 (A) Ig G (B) Ig A  
 (C) Ig M (D) Ig D
- 90. The immunoglobulin possessing highest concentration of carbohydrate is**  
 (A) Ig G (B) Ig M  
 (C) Ig A (D) Ig D
- 91. The normal serum level of Ig D is**  
 (A) 1 mg% (B) 2 mg%  
 (C) 3 mg% (D) 5 mg%
- 92. The half life of Ig D is**  
 (A) 1 day (B) 2–8 days  
 (C) 10–15 days (D) 20–24 days
- 93. The carbohydrate content of Ig M is about**  
 (A) 2.8% (B) 6.4%  
 (C) 8.0% (D) 10.2%
- 94. The immunoglobulin having highest sedimentation coefficient is**  
 (A) Ig G (B) Ig A  
 (C) Ig M (D) Ig D
- 95. The immunoglobulin having highest molecular weight is**  
 (A) Ig G (B) Ig M  
 (C) Ig E (D) Ig A

- 96. The half life of Ig M is**  
(A) 2 days (B) 4 days  
(C) 5 days (D) 8 days
- 97. The normal serum level of Ig M is**  
(A) 50 mg% (B) 120 mg%  
(C) 200 mg% (D) 300 mg%
- 98. The immunoglobulin associated with reginic antibody is**  
(A) Ig E (B) Ig D  
(C) Ig M (D) Ig A
- 99. The immunoglobulin having least concentration in serum is**  
(A) Ig A (B) Ig M  
(C) Ig D (D) Ig E
- 100. The half life of Ig E protein is**  
(A) 1–6 days (B) 2–8 days  
(C) 10 days (D) 20 days
- 101. The immunoglobulin which provides highest antiviral activity is**  
(A) Ig D (B) Ig E  
(C) Ig A (D) Ig G
- 102. The half life of Ig A is**  
(A) 6 days (B) 2–4 days  
(C) 5–10 days (D) 12–20 days
- 103. The normal serum level of Ig A is**  
(A) 100 mg% (B) 200 mg%  
(C) 300 mg% (D) 400 mg%
- 104. Calcium is excreted by**  
(A) Kidney  
(B) Kidney and intestine  
(C) Kidney and liver  
(D) Kidney and pancreas
- 105. A decrease in the ionized fraction of serum calcium causes**  
(A) Tetany (B) Rickets  
(C) Osteomalacia (D) Osteoporosis
- 106. A rise in blood calcium may indicate**  
(A) Paget's disease (B) Rickets  
(C) Osteomalacia (D) Hypervitaminosis D
- 107. The normal serum level of phosphorus in human adult is**  
(A) 1–2 mg (B) 2–3 mg  
(C) 3–4.5 mg (D) 5–7 mg
- 108. An increase in carbohydrate metabolism is accompanied by temporary decrease in serum:**  
(A) Calcium (B) Phosphate  
(C) Iron (D) Sodium
- 109. In rickets of the common low-phosphate variety, serum phosphate values may go as low as**  
(A) 1–2 mg/100 ml (B) 2–3 mg/100 ml  
(C) 3–4 mg/100 ml (D) 4–5 mg/100 ml
- 110. The normal serum level of phosphorous in children varies from**  
(A) 1–2 mg/100 ml (B) 2–3 mg/100 ml  
(C) 3–4 mg/100 ml (D) 4–7 mg/100 ml
- 111. An inherited or acquired renal tubular defect in the reabsorption of phosphate (Vit D resistant ricket) is characterized with**  
(A) Normal serum Phosphate  
(B) High serum phosphate  
(C) A low blood phosphorous with elevated alkaline Phosphate  
(D) A high blood phosphorous with decreased alkaline phosphatase
- 112. The total magnesium content in gms of human body is about**  
(A) 5 (B) 10  
(C) 15 (D) 21
- 113. Iron is a component of**  
(A) Hemoglobin (B) Ceruloplasmin  
(C) Transferase (D) Transaminase
- 114. Daily requirement of iron for normal adult male is about**  
(A) 5 mg (B) 10 mg  
(C) 15 mg (D) 20 mg

- 115. The normal content of protein bound iron (PBI) in the plasma of males is**  
 (A) 120–140  $\mu\text{g}/100\text{ ml}$   
 (B) 200–300  $\mu\text{g}/100\text{ ml}$   
 (C) 120–140  $\mu\text{g}/100\text{ ml}$   
 (D) 200–300  $\mu\text{g}/100\text{ ml}$
- 116. In iron deficiency anemia**  
 (A) The plasma bound iron is low  
 (B) The plasma bound iron is high  
 (C) Total iron binding capacity is low  
 (D) Both the plasma bound iron and total iron binding capacity are low
- 117. The total iron content of the human body is**  
 (A) 400–500 mg      (B) 1–2 g  
 (C) 2–3 g              (D) 4–5 g
- 118. In hepatic diseases**  
 (A) Both the bound iron and total iron binding capacity of the plasma may be low  
 (B) Both the bound iron and total iron binding capacity of the plasma may be high  
 (C) Only bound iron may be high  
 (D) Only the total iron binding capacity may be high
- 119. The recommended daily requirement of iron for women of 18–55 yrs age is**  
 (A) 5 mg                  (B) 8 mg  
 (C) 10 mg                (D) 15 mg
- 120. The percent of total iron in body in hemoglobin is**  
 (A) 10–20                (B) 20–30  
 (C) 30–40                (D) 60–70
- 121. A hypochromic microcytic anemia with increased iron stores in the bone marrow may be**  
 (A) Iron responsive  
 (B) Pyridoxine responsive  
 (C) Vitamin B<sub>12</sub> responsive  
 (D) Folate responsive
- 122. A good source of iron is**  
 (A) Spinach                (B) Milk  
 (C) Tomato                (D) Potato
- 123. The best source of iron is**  
 (A) Organ meats      (B) Milk  
 (C) Tomato              (D) Potato
- 124. An increased serum iron and decreased iron binding capacity is found in**  
 (A) Fe deficiency anemia  
 (B) Sideroblastic anemia  
 (C) Folate deficiency anemia  
 (D) Sickle cell anemia
- 125. The absorption of iron is increased 2–10 times of normal in**  
 (A) Iron deficiency anemia  
 (B) Pregnancy  
 (C) Spherocytosis  
 (D) Sickle cell anemia
- 126. Iron is mainly absorbed from**  
 (A) Stomach and duodenum  
 (B) Ileum  
 (C) Caecum  
 (D) Colon
- 127. The iron containing nonporphyrin is**  
 (A) Hemosiderin      (B) Catalase  
 (C) Cytochrome C    (D) Peroxidase
- 128. Molecular iron is**  
 (A) Stored primarily in the spleen  
 (B) Excreted in the urine as Fe<sup>2+</sup>  
 (C) Stored in the body in combination with ferritin  
 (D) Absorbed in the ferric form
- 129. In hemochromatosis, the liver is infiltrated with**  
 (A) Iron                    (B) Copper  
 (C) Molybdenum        (D) Fats
- 130. An acquired siderosis-Bantu siderosis is due to**  
 (A) Foods cooked in iron pots  
 (B) Diet high in phosphorus  
 (C) Diet high in calcium  
 (D) High fat diet
- 131. The amount of copper in the human body is**  
 (A) 50–80 mg            (B) 100–150 mg  
 (C) 400–500 mg        (D) 500–1000 mg

- 132. The amount of copper in muscles is about**  
(A) 10 mg (B) 30 mg  
(C) 64 mg (D) 100 mg
- 133. The amount of copper in bones is about**  
(A) 5 mg (B) 10 mg  
(C) 15 mg (D) 23 mg
- 134. The normal serum of concentration of copper in mg/100 ml varies between**  
(A) 0–5 (B) 50–100  
(C) 100–200 (D) 200–300
- 135. The normal serum concentration of ceruloplasmin in mg/100 ml varies between**  
(A) 5–10 (B) 10–20  
(C) 25–43 (D) 50–100
- 136. Recommended daily dietary requirement of copper for adults is**  
(A) 0.5–1 mg (B) 1.5–3.0 mg  
(C) 3.5–4.5 mg (D) 4.5–5.5 mg
- 137. The richest source of copper is**  
(A) Liver  
(B) Milk  
(C) Legumes  
(D) Green leafy vegetables
- 138. The cytosolic superoxide dismutase enzyme contains**  
(A)  $\text{Cu}^{2+}$  (B)  $\text{Cu}^{2+}$  and  $\text{Zn}^{2+}$   
(C)  $\text{Zn}^{2+}$  (D)  $\text{Mn}^{2+}$
- 139. The deficiency of copper decreases the activity of the enzyme:**  
(A) lysine oxidase (B) lysine hydroxylase  
(C) Tyrosine oxidase (D) Proline hydroxylase
- 140. Wilson's disease is a condition of toxicosis of**  
(A) Iron (B) Copper  
(C) Chromium (D) Molybdenum
- 141. In Wilson's disease**  
(A) Copper fails to be excreted in the bile  
(B) Copper level in plasma is decreased  
(C) Ceruloplasmin level is increased  
(D) Intestinal absorption of copper is decreased
- 142. Menke's disease is due to an abnormality in the metabolism of**  
(A) Iron (B) Manganese  
(C) Magnesium (D) Copper
- 143. Menke's disease (Kinky or steel hair disease) is a X-linked disease characterized by**  
(A) High levels of plasma copper  
(B) High levels of ceruloplasmin  
(C) Low levels of plasma copper and of ceruloplasmin  
(D) High level of hepatic copper
- 144. The trace element catalyzing hemoglobin synthesis is**  
(A) Manganese (B) Magnesium  
(C) Copper (D) Selenium
- 145. The total body content of manganese is about**  
(A) 2 mg (B) 4 mg  
(C) 8 mg (D) 10 mg
- 146. In blood the values of manganese in  $\mu\text{g}$  / 100 ml varies between**  
(A) 0–4 (B) 2–4  
(C) 3–5 (D) 4–20
- 147. The adequate daily dietary requirement of manganese is**  
(A) 1–2 mg (B) 2–5 mg  
(C) 5–10 mg (D) 10–20 mg
- 148. Mitochondrial superoxide dismutase contains**  
(A) Zinc (B) Copper  
(C) Magnesium (D) Manganese
- 149. Mitochondrial pyruvate carboxylase contains**  
(A) Zinc (B) Zinc  
(C) Manganese (D) Magnesium
- 150. The adequate daily dietary requirement of molybdenum for normal human adult is**  
(A) 10–20  $\mu\text{g}$  (B) 25–50  $\mu\text{g}$   
(C) 50–70  $\mu\text{g}$  (D) 75–200  $\mu\text{g}$

- 151. In human beings molybdenum is mainly absorbed from**  
 (A) Liver (B) Kidney  
 (C) Intestine (D) Pancreas
- 152. In human beings molybdenum is mainly excreted in**  
 (A) Feces (B) Sweat  
 (C) Urine (D) Tears
- 153. Molybdenum is a constituent of**  
 (A) Hydroxylases (B) Oxidases  
 (C) Transaminases (D) Transferases
- 154. Safe and adequate daily dietary intake of chromium in adults in mg is**  
 (A) 0.01–0.02 (B) 0.02–0.03  
 (C) 0.03–0.04 (D) 0.05–0.2
- 155. Richest source of chromium is**  
 (A) Brewer's yeast  
 (B) Milk and milk products  
 (C) Yellow vegetables  
 (D) Green vegetables
- 156. Metallic constituent of "Glucose tolerance factor" is**  
 (A) Sulphur (B) Cobalt  
 (C) Chromium (D) Selenium
- 157. Intestinal absorption of chromium is shared with**  
 (A) Mn (B) Mg  
 (C) Ca (D) Zn
- 158. Serum level of chromium in healthy adult is about**  
 (A) 2.5  $\mu\text{g}/100\text{ ml}$  (B) 6–20  $\mu\text{g}/100\text{ ml}$   
 (C) 30–60  $\mu\text{g}/100\text{ ml}$  (D) 50–100  $\mu\text{g}/100\text{ ml}$
- 159. Chromium is potentiator of**  
 (A) Insulin (B) Glucagon  
 (C) Thyroxine (D) Parathormone
- 160. Recommended daily dietary allowance of selenium for adult human in  $\mu\text{g}$  is**  
 (A) 20 (B) 40  
 (C) 50 (D) 70
- 161. Total body content of selenium is about**  
 (A) 1–2 mg (B) 2–4 mg  
 (C) 4–10 mg (D) 50–100 mg
- 162. Normal serum level of selenium is**  
 (A) 5  $\mu\text{g}/100\text{ ml}$  (B) 8  $\mu\text{g}/100\text{ ml}$   
 (C) 10  $\mu\text{g}/100\text{ ml}$  (D) 13  $\mu\text{g}/100\text{ ml}$
- 163. Selenium is a constituent of the enzyme:**  
 (A) Glutathione peroxidase  
 (B) Homogentisate oxidase  
 (C) Tyrosine hydroxylase  
 (D) Phenylalanin hydroxylase
- 164. A nonspecific intracellular antioxidant is**  
 (A) Chromium (B) Magnesium  
 (C) Selenium (D) Nickel
- 165. Cobalt forms an integral part of the vitamin:**  
 (A) B<sub>1</sub> (B) B<sub>6</sub>  
 (C) B<sub>12</sub> (D) Folate
- 166. Cobalt may act as cofactor for the enzyme:**  
 (A) Glycyl-glycine dipeptidase  
 (B) Elastase  
 (C) Polynucleotidases  
 (D) Phosphatase
- 167. Excess intake of cobalt for longer periods leads to**  
 (A) Polycythemia  
 (B) Megaloblastic anemia  
 (C) Pernicious anemia  
 (D) Microcytic anemia
- 168. The total sulphur content of the body is**  
 (A) 25–50 gm (B) 50–75 gm  
 (C) 100–125 gm (D) 150–200 gm
- 169. Sulphur is made available to the body by the amino acids:**  
 (A) Cystine and methionine  
 (B) Taurine and alanine  
 (C) Proline and hydroxyproline  
 (D) Arginine and lysine

**170. Sulphur containing coenzyme is**

- (A) NAD
- (B) FAD
- (C) Pyridoxal phosphate
- (D) Biotin

**171. Iodine is stored in**

- (A) Thyroid gland as thyroglobulin
- (B) Liver
- (C) Intestine
- (D) Skin

**172. Iodine is the constituent of**

- (A)  $T_3$  and  $T_4$
- (B) PTH
- (C) Insulin
- (D) Adrenaline

**173. Goitrogenic substance present in cabbage is**

- (A) 5-vinyl-2 thio oxalozolidone
- (B) Pyridine-3-carboxylic acid
- (C) 3-Hydroxy-4, 5-dihydroxymethyl-2-methyl pyridine
- (D)  $\delta$ -ALA dehydratase

**174. For an adult male daily requirement of iodine is**

- (A) 25–50  $\mu$ g
- (B) 50–100  $\mu$ g
- (C) 100–150  $\mu$ g
- (D) 200–250  $\mu$ g

**175. Recommended daily intake of fluoride for a normal adult is**

- (A) 1.5–4.0 mg
- (B) 0–1 mg
- (C) 5–10 mg
- (D) 10–20 mg

**176. The percentage of fluoride present in normal bone is**

- (A) 0.01–0.03
- (B) 0.04–0.08
- (C) 0.10–0.12
- (D) 0.15–0.2

**177. The percentage of fluoride present in dental enamel is**

- (A) 0.01–0.02
- (B) 0.05–0.10
- (C) 0.15–0.20
- (D) 0.20–0.40

**178. Fluorosis occurs due to**

- (A) Drinking water containing less than 0.2 ppm of fluorine
- (B) Drinking water containing high calcium
- (C) Drinking water containing greater than 1.2 ppm of fluorine
- (D) Drinking water containing heavy metals

**179. Dental caries occur due to**

- (A) Drinking water containing less than 0.2 ppm of fluorine
- (B) Drinking water containing greater than 1.2 ppm of fluorine
- (C) Drinking water containing high calcium
- (D) Drinking water containing heavy metals

**180. Total zinc content of human body is about**

- (A) 800 mg
- (B) 1200 mg
- (C) 2000 mg
- (D) 3200 mg

**181. Metal required for polymerization of insulin is**

- (A) Copper
- (B) Chromium
- (C) Cobalt
- (D) Zinc

**182. Metalloenzyme-retinene for polymerization of insulin is**

- (A) Copper
- (B) Zinc
- (C) Cobalt
- (D) Manganese

**183. An important zinc containing enzyme is**

- (A) Carboxypeptidase A
- (B) Isocitrate dehydrogenase
- (C) Cholinesterase
- (D) Lipoprotein lipase

**184. Acrodermatitis enteropathica is due to defective absorption of**

- (A) Manganese
- (B) Molybdenum
- (C) Iodine
- (D) Zinc

**185. Hypogonadism develops due to deficiency of**

- (A) Sulphur
- (B) Cobalt
- (C) Zinc
- (D) Manganese

**186. Psychotic symptoms and parkinsonism like symptoms develop due to inhalation poisoning of**

- (A) Manganese
- (B) Phosphorous
- (C) Magnesium
- (D) Zinc

**187. One gram of carbohydrate on complete oxidation in the body yields about**

- (A) 1 Kcal
- (B) 4 Kcal
- (C) 6 Kcal
- (D) 9 Kcal

- 188. One gram of fat on complete oxidation in the body yields about**  
 (A) 4 Kcal (B) 6 Kcal  
 (C) 9 Kcal (D) 12 Kcal
- 189. One gram of protein on complete oxidation in the body yields about**  
 (A) 2 Kcal (B) 4 Kcal  
 (C) 8 Kcal (D) 12 Kcal
- 190. R.Q. of mixed diet is about**  
 (A) 0.70 (B) 0.80  
 (C) 0.85 (D) 1.0
- 191. R.Q. of proteins is about**  
 (A) 0.70 (B) 0.75  
 (C) 0.80 (D) 0.85
- 192. R.Q. of carbohydrates is about**  
 (A) 0.75 (B) 0.80  
 (C) 0.85 (D) 1.0
- 193. R.Q. of fats is about**  
 (A) 0.75 (B) 0.80  
 (C) 0.85 (D) 1.0
- 194. Proteins have the SDA:**  
 (A) 5% (B) 10%  
 (C) 20% (D) 30%
- 195. Humans most easily tolerate a lack of the nutrient:**  
 (A) Protein (B) Lipid  
 (C) Iodine (D) Carbohydrate
- 196. The basal metabolic rate (B.M.R.) is measurement of**  
 (A) Energy expenditure during sleep  
 (B) Energy expenditure after 100 m walk  
 (C) Energy expenditure after a meal  
 (D) Energy expenditure under certain basal (Standard) conditions
- 197. B.M.R. is raised in**  
 (A) Polycythemia (B) Starvation  
 (C) Lipid nephrosis (D) Hypothyroidism
- 198. B.M.R. is lowered in**  
 (A) Hypothyroidism (B) Leukemia  
 (C) Cardiac failure (D) Hyperthyroidism
- 199. B.M.R. is subnormal in**  
 (A) Addison's disease  
 (B) Adrenal tumour  
 (C) Cushing's syndrome  
 (D) Fever
- 200. A healthy 70 kg man eats a well balanced diet containing adequate calories and 62.5 g of high quality protein per day. Measured in grams of nitrogen, his daily nitrogen balance would be**  
 (A) +10 g (B) +6.25 g  
 (C) 0 g (D) -6.25 g
- 201. The percentage of nitrogen retained in the body after absorption of diet represents**  
 (A) Digestibility coefficient of proteins  
 (B) Biological value of proteins  
 (C) Protein efficiency ratio  
 (D) Net protein utilisation
- 202. In a person increase in weight in gms per gm of protein consumption represents**  
 (A) Protein efficiency ratio  
 (B) Digestibility value of proteins  
 (C) Biological value of proteins  
 (D) Net protein utilisation
- 203. The percentage of food nitrogen that is retained in the body represents**  
 (A) Digestibility coefficient  
 (B) Biological value of proteins  
 (C) Protein efficiency ratio  
 (D) Net protein utilisation
- 204. The chemical score of different proteins is calculated in terms of**  
 (A) Egg proteins (B) Milk proteins  
 (C) Fish proteins (D) Wheat proteins
- 205. Biological value of egg protein is**  
 (A) 94 (B) 60  
 (C) 51 (D) 40
- 206. Biological value of protein of cow's milk is**  
 (A) 95 (B) 60  
 (C) 71 (D) 67
- 207. Biological value of soyabean protein is**  
 (A) 86 (B) 71  
 (C) 64 (D) 54

**208. Plasma bicarbonate is decreased in**

- (A) Respiratory alkalosis
- (B) Respiratory acidosis
- (C) Metabolic alkalosis
- (D) Metabolic acidosis

**209. Plasma bicarbonate is increased in**

- (A) Respiratory alkalosis
- (B) Metabolic alkalosis
- (C) Respiratory acidosis
- (D) Metabolic acidosis

**210. Total CO<sub>2</sub> is increased in**

- (A) Respiratory acidosis
- (B) Metabolic alkalosis
- (C) Both respiratory acidosis and metabolic alkalosis
- (D) Respiratory alkalosis

**211. Respiratory acidosis is caused by**

- (A) Increase in carbonic acid relative to bicarbonate
- (B) Decrease in bicarbonate fraction
- (C) Increase in bicarbonate fraction
- (E) Decrease in the carbonic acid fraction

**212. Respiratory alkalosis is caused by**

- (A) An increase in carbonic acid fraction
- (B) A decrease in bicarbonic fraction
- (C) A decrease in the carbonic acid fraction
- (D) An increase in bicarbonate fraction

**213. Meningitis and encephalitis cause**

- (A) Metabolic alkalosis
- (B) Respiratory alkalosis
- (C) Metabolic acidosis
- (D) Respiratory acidosis

**214. Metabolic acidosis is caused in**

- (A) Uncontrolled diabetes with ketosis
- (B) Pneumonia
- (C) Intestinal Obstruction
- (D) Hepatic coma

**215. Metabolic acidosis is caused in**

- (A) Pneumonia
- (B) Prolonged starvation
- (C) Intestinal obstruction
- (D) Bulbar polio

**216. Respiratory acidosis occurs in**

- (A) Any disease which impairs respiration like emphysema
- (B) Renal disease
- (C) Poisoning by an acid
- (D) Pyloric stenosis

**217. Metabolic alkalosis occurs**

- (A) As consequence of high intestinal obstruction
- (B) In central nervous system disease
- (C) In diarrhoea
- (D) In colitis

**218. Respiratory alkalosis occurs in**

- (A) Hysterical hyperventilation
- (B) Depression of respiratory centre
- (C) Renal diseases
- (D) Loss of intestinal fluids

**219. Morphine poisoning causes**

- (A) Metabolic acidosis
- (B) Respiratory acidosis
- (C) Metabolic alkalosis
- (D) Respiratory alkalosis

**220. Salicylate poisoning in early stages causes**

- (A) Metabolic acidosis
- (B) Respiratory acidosis
- (C) Metabolic alkalosis
- (D) Respiratory alkalosis

**221. The compound having the lowest redox potential amongst the following is**

- (A) Hydrogen
- (B) NAD
- (C) Cytochrome b
- (D) Cytochrome a

**222. All the oxidases contain a metal which is**

- (A) Copper
- (B) FAD
- (C) Manganese
- (D) None of these

**223. Isocitrate dehydrogenases is**

- (A) Aerobic dehydrogenase
- (B) Anaerobic dehydrogenase
- (C) Hydroperoxidase
- (D) Oxygenase

- 224. Iron-porphyrin is present as prosthetic group in**  
 (A) Cytochromes (B) Catalases  
 (C) Peroxidase (D) None of these
- 225. Microsomal hydroxylase system contains a**  
 (A) Di-oxygenase (B) Mono-oxygenase  
 (C) Both (A) and (B) (D) None of these
- 226. Superoxide radicals can be detoxified by**  
 (A) Cytochrome c (B) Cytochrome b  
 (C) Cytochrome a (D) None of these
- 227. A copper containing cytochrome is**  
 (A) Cytochrome a (B) Cytochrome P-450  
 (C) Cytochrome  $\alpha_3$  (D) None of these
- 228. Rate of tissue respiration is raised when the intracellular concentration of**  
 (A) ADP increases (B) ATP increases  
 (C) ADP decreases (D) None of these
- 229. Which of the following component of respiratory chain is not attached to the inner mitochondrial membrane?**  
 (A) Coenzyme Q (B) Cytochrome c  
 (C) Both (A) and (B) (D) None of these
- 230. In some reactions, energy is captured in the form of**  
 (A) GTP (B) UTP  
 (C) CTP (D) None of these
- 231. Substrate-linked phosphorylation occurs in**  
 (A) Glycolytic pathway (B) Citric acid cycle  
 (C) Both (A) and (B) (D) None of these
- 232. Hydrogen peroxide may be detoxified in the absence of an oxygen acceptor by**  
 (A) Peroxidase (B) Catalase  
 (C) Both (A) and (B) (D) None of these
- 233. Superoxide radicals can be detoxified by**  
 (A) Cytochrome c  
 (B) Superoxide dismutase  
 (C) Both (A) and (B)  
 (D) None of these
- 234. The porphyrin present in haem is**  
 (A) Uroporphyrin (B) Protoporphyrin I  
 (C) Coproporphyrin (D) Protoporphyrin II
- 235. An amino acid required for porphyrin synthesis is**  
 (A) Proline (B) Glycine  
 (C) Serine (D) Histidine
- 236. Which of the following coenzyme is required for porphyrin synthesis?**  
 (A) Coenzyme A  
 (B) Pyridoxal phosphate  
 (C) Both (A) and (B)  
 (D) None of these
- 237. The regulatory enzyme for haem synthesis is**  
 (A) ALA synthetase  
 (B) haem synthetase  
 (C) Both (A) and (B)  
 (D) None of these
- 238. Regulation of haem synthesis occurs by**  
 (A) Covalent modification  
 (B) Repression - derepression  
 (C) Induction  
 (D) Allosteric regulation
- 239. Sigmoidal oxygen dissociation curve is a property of**  
 (A) Haemoglobin  
 (B) Carboxyhaemoglobin  
 (C) Myoglobin  
 (D) Methaemoglobin
- 240. Cyanmethaemoglobin can be formed from**  
 (A) Oxy Hb (B) Met Hb  
 (C) Carboxy Hb (D) All of these
- 241. In thalassemia, an amino acid is substituted in**  
 (A) Alpha chain  
 (B) Beta chain  
 (C) Alpha and beta chains  
 (D) Any chain

- 242. Haem synthetase is congenitally deficient in**
- (A) Congenital erythropoietic porphyria
  - (B) Protoporphyrin
  - (C) Hereditary coproporphyrin
  - (D) Variegated porphyria
- 243. During breakdown of haem, the methenyl bridge between the following two pyrrole rings is broken:**
- (A) I and II                      (B) II and III
  - (C) III and IV                    (D) IV and I
- 244. Pre-hepatic jaundice occurs because of**
- (A) Increased haemolysis
  - (B) Liver damage
  - (C) Biliary obstruction
  - (D) None of these
- 245. kernicterus can occur in**
- (A) Haemolytic jaundice
  - (B) Hepatic jaundice
  - (C) Obstructive jaundice
  - (D) All of these
- 246. Bile pigments are not present in urine in**
- (A) Haemolytic jaundice
  - (B) Hepatic jaundice
  - (C) Obstructive jaundice
  - (D) Rotor's syndrome
- 247. Serum alkaline phosphatase is greatly increased in**
- (A) Haemolytic jaundice
  - (B) Hepatic jaundice
  - (C) Obstructive jaundice
  - (D) None of these
- 248. The active transport system for hepatic uptake of bilirubin is congenitally defective in**
- (A) Gilbert's disease
  - (B) Crigler-Najjar syndrome
  - (C) Rotor's syndrome
  - (D) Dubin-Johnson syndrome
- 249. Bilirubin UDP-glucuronyl transferase is absent from liver in**
- (A) Crigler-Najjar syndrome, type I
  - (B) Gilbert's disease
  - (C) Crigler-Najjar syndrome, type II
  - (D) Rotor's syndrome
- 250. Unconjugated bilirubin in serum is soluble in**
- (A) Water                              (B) Alkaline
  - (C) Acids                                (D) Methanol
- 251. Excretion of conjugated bilirubin from liver cells into biliary canaliculi is defective in**
- (A) Gilbert's disease
  - (B) Crigler-Najjar syndrome
  - (C) Lucey-Driscoll syndrome
  - (D) Rotor's syndrome
- 252. Breakdown of 1gm haemoglobin produces**
- (A) 20 mg of bilirubin    (B) 35 mg of bilirubin
  - (C) 50 mg of bilirubin    (D) 70 mg of bilirubin
- 253. Variable regions are present in**
- (A) Immunoglobulins
  - (B)  $\alpha$ -Chains of T cell receptors
  - (C)  $\beta$ -Chains of T cell receptors
  - (D) All of these
- 254. The total amount of calcium in an average adult man is about**
- (A) 100 gm                              (B) 500 gm
  - (C) 1 kg                                    (D) 10 kg
- 255. The following proportion of the total body calcium is present in bones and teeth:**
- (A) 75%                                  (B) 90%
  - (C) 95%                                  (D) 99%
- 256. The normal range of plasma calcium is**
- (A) 3-5 mg/dl                              (B) 5-10 mg/dl
  - (C) 9-11 mg/dl                            (D) 11-15 mg/dl
- 257. Which of the normal range of ionized calcium in plasma is**
- (A) 2-4 mg/dl                              (B) 2-4 mEq/L
  - (C) 4-5 mg/dl                              (D) 4-5 mEq/L

- 258. Tetany can occur in**  
 (A) Hypocalcaemia  
 (B) Hypercalcaemia  
 (C) Alkalosis  
 (D) Hypocalcaemia and alkalosis
- 259. Intestinal absorption of calcium occurs by**  
 (A) Active takeup  
 (B) Simple diffusion  
 (C) Facilitated diffusion  
 (D) Endocytosis
- 260. Intestinal absorption of calcium is hampered by**  
 (A) Phosphate (B) Phytate  
 (C) Proteins (D) Lactose
- 261. Calcitriol facilitates calcium absorption by increasing the synthesis of the following in intestinal mucosa:**  
 (A) Calcium Binding Protein  
 (B) Alkaline Phosphatase  
 (C) Calcium-dependent ATPase  
 (D) All of these
- 262. A high plasma calcium level decreases intestinal absorption of calcium by**  
 (A) Stimulating the secretion of parathormone  
 (B) Inhibiting the secretion of parathormone  
 (C) Decreasing the synthesis of cholecalciferol  
 (D) Inhibiting the secretion of thyrocalcitonin
- 263. The daily calcium requirement of an adult man is about**  
 (A) 400 mg (B) 600 mg  
 (C) 800 mg (D) 1,000 mg
- 264. The daily calcium requirement in pregnancy and lactation is about**  
 (A) 600 mg (B) 800 mg  
 (C) 1,200 mg (D) 1,500 mg
- 265. Hypercalcaemia can occur in all the following except**  
 (A) Hyperparathyroidism  
 (B) Hypervitaminosis D  
 (C) Milk alkali syndrome  
 (D) Nephrotic syndrome
- 266. Hypocalcaemia can occur in all the following except**  
 (A) Rickets  
 (B) Osteomalacia  
 (C) Hyperparathyroidism  
 (D) Intestinal malabsorption
- 267. The major calcium salt in bones is**  
 (A) Calcium carbonate  
 (B) Calcium chloride  
 (C) Calcium hydroxide  
 (D) Calcium phosphate
- 268. The correct statement about serum inorganic phosphorous concentration is**  
 (A) It is higher in men than in women  
 (B) It is higher in women than in men  
 (C) It is higher in adults than in children  
 (D) It is higher in children than in adults
- 269. The product of serum calcium concentration (mg/dl) and serum inorganic phosphorous concentration (mg/dl) in adults is about**  
 (A) 30 (B) 40  
 (C) 50 (D) 60
- 270. The product of serum calcium concentration (mg/dl) and serum inorganic phosphorous concentration (mg/dl) in children is about**  
 (A) 30 (B) 40  
 (C) 50 (D) 60
- 271. The product of serum calcium concentration (mg/dl) and serum inorganic phosphorous concentration (mg/dl) is decreased in**  
 (A) Rickets  
 (B) Hypoparathyroidism  
 (C) Hyperparathyroidism  
 (D) Renal failure
- 272. Serum inorganic phosphorous rises in all the following conditions except**  
 (A) Hypoparathyroidism  
 (B) Hypervitaminosis D  
 (C) Chronic renal failure  
 (D) After a carbohydrate-rich meal

- 273. Serum inorganic phosphorous decreases in all the following conditions except**
- (A) Hyperparathyroidism
  - (B) Intestinal malabsorption
  - (C) Osteomalacia
  - (D) Chronic renal failure
- 274. Serum magnesium level ranges between**
- (A) 2–3 mg/dl      (B) 3–5 mg/dl
  - (C) 6–8 mg/dl      (D) 9–11 mg/dl
- 275. Magnesium ions are required in the reactions involving**
- (A) NAD                      (B) FAD
  - (C) ATP                      (D) CoA
- 276. Normal range of serum sodium is**
- (A) 30–70 mEq/L      (B) 70–110 mEq/L
  - (C) 117–135 mEq/L      (D) 136–145 mEq/L
- 277. Sodium is involved in the active uptake of**
- (A) D-Glucose              (B) D-Galactose
  - (C) L-Amino acids      (D) All of these
- 278. Aldosterone increases reabsorption of sodium in**
- (A) Proximal convoluted tubules
  - (B) Ascending limb of loop of Henle
  - (C) Descending limb of loop of Henle
  - (D) Distal convoluted tubules
- 279. Restriction of sodium intake is commonly advised in**
- (A) Addison's disease      (B) Diarrhoea
  - (C) Hypertension              (D) None of these
- 280. Serum sodium level rises in all of the following except**
- (A) Renal failure
  - (B) Prolonged steroid therapy
  - (C) Aldosteronism
  - (D) Dehydration
- 281. Hyponatraemia occurs in the following condition:**
- (A) Addison's disease      (B) Chronic renal failure
  - (C) Severe diarrhoea      (D) All of these
- 282. Serum potassium level decreases in**
- (A) Familial periodic paralysis
  - (B) Addison's disease
  - (C) Renal failure
  - (D) All of these
- 283. Concentration of the following is higher in intracellular fluid than in extracellular fluid:**
- (A) Sodium                      (B) Potassium
  - (C) Chloride                      (D) Bicarbonate
- 284. Normal range of serum potassium is**
- (A) 2.1–3.4 mEq/L      (B) 3.5–5.3 mEq/L
  - (C) 5.4–7.4 mEq/L      (D) 7.5–9.5 mEq/L
- 285. Normal range of serum chloride is**
- (A) 24–27 mEq/L      (B) 70–80 mEq/L
  - (C) 100–106 mEq/L      (D) 120–140 mEq/L
- 286. An extracellular fluid having a higher concentration of chloride than serum is**
- (A) Bile                              (B) Sweat
  - (C) CSF                              (D) Pancreatic juice
- 287. Total amount of iron in an adult man is about**
- (A) 1–2 gm                      (B) 2–3 gm
  - (C) 3–4 gm                      (D) 6–7 gm
- 288. Haemoglobin contains about**
- (A) 30% of the total body iron
  - (B) 50% of the total body iron
  - (C) 75% of the total body iron
  - (D) 90% of the total body iron
- 289. About 5% of the total body, iron is present in**
- (A) Transferrin                      (B) Myoglobin
  - (C) Cytochromes                      (D) Haemosiderin
- 290. Each haemoglobin molecule contains**
- (A) One iron atom                      (B) Two iron atoms
  - (C) Four iron atoms                      (D) Six iron atoms
- 291. Each myoglobin molecule contains**
- (A) One iron atom                      (B) Two iron atoms
  - (C) Four iron atoms                      (D) Six iron atoms

- 292. Apoferritin molecule is made up of**  
 (A) Four subunits (B) Eight subunits  
 (C) Ten subunits (D) Twenty-four subunits
- 293. Ferritin is present in**  
 (A) Intestinal mucosa (B) Liver  
 (C) Spleen (D) All of these
- 294. Iron is stored in the form of**  
 (A) Ferritin and transferrin  
 (B) Transferrin and haemosiderin  
 (C) Haemoglobin and myoglobin  
 (D) Ferritin and haemosiderin
- 295. Iron is transported in blood in the form of**  
 (A) Ferritin (B) Haemosiderin  
 (C) Transferrin (D) Haemoglobin
- 296. Molecular weight of transferrin is about**  
 (A) 40,000 (B) 60,000  
 (C) 80,000 (D) 1,00,000
- 297. Normal plasma iron level is**  
 (A) 50100  $\mu\text{g}/\text{dl}$  (B) 100150  $\mu\text{g}/\text{dl}$   
 (C) 50175  $\mu\text{g}/\text{dl}$  (D) 250400  $\mu\text{g}/\text{dl}$
- 298. Iron is present in all the following except**  
 (A) Peroxidase (B) Xanthine oxidase  
 (C) Aconitase (D) Fumarase
- 299. Total daily iron loss of an adult man is about**  
 (A) 0.1 mg (B) 1 mg  
 (C) 5 mg (D) 10 mg
- 300. Iron absorption is hampered by**  
 (A) Ascorbic acid (B) Succinic acid  
 (C) Phytic acid (D) Amino acid
- 301. Iron absorption is hampered by**  
 (A) In achlorhydria  
 (B) When ferritin content of intestinal mucosa is low  
 (C) When saturation of plasma transferrin is low  
 (D) When erythropoietic activity is increased
- 302. Daily iron requirement of an adult man is about**  
 (A) 1 mg (B) 5 mg  
 (C) 10 mg (D) 18 mg
- 303. Daily iron requirement of a woman of reproductive age is about**  
 (A) 1 mg (B) 2 mg  
 (C) 10 mg (D) 20 mg
- 304. All the following are good sources of iron except**  
 (A) Milk (B) Meat  
 (C) Liver (D) Kidney
- 305. Relatively more iron is absorbed from**  
 (A) Green leafy vegetables  
 (B) Fruits  
 (C) Whole grain cereals  
 (D) Organ meats
- 306. Iron absorption from a mixed diet is about**  
 (A) 1–5% (B) 5–10%  
 (C) 20–25% (D) 25–50%
- 307. Iron deficiency causes**  
 (A) Normocytic anaemia  
 (B) Microcytic anaemia  
 (C) Megaloblastic anaemia  
 (D) Pernicious anaemia
- 308. Prolonged and severe iron deficiency can cause atrophy of epithelium of**  
 (A) Oral cavity (B) Oesophagus  
 (C) Stomach (D) All of these
- 309. All of the following statements about bronzed diabetes are true except**  
 (A) It is caused by excessive intake of copper  
 (B) Skin becomes pigmented  
 (C) There is damage to  $\beta$  cells of Islets of Langerhans  
 (D) Liver is damaged
- 310. The total amount of iodine in the body of an average adult is**  
 (A) 10–15 mg (B) 20–25 mg  
 (C) 45–50 mg (D) 75–100 mg

- 311. Iodine content of thyroid gland in an adult is about**  
(A) 1–3 mg (B) 4–8 mg  
(C) 10–15 mg (D) 25–30 mg
- 312. Daily iodine requirement of an adult is about**  
(A) 50 µg (B) 100 µg  
(C) 150 µg (D) 1 mg
- 313. Consumption of iodised salt is recommended in**  
(A) Patients with hyperthyroidism  
(B) Patients with hypothyroidism  
(C) Pregnant women  
(D) Goitre belt areas
- 314. All the following statements about endemic goiter are true except**  
(A) It occurs in areas where soil and water have low iodine content  
(B) It leads to enlargement of thyroid gland  
(C) It results ultimately in hyperthyroidism  
(D) It can be prevented by consumption of iodised salt
- 315. The total amount of copper in the body of an average adult is**  
(A) 1 gm (B) 500 mg  
(C) 100 mg (D) 10 mg
- 316. The normal range of plasma copper is**  
(A) 25–50 µg/dl (B) 50–100 µg/dl  
(C) 100–200 µg/dl (D) 200–400 µg/dl
- 317. Copper deficiency can cause**  
(A) Polycythaemia (B) Leukocytopenia  
(C) Thrombocytopenia (D) Microcytic anaemia
- 318. Daily requirement of copper in adults is about**  
(A) 0.5 mg (B) 1 mg  
(C) 2.5 mg (D) 5 mg
- 319. All the following statements about ceruloplasmin are correct except**  
(A) It is a copper-containing protein  
(B) It possesses oxidase activity  
(C) It is synthesised in intestinal mucosa  
(D) Its plasma level is decreased in Wilson's disease
- 320. All the following statements about Wilson's disease are correct except**  
(A) It is a genetic disease  
(B) The defect involves copper-dependent P-type ATPase  
(C) Copper is deposited in liver, basal ganglia and around cornea  
(D) Plasma copper level is increased in it
- 321. Which of the following statements about Menke's disease are true.**  
(A) It is an inherited disorder of copper metabolism  
(B) It occurs only in males  
(C) Plasma copper is increased in it  
(D) Hair becomes steely and kinky in it
- 322. The total amount of zinc in an average adult is**  
(A) 0.25–0.5 gm (B) 0.5–1.0 gm  
(C) 1.5–2.0 gm (D) 2.5–5.0 gm
- 323. Plasma zinc level is**  
(A) 10–50 µg/dl (B) 50–150 µg/dl  
(C) 150–250 µg/dl (D) 250–500 µg/dl
- 324. Zinc is a cofactor for**  
(A) Acid phosphatase  
(B) Alkaline phosphatase  
(C) Amylase  
(D) Lipase
- 325. Zinc is involved in storage and release of**  
(A) Histamine (B) Acetylcholine  
(C) Epinephrine (D) Insulin
- 326. Intestinal absorption of zinc is retarded by**  
(A) Calcium (B) Cadmium  
(C) Phytate (D) All of these
- 327. The daily zinc requirement of an average adult is**  
(A) 5 mg (B) 10 mg  
(C) 15 mg (D) 25 mg
- 328. Zinc deficiency occurs commonly in**  
(A) Acrodermatitis enteropathica  
(B) Wilson's disease  
(C) Xeroderma pigmentosum  
(D) Menke's disease

- 329. Hypogonadism can occur in deficiency of**  
(A) Copper (B) Chromium  
(C) Zinc (D) Manganese
- 330. Healing of wounds may be impaired in deficiency of**  
(A) Selenium (B) Copper  
(C) Zinc (D) Cobalt
- 331. Hypochromic microcytic anaemia can occur in**  
(A) Zinc (B) Copper  
(C) Manganese (D) None of these
- 332. The daily requirement for manganese in adults is about**  
(A) 1–2 mg (B) 2–5 mg  
(C) 2–5  $\mu$ g (D) 5–20  $\mu$ g
- 333. Molybdenum is a cofactor for**  
(A) Xanthine oxidase (B) Aldehyde oxidase  
(C) Sulphite oxidase (D) All of these
- 334. A trace element having antioxidant function is**  
(A) Selenium (B) Tocopherol  
(C) Chromium (D) Molybdenum
- 335. Selenium is a constituent of**  
(A) Glutathione reductase  
(B) Glutathione peroxidase  
(C) Catalase  
(D) Superoxide dismutase
- 336. Selenium decreases the requirement of**  
(A) Copper (B) Zinc  
(C) Vitamin D (D) Vitamin E
- 337. Upper safe limit of fluorine in water is**  
(A) 0.4 ppm (B) 0.8 ppm  
(C) 1.2 ppm (D) 2 ppm
- 338. The daily fluoride intake should not exceed**  
(A) 0.5 mg (B) 1 mg  
(C) 2 mg (D) 3 mg
- 339. In adults, water constitutes about**  
(A) 50% of body weight  
(B) 55% of body weight  
(C) 60% of body weight  
(D) 75% of body weight
- 340. 1 kcal is roughly equal to**  
(A) 4.2 J (B) 42 J  
(C) 4.2 KJ (D) 42 KJ
- 341. Calorific value of proteins as determined in a bomb calorimeter is**  
(A) 4 kcal/gm (B) 4.8 kcal/gm  
(C) 5.4 kcal/gm (D) 5.8 kcal/gm
- 342. Calorific value of proteins in a living person is less than that in a bomb calorimeter because**  
(A) Digestion and absorption of proteins is less than 100%  
(B) Respiratory quotient of proteins is less than 1  
(C) Specific dynamic action of proteins is high  
(D) Proteins are not completely oxidized in living persons
- 343. Calorific value of alcohol is**  
(A) 4 kcal/gm (B) 5.4 kcal/gm  
(C) 7 kcal/gm (D) 9 kcal/gm
- 344. Energy expenditure of a person can be measured by**  
(A) Bomb calorimetry  
(B) Direct calorimetry  
(C) Indirect calorimetry  
(D) Direct or indirect calorimetry
- 345. Respiratory quotient of carbohydrates is about**  
(A) 0.5 (B) 0.7  
(C) 0.8 (D) 1.0
- 346. Respiratory quotient of fats is about**  
(A) 0.5 (B) 0.7  
(C) 0.8 (D) 1.0
- 347. Respiratory quotient of proteins is about**  
(A) 0.5 (B) 0.7  
(C) 0.8 (D) 1.0
- 348. Respiratory quotient of an average mixed diet is about**  
(A) 0.65 (B) 0.7  
(C) 0.75 (D) 0.85

- 349. At a respiratory quotient of 0.85, every litre of oxygen consumed represents an energy expenditure of**  
(A) 5.825 kcal (B) 4.825 kcal  
(C) 3.825 kcal (D) 2.825 kcal
- 350. BMR of healthy adult men is about**  
(A) 30 kcal/hour/square metre  
(B) 35 kcal/hour/square metre  
(C) 40 kcal/hour/square metre  
(D) 45 kcal/hour/square metre
- 351. BMR of healthy adult women is about**  
(A) 32 kcal/hour/square metre  
(B) 36 kcal/hour/square metre  
(C) 40 kcal/hour/square metre  
(D) 44 kcal/hour/square metre
- 352. BMR is higher in**  
(A) Adults than in children  
(B) Men than in women  
(C) Vegetarians than in non-vegetarians  
(D) Warmer climate than in colder climate
- 353. BMR is decreased in**  
(A) Pregnancy (B) Starvation  
(C) Anaemia (D) Fever
- 354. BMR is increased in**  
(A) Starvation (B) Hypothyroidism  
(C) Addison's disease (D) Pregnancy
- 355. BMR is decreased in all of the following except**  
(A) Fever (B) Addison's disease  
(C) Starvation (D) Hypothyroidism
- 356. BMR is increased in all of the following except**  
(A) Hyperthyroidism (B) Anaemia  
(C) Addison's disease (D) Pregnancy
- 357. Specific dynamic action of carbohydrates is about**  
(A) 5% (B) 13%  
(C) 20% (D) 30%
- 358. Specific dynamic action of proteins is about**  
(A) 5% (B) 13%  
(C) 20% (D) 30%
- 359. All following are essential trace elements except**  
(A) Iron (B) Iodine  
(C) Zinc (D) Cadmium
- 360. Maximum quantity of sodium is excreted through**  
(A) Urine (B) Faeces  
(C) Sweat (D) None of these
- 361. All followings are rich sources of magnesium, except**  
(A) Milk (B) Eggs  
(C) Meat (D) Cabbage
- 362. All followings are poor sources of iron except**  
(A) Milk (B) Potatoes  
(C) Wheat flour (D) Liver
- 363. The Iron deficient children, absorption of Iron from GIT is**  
(A) Unaltered  
(B) Double than in normal child  
(C) Manifold than in normal child  
(D) Lesser than in normal child
- 364. Main source of fluoride for human beings is**  
(A) Milk (B) Water  
(C) Vegetables (D) Eggs
- 365. Quantity of copper present in the body of an adult is**  
(A) 0–50 mg (B) 50–100 mg  
(C) 100–150 mg (D) 150–250 mg
- 366. A level of 310–340 mg per 1000 ml of blood is normal for the**  
(A) Copper (B) Iron  
(C) Potassium (D) Sodium
- 367. Daily requirement of phosphorous for an infant is**  
(A) 240–400 mg (B) 1.2 gms  
(C) 800 mg (D) 800–1200 mg
- 368. Maximum quantity of Zinc is present in the body in**  
(A) Prostate (B) Choroid  
(C) Skin (D) Bones

- 369. Average concentration of chloride ions in cerebrospinal fluid per 100 ml is**  
 (A) 40 mg (B) 440 mg  
 (C) 160 mg (D) 365 mg
- 370. Total iron content of the normal adult is**  
 (A) 1-2 gm (B) 3-4 gm  
 (C) 4-5 gm (D) 7-10 gm
- 371. Absorption of phosphorous from diet is favoured by**  
 (A) Moderate amount of fat  
 (B) Acidic environment  
 (C) High calcium content  
 (D) High phytic acid
- 372. Daily intake of potassium for a normal person should be**  
 (A) 1 gm (B) 2 gm  
 (C) 3 gm (D) 4 gm
- 373. Absorption of calcium decreases if there is high concentration in the diet of**  
 (A) Copper (B) Sodium  
 (C) Magnesium (D) Cadmium
- 374. Of the following highest concentration of calcium is seen in**  
 (A) Blood (B) CSF  
 (C) Muscle (D) Nerve
- 375. Cobalt is essential component of**  
 (A) Vitamin B<sub>1</sub> (B) Vitamin B<sub>6</sub>  
 (C) Vitamin B<sub>12</sub> (D) All of these
- 376. Iodine is required in human body for**  
 (A) Formation of thyroxine  
 (B) Formation of Glutathione  
 (C) Formation of potassium iodide  
 (D) Adrenalin
- 377. A hypochromic necrocytic anaemia with increase Fe stores in the bone marrow may be**  
 (A) Folic acid responsive  
 (B) Vitamin B<sub>12</sub> responsive  
 (C) Pyridoxine responsive  
 (D) Vitamin C responsive
- 378. A deficiency of copper effects the formation of normal collagen by reducing the activity of which of the following enzyme?**  
 (A) Prolyl hydroxylase  
 (B) Lysyl oxidase  
 (C) Lysyl hydroxylase  
 (D) Glucosyl transferase
- 379. Molecular iron (Fe) is**  
 (A) Stored primarily in spleen  
 (B) Absorbed in the intestine  
 (C) Absorbed in the ferric, Fe<sup>+++</sup> form  
 (D) Stored in the body in combination with ferritin
- 380. All the following statements regarding calcium are correct except**  
 (A) It diffuses as a divalent cation  
 (B) It freely diffuses across the endoplasmic reticulum of muscle cells  
 (C) It can exist in the blood as ionic form and also protein bound  
 (D) It is found in high concentration in bones
- 381. Iron is absorbed from**  
 (A) Stomach  
 (B) Duodenum and jejunum  
 (C) Ileum  
 (D) Noen of the above
- 382. The normal route of calcium excretion is**  
 (A) Kidney  
 (B) Kidney and Liver  
 (C) Kidney and Intestine  
 (D) Kidney, Intestine and Pancreas
- 383. Hypocalcaemia affects**  
 (A) Skeletal muslces  
 (B) Smooth muscles  
 (C) Cardiac muscles  
 (D) Skeletal muscles + smooth muscles + cardiac muscles
- 384. Transferrin is a type of**  
 (A) Albumin (B) α-globulin  
 (C) β<sub>1</sub> globulin (D) γ-globulin



**402. What is the normal level of K<sup>+</sup> in the serum ?**

- (A) 137–148 mEq/L (B) 120–160 mEq/L  
(C) 3.9–5.0 mEq/L (D) 0.3–0.59 mEq/L

**403. The general functions of minerals are**

- (A) The structural components of body tissues  
(B) In the regulation of body fluids  
(C) In acid-base balance  
(D) All of these

**404. What are the functions of potassium?**

- (A) In muscle contraction  
(B) Cell membrane function  
(C) Enzyme action  
(D) All of these

**405. The daily requirement of calcium is**

- (A) 200 mg (B) 400 mg  
(C) 800 mg (D) 600 mg

**406. The normal serum inorganic phosphorous level is**

- (A) 1.5–2.5 mg/100 ml  
(B) 2.5–4.5 mg/100 ml  
(C) 4.5–6.5 mg/100 ml  
(D) 0.5–1.5 mg/100 ml

**407. When phosphorous level is lowered ?**

- (A) In hyper thyroidism (B) Cirrosis of liver  
(C) Leukemia (D) Hypothyroidism

**408. Ferritin is**

- (A) Coenzyme  
(B) One of the component of photophosphorylation

- (C) It is the stored form of iron  
(D) Non-protein moiety

**409. What is ceruloplasmin?**

- (A) Plasma protein (B) Stored form of copper  
(C) Both A and B (D) None of these

**410. The following are the functions of copper:**

- (A) Constituent of cytochromes  
(B) Catalase  
(C) Tyrosinase  
(D) All of these

**411. Zn is present as prosthetic group in this enzyme:**

- (A) Carbonic anhydrase  
(B) Carboxy peptidase  
(C) Lactate dehydrogenase  
(D) All of these

**412. Fluorosis is caused due to**

- (A) Excessive intake of fluorine  
(B) Low intake of fluorine  
(C) Discoloration of the teeth due to low intake  
(D) All of these

**413. What is the state of iron in transferrin?**

- (A) Ferrous form (B) Ferric form  
(C) Both A and B (D) None of these

**414. Haemoglobin formation needs both**

- (A) Iron and Zinc (B) Iron and Calcium  
(C) Iron and Copper (D) Iron and Magnesium

**ANSWERS**

1. A	2. C	3. C	4. A	5. B	6. B
7. C	8. B	9. C	10. D	11. C	12. C
13. B	14. A	15. B	16. A	17. B	18. D
19. D	20. A	21. A	22. A	23. C	24. B
25. C	26. C	27. A	28. C	29. C	30. A
31. D	32. A	33. D	34. A	35. B	36. D
37. B	38. C	39. A	40. A	41. B	42. A
43. D	44. A	45. B	46. A	47. A	48. D
49. D	50. A	51. D	52. A	53. A	54. A
55. D	56. B	57. B	58. A	59. C	60. D
61. A	62. D	63. D	64. D	65. B	66. D
67. D	68. D	69. C	70. D	71. A	72. B
73. C	74. D	75. D	76. B	77. A	78. C
79. A	80. D	81. A	82. A	83. C	84. A
85. C	86. D	87. A	88. C	89. D	90. D
91. C	92. B	93. D	94. C	95. B	96. C
97. B	98. A	99. D	100. A	101. C	102. A
103. B	104. B	105. A	106. D	107. C	108. B
109. A	110. D	111. C	112. D	113. A	114. B
115. A	116. A	117. D	118. A	119. D	120. D
121. B	122. A	123. A	124. B	125. A	126. A
127. A	128. C	129. A	130. A	131. B	132. C
133. D	134. C	135. C	136. C	137. A	138. B
139. A	140. B	141. A	142. D	143. C	144. C
145. D	146. D	147. B	148. D	149. C	150. D
151. C	152. C	153. B	154. D	155. A	156. C
157. D	158. B	159. A	160. D	161. C	162. D
163. A	164. C	165. C	166. A	167. A	168. D
169. A	170. D	171. A	172. A	173. A	174. A
175. B	176. A	177. A	178. C	179. A	180. C
181. D	182. B	183. A	184. D	185. C	186. A
187. B	188. C	189. B	190. C	191. C	192. D
193. A	194. D	195. D	196. D	197. A	198. A
199. A	200. C	201. B	202. A	203. D	204. A
205. A	206. B	207. C	208. D	209. B	210. C
211. A	212. C	213. B	214. A	215. B	216. A
217. A	218. A	219. B	220. D	221. A	222. A
223. B	224. D	225. B	226. A	227. C	228. A
229. C	230. A	231. C	232. B	233. C	234. D
235. A	236. C	237. A	238. B	239. A	240. B
241. D	242. B	243. A	244. A	245. A	246. A
247. C	248. A	249. A	250. D	251. D	252. B

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253. D	254. C	255. D	256. C	257. C	258. D
259. A	260. B	261. D	262. B	263. C	264. C
265. D	266. C	267. D	268. D	269. A	270. C
271. A	272. D	273. D	274. A	275. C	276. D
277. D	278. D	279. C	280. A	281. D	282. A
283. B	284. B	285. C	286. C	287. C	288. C
289. B	290. C	291. A	292. D	293. D	294. D
295. C	296. C	297. C	298. D	299. B	300. C
301. A	302. C	303. D	304. A	305. D	306. B
307. B	308. D	309. A	310. C	311. C	312. C
313. D	314. C	315. C	316. C	317. D	318. C
319. C	320. D	321. C	322. C	323. B	324. B
325. D	326. D	327. C	328. D	329. C	330. C
331. B	332. B	333. D	334. A	335. B	336. D
337. C	338. D	339. C	340. C	341. C	342. D
343. C	344. D	345. D	346. B	347. C	348. D
349. B	350. C	351. B	352. B	353. B	354. D
355. A	356. C	357. A	358. D	359. D	360. A
361. C	362. D	363. B	364. B	365. C	366. D
367. A	368. C	369. B	370. C	371. B	372. D
373. C	374. C	375. C	376. A	377. C	378. B
379. D	380. B	381. B	382. C	383. D	384. B
385. D	386. A	387. A	388. C	389. C	390. B
391. D	392. B	393. D	394. C	395. D	396. D
397. B	398. D	399. A	400. B	401. A	402. C
403. D	404. D	405. C	406. B	407. A	408. C
409. C	410. D	411. D	412. A	413. B	414. C

**HORMONE METABOLISM****1. Hormones**

- (A) Act as coenzyme
- (B) Act as enzyme
- (C) Influence synthesis of enzymes
- (D) Belong to B-complex group

**2. Hormone that binds to intracellular receptor is**

- (A) Adrenocorticotrophic hormone
- (B) Thyroxine
- (C) Follicle stimulating hormone
- (D) Glucagon

**3. Hormone that bind to cell surface receptor and require the second messenger camp is**

- (A) Antidiuretic hormone
- (B) Cholecystokinin
- (C) Calcitriol
- (D) Gastrin

**4. A hormone secreted from anterior pituitary is**

- (A) Growth hormone    (B) Vasopressin
- (C) Oxytocin            (D) Epinephrine

**5. A hormone secreted from posterior pituitary is**

- (A) Vasopressin
- (B) Thyrotropic hormone
- (C) Prolactin
- (D) Adrenocorticotrophic hormone

**6. The number of amino acids in human growth hormone is**

- (A) 91                      (B) 151
- (C) 191                   (D) 291

**7. Growth hormone causes hyperglycemia. It is a result of**

- (A) Decreased peripheral utilization of glucose
- (B) Decreased hepatic production via gluconeogenesis
- (C) Increased glycolysis in muscle
- (D) Decreased lipolysis

**8. Acromegaly results due to excessive release of**

- (A) Thyroxine            (B) Growth hormone
- (C) Insulin                (D) Glucagon

**9. Growth hormone is released by**

- (A) Somatostatin
- (B) Growth hormone releasing hormone
- (C) Prolactin release inhibiting hormone
- (D) Luteinizing releasing hormone

**10. The number of amino acids in prolactin is**

- (A) 134                    (B) 146
- (C) 172                    (D) 199

**11. Adrenocorticotrophic hormone (ACTH) is a single polypeptide containing**

- (A) 25 amino acid    (B) 39 amino acid
- (C) 49 amino acid    (D) 52 amino acid

**12. Biological activity of ACTH requires**

- (A) 10-N-terminal amino acid
- (B) 24-N-terminal amino acid
- (C) 24-C-terminal amino acid
- (D) 15-C-terminal amino acid

**13. ACTH stimulates the secretion of**

- (A) Glucocorticoids (B) Epinephrine
- (C) Thyroxine (D) Luteinizing hormone

**14. Excessive secretion of ACTH causes**

- (A) Cushing's syndrome
- (B) Addison's disease
- (C) Myxoedema
- (D) Thyrotoxicosis

**15. In Cushing's syndrome—a tumour associated disease of adrenal cortex, there is**

- (A) Decreased epinephrine production
- (B) Excessive cortisol production
- (C) Excessive epinephrine production
- (D) Decreased cortisol production

**16. ACTH induces rise in**

- (A) Cyclic AMP (B) Cyclic GMP
- (C) Calcium (D) Magnesium

**17. The circulating concentration of ACTH in plasma is**

- (A) 0.05 m $\mu$ /100 ml
- (B) 0.1–2.0 m $\mu$ /100 ml
- (C) 2.5–3.5 m $\mu$ /100 ml
- (D) 3.0–5.0 m $\mu$ /100 ml

**18. Hyperglycemic effect of glucocorticoids is due to**

- (A) Inactivation of protein phosphatase
- (B) Inactivation of fructose 1,6-biphosphatase
- (C) Stimulation of synthesis of pyruvate carboxylase
- (D) Stimulation of synthesis of eltroxykinase

**19. The predominant glucocorticoid is**

- (A) Cortisol
- (B) Aldosterone
- (C) Dehydroepiandrosterone
- (D) Androstenedione

**20. A specific cortisol binding protein, transcortin is a**

- (A) Albumin (B)  $\alpha_1$ -Globulin
- (C)  $\alpha_2$ -Globulin (D)  $\beta$ -Globulin

**21. Cortisol is synthesized in**

- (A) Zona fasciculata (B) Zona glomerulosa
- (C) Zona reticularis (D) Chromaffin cells

**22. All mammalian steroid hormones are formed from**

- (A) Purine (B) Pyrimidine
- (C) Cholesterol (D) Pyrrole

**23. A very efficient inhibitor of steroid biosynthesis is**

- (A) Aminoglutethimide
- (B) Aminoimidazole
- (C) Aminoimidazolesuccinyl carboxamine
- (D) Aminopterin

**24. In adrenal gland the cholesterol is stored**

- (A) Mostly in the free form
- (B) Mostly in esterified form
- (C) Large amount of free form and less amount of esterified form
- (D) Equal amounts of free and esterified form

**25. Aldosterone synthesis occurs in**

- (A) Zona reticularis (B) Zona fasciculata
- (C) Zona glomerulosa (D) Chromaffian cells

**26. In the biosynthesis of cortisol, the sequence of enzymes involved is**

- (A) Hydroxylase–dehydrogenase + isomerase – hydroxylase
- (B) Dehydrogenase–hydroxylase–isomerase
- (C) Hydroxylase–lyase–dehydrogenase isomerase
- (D) Isomerase–lyase–hydroxylase–dehydrogenase

**27. The defect in adrenal cortex responsible for lack of glucocorticoids and mineralcorticoids is**

- (A) Androstenedione deficiency
- (B) 17 $\alpha$ -OH progesterone deficiency
- (C) C-21 hydroxylase deficiency
- (D) Testosterone deficiency

- 28. 3- $\beta$ -Hydroxysteroid dehydrogenase and  $\Delta^{5,4}$  isomerase catalyse the conversion of the weak androgen DHEA to**  
(A) Androstenedione (B) Testosterone  
(C) Progesterone (D) Estrone
- 29. In the resting state plasma concentration of cortisol is**  
(A) 0.4–2.0  $\mu\text{g}/100$  ml  
(B) 2.0–4.0  $\mu\text{g}/100$  ml  
(C) 5.0–15.0  $\mu\text{g}/100$  ml  
(D) 18.0–25.0  $\mu\text{g}/100$  ml
- 30. The most important effect of aldosterone is to**  
(A) Increase the rate of tubular reabsorption of sodium  
(B) Decrease the rate of tubular reabsorption of potassium  
(C) Decrease the reabsorption of chloride  
(D) Decrease the renal reabsorption of sodium
- 31. One of the potent stimulators of aldosterone secretion is**  
(A) Increased sodium concentration  
(B) Decreased potassium concentration  
(C) Increased potassium concentration  
(D) Increased ECF volume
- 32. In the rennin-angiotensin system the primary hormone is**  
(A) Angiotensinogen (B) Angiotensin I  
(C) Angiotensin II (D) Angiotensin III
- 33. Aldosterone release is stimulated by**  
(A)  $\alpha_2$ -Globulin (B) Renin  
(C) Angiotensin II (D) Growth hormone
- 34. In the synthesis of Angiotensin I, rennin acts on Angiotensinogen and cleaves the**  
(A) Leucine – leucine at 10 and 11 position  
(B) Valine – tyrosine at 3 and 4 position  
(C) Isoleucine – histidine at 5 and 6 position  
(D) Proline – histidine at 7 and 8 position
- 35. Catecholamine hormones are synthesized in the**  
(A) Chromaffin cells of adrenal medulla  
(B) Zona glomerulosa of adrenal cortex  
(C) Zona fasciculate of adrenal cortex  
(D) Zona reticularis of adrenal cortex
- 36. Catecholamine hormones are**  
(A) 3, 4-Dihydroxy derivatives of phenylethylamine  
(B) p-Hydroxy derivatives of phenylacetate  
(C) p-Hydroxy derivatives of phenylpyruvate  
(D) p-Hydroxy derivatives of phenyllactate
- 37. The sequential steps in the conversion of tyrosine to epinephrine are**  
(A) Ring hydroxylation-decarboxylation-side chain hydroxylation-N-methylation  
(B) Side chain hydroxylation-decarboxylation-ring hydroxylation N-methylation  
(C) Decarboxylation-ring hydroxylation-side chain hydroxylation-N-methylation  
(D) N-methylation-decarboxylation-ring and side chain hydroxylation
- 38. The hormone required for uterine muscle contraction for child birth is**  
(A) Progesterone (B) Estrogen  
(C) Oxytocin (D) Vasopressin
- 39. The number of amino acids in the hormone oxytocin is**  
(A) 7 (B) 9  
(C) 14 (D) 18
- 40. Vasopressin and oxytocin circulate unbound to proteins and have very short plasma half lives, on the order of**  
(A) 1–2 minutes (B) 2–4 minutes  
(C) 5–8 minutes (D) 10–12 minutes
- 41. Melanogenesis is stimulated by**  
(A) MSH (B) FSH  
(C) LH (D) HCG
- 42. The number of amino acids in antidiuretic hormone is**  
(A) 9 (B) 18  
(C) 27 (D) 36
- 43. ADH**  
(A) Reabsorbs water from renal tubules  
(B) Excretes water from renal tubules  
(C) Excretes hypotonic urine  
(D) Causes low specific gravity of urine

- 44. Increased reabsorption of water from the kidney is the major consequence of the secretion of the hormone?**  
 (A) Cortisol (B) Insulin  
 (C) Vasopressin (D) Aldosterone
- 45. An increase in the osmolality of extracellular compartment will**  
 (A) Inhibit ADH secretion  
 (B) Stimulate ADH secretion  
 (C) Cause no change in ADH secretion  
 (D) Stimulate the volume and osmoreceptor and inhibit ADH secretion
- 46. For Catecholamine biosynthesis the rate limiting enzyme is**  
 (A) DOPA decarboxylase  
 (B) DOPAMINE  $\beta$ -hydroxylase  
 (C) Tyrosine hydroxylase  
 (D) Phenylalanine hydroxylase
- 47. A hormone which cannot cross the blood brain barrier is**  
 (A) Epinephrine (B) Aldosterone  
 (C) ACTH (D) TSH
- 48. The plasma level of epinephrine is less than**  
 (A) 0.1 ng/ml (B) 0.2 ng/ml  
 (C) 0.4 ng/ml (D) 0.8 ng/ml
- 49. Epinephrine is rapidly metabolized by**  
 (A) Monoamine oxidase  
 (B) Deaminase  
 (C) Transaminase  
 (D) Decarboxylase
- 50. Pheochromocytomas are tumours of**  
 (A) Adrenal cortex (B) Adrenal medulla  
 (C) Pancreas (D) Bone
- 51. A characteristic of pheochromocytoma is elevated urinary excretion of**  
 (A) Dopamine  
 (B) Tyrosine  
 (C) Vinylmandelic acid  
 (D) Phenylalanine
- 52. In the synthetic pathway of epinephrine, disulfiram (antabuse) inhibits the enzyme:**  
 (A) Tyrosine hydroxylase  
 (B) Dopamine  $\beta$ -hydroxylase  
 (C) DOPA decarboxylase  
 (D) N-methyl transferase
- 53. The biosynthesis of both Catecholamine and serotonin require**  
 (A) Tyrosine hydroxylase  
 (B) N-methyl transferase  
 (C) Aromatic amino acid decarboxylase  
 (D) Tryptophan pyrrolase
- 54. Epinephrine stimulates glycogenolysis in**  
 (A) Liver (B) Muscle  
 (C) Liver and muscle (D) Kidney
- 55. A cup of strong coffee would be expected to**  
 (A) Interfere with the synthesis of prostaglandins  
 (B) Decrease the effect of glucagon  
 (C) Enhance the effect of epinephrine  
 (D) Provide the vitamin nicotinic acid
- 56. Epinephrine is derived from norepinephrine by**  
 (A) Decarboxylation (B) Hydroxylation  
 (C) Oxidation (D) N-methylation
- 57. 5 HIAA test is negative if patient is taking**  
 (A) Aspirin (B) Colchicine  
 (C) Phenothiazone (D) Methotrexate
- 58. Presence of significant amount of 5-HIAA in urine indicates**  
 (A) Carcinoid in liver  
 (B) Carcinoid in appendix  
 (C) Metastasis of carcinoma of liver  
 (D) Hepatoma
- 59. The normal serum level of triiodothyronine ( $T_3$ ) is**  
 (A) 0.2–0.5 ng/ml (B) 0.7–2.0 ng/ml  
 (C) 2.0–4.0 ng/ml (D) 5.0–8.0 ng/ml

- 60. The normal serum level of thyroxine ( $T_4$ ) is**  
(A) 2.0–4.0  $\mu\text{g}/100\text{ ml}$   
(B) 5.5–13.5  $\mu\text{g}/100\text{ ml}$   
(C) 14.0–20.3  $\mu\text{g}/100\text{ ml}$   
(D) 20.0–25.0  $\mu\text{g}/100\text{ ml}$
- 61. Excess secretion of thyroid hormones causes**  
(A) Hyperthyroidism (B) Myxoedema  
(C) Cretinism (D) Cushing syndrome
- 62. Insufficient free  $T_3$  and  $T_4$  results in**  
(A) Grave's disease (B) Myxoedema  
(C) Cushing syndrome (D) Gigantism
- 63. In primary hypothyroidism the useful estimation is of**  
(A)  $T_3$  (B)  $T_4$   
(C) TBG (D) Autoantibodies
- 64. When iodine supplies are sufficient the  $T_3$  and  $T_4$  ratio in thyroglobulin is**  
(A) 1 : 2 (B) 1 : 4  
(C) 1 : 7 (D) 1 : 10
- 65. A substance which competes with iodide uptake mechanism by thyroid gland is**  
(A) Thiocyanate (B) Iodoacetate  
(C) Fluoride (D) Fluoroacetate
- 66. Thyroperoxidase enzyme contains**  
(A) Heme (B) Copper  
(C) Zinc (D) Magnesium
- 67. Thyroproxidase requires hydrogen peroxide as oxidizing agent. The  $\text{H}_2\text{O}_2$  is produced by**  
(A)  $\text{FADH}_2$  dependent enzyme  
(B) NADH dependent enzyme  
(C) NADP dependent enzyme  
(D) NADPH dependent enzyme
- 68. Thyroid stimulating hormone is a dimer. The  $\alpha$ -subunits of TSH, LH, FSH are identical. Thus the biological specificity must therefore be  $\beta$  subunit in which the number of amino acids is**  
(A) 78 (B) 112  
(C) 130 (D) 199
- 69. TSH stimulates the synthesis delete**  
(A) Thyroxine (B) Adrenocorticoids  
(C) Epinephrine (D) Insulin
- 70. Thyroid hormones are synthesized by the iodination of the amino acid:**  
(A) Glycine (B) Phenylalanine  
(C) Alanine (D) Tyrosine
- 71. The tyrosine residues per molecule of thyroglobulin is**  
(A) 85 (B) 95  
(C) 115 (D) 135
- 72. The percentage of inactive precursors (moniodotyrosine and diiodotyrosine) in thyroglobulin is**  
(A) 30 (B) 40  
(C) 50 (D) 70
- 73. The number of amino acids in parathormone is**  
(A) 65 (B) 84  
(C) 115 (D) 122
- 74. The sequence of amino acid in which the biological value of parathormone is**  
(A) 1–15 (B) 1–34  
(C) 30–50 (D) 50–84
- 75. PTH**  
(A) Reduces the renal clearance or excretion of calcium  
(B) Increases renal phosphate clearance  
(C) Increases the renal clearance of calcium  
(D) Decreases the renal phosphate clearance
- 76. The number of amino acids in the peptide hormone calcitonin is**  
(A) 16 (B) 24  
(C) 32 (D) 40
- 77. Calcitonin causes**  
(A) Calcinuria and phosphaturia  
(B) Decrease in urinary calcium  
(C) Decrease in urinary phosphorous  
(D) Increase in blood calcium level

- 78. The characteristic of hyperparathyroidism is**
- (A) Low serum calcium  
(B) High serum phosphorous  
(C) Low serum calcium and high serum phosphorous  
(D) High serum calcium and low serum phosphate
- 79. Parathyroid hormone**
- (A) Is released when serum  $\text{Ca}^{++}$  is too high  
(B) Inactivates vitamin D  
(C) Is secreted when  $\text{Ca}^{++}$  is too low  
(D) Depends on vitamin K for adequate activity
- 80.  $\delta$ -Cells of islet of langerhans of pancreas produce**
- (A) Pancreatic polypeptide  
(B) Pancreatic lipase  
(C) Somatostatin  
(D) Steapsin
- 81.  $\beta$ -cells of islet of langerhans of the pancreas secrete**
- (A) Insulin  
(B) Glucagon  
(C) Somatostatin  
(D) Pancreatic polypeptide
- 82. Target tissue of insulin is**
- (A) Red blood cells  
(B) Renal tubular cells  
(C) GI tract epithelial cells  
(D) Liver
- 83. Insulin is a dimer. The number of amino acids in the A and B chain respectively is**
- (A) 19 and 28      (B) 21 and 30  
(C) 25 and 35      (D) 29 and 38
- 84. In A chain of the insulin molecule the N-terminal amino acid is**
- (A) Glycine      (B) Valine  
(C) Serine      (D) Phenylalanine
- 85. In the A chain of insulin molecule the C-terminal amino acid is**
- (A) Asparagine      (B) Threonine  
(C) Valine      (D) Tyrosine
- 86. In the B chain of insulin molecule, the N-terminal amino acid is**
- (A) Proline      (B) Threonine  
(C) Phenylalanine      (D) Lysine
- 87. In the B chain of insulin molecule, the C-terminal amino acid:**
- (A) Threonine      (B) Tyrosine  
(C) Glutamate      (D) Valine
- 88. In the insulin molecule, the number of interchain disulphide bridges is**
- (A) 1      (B) 2  
(C) 3      (D) 4
- 89. In the insulin molecule, the number of intrachain disulphide bridges is**
- (A) 1      (B) 2  
(C) 3      (D) 4
- 90. Insulin exists in polymeric forms, for polymerization it requires**
- (A) Calcium      (B) Magnesium  
(C) Manganese      (D) Zinc
- 91. The number of amino acids in pre-pro insulin is**
- (A) 51      (B) 86  
(C) 109      (D) 132
- 92. Proinsulin has**
- (A) 74 amino acids      (B) 86 amino acids  
(C) 105 amino acids      (D) 109 amino acids
- 93. Daily secretion of insulin in a normal adult man is about**
- (A) 10 units      (B) 20 units  
(C) 30 units      (D) 50 units
- 94. The insulin content of pancreas is about**
- (A) 50–70 units      (B) 100–150 units  
(C) 150–180 units      (D) 200–250 units
- 95. The half life of insulin is**
- (A) < 3–5 minutes      (B) < 8–10 minutes  
(C) < 15 minutes      (D) < 15 minutes

**96. Insulin stimulates**

- (A) Hepatic glycogenolysis
- (B) Hepatic glycogenesis
- (C) Lipolysis
- (D) Gluconeogenesis

**97. Action of insulin on lipid metabolism is**

- (A) It increases lipolysis and increases triglyceride synthesis
- (B) It decreases lipolysis and increases triglyceride synthesis
- (C) It decreases lipolysis and decreases triglyceride synthesis
- (D) It increases synthesis of triglyceride and increased ketogenesis

**98. Insulin increases the activity of**

- (A) Pyruvate kinase
- (B) Phosphorylase
- (C) Triacylglycerol kinase
- (D) Fructose 2, 6-bisphosphatase

**99. Insulin decreases the activity of**

- (A) cAMP dependent protein kinase
- (B) HMG CoA-reductase
- (C) Phosphodiesterase
- (D) Acetyl CoA-carboxylase

**100. The human insulin gene located on the short arm of chromosome:**

- (A) 11                      (B) 17
- (C) 18                      (D) 20

**101. Normal serum insulin level varies between**

- (A) 4–25  $\mu$ U/ml      (B) 25–50  $\mu$ U/ml
- (C) 70–90  $\mu$ U/ml      (D) 100–120  $\mu$ U/ml

**102. Following is a normal overnight fast and a cup of black coffee, a diabetic woman feels slightly nauseous and decides to skip breakfast. However she does take her shot of insulin. This may result in**

- (A) Heightened glycogenolysis
- (B) Hypoglycemia
- (C) Increased lipolysis
- (D) Glycosuria

**103. Deficiency of insulin results in**

- (A) Rapid uptake of sugar
- (B) Low blood glucose level
- (C) Decrease urine output
- (D) Presence of glucose in urine

**104. The primary stimulus for insulin secretion is increased.**

- (A) Blood level of epinephrine
- (B) Blood level of glucagon
- (C) Blood level of glucose
- (D) Water intake

**105. The  $\alpha$ -cells of pancreas islets produce**

- (A) Insulin
- (B) Glucagon
- (C) Somatostatin
- (D) Pancreatic polypeptide

**106. The number of amino acids in single chain polypeptide glucagons is**

- (A) 21                      (B) 29
- (C) 31                      (D) 39

**107. The half life of glucagons is**

- (A) ~5                      (B) ~7
- (C) ~10                      (D) ~12

**108. Glucagon enhances**

- (A) Hepatic glycogenolysis
- (B) Muscle glycogenolysis
- (C) Hepatic glycogenesis
- (D) Lipogenesis

**109. Normal serum glucagons level in fasting state varies between**

- (A) 0–10 pg/ml      (B) 20–100 pg/ml
- (C) 200–300 pg/ml      (D) 400–500 pg/ml

**110. Glucagon**

- (A) Increases protein synthesis
- (B) Inhibits lipolysis in adipocytes
- (C) Increases gluconeogenesis in liver
- (D) Stimulates muscle glycogenolysis

**111. Normal serum free testosterone in adult men varies between**

- (A) 1–5 ng/dl      (B) 6–9 ng/dl
- (C) 10–30 ng/dl      (D) 50–100 ng/dl

- 112. Normal serum free testosterone in adult women varies between**  
 (A) 0.0–0.2 ng/dl (B) 0.3–2 ng/dl  
 (C) 10–30 ng/dl (D) 50–100 ng/dl
- 113. The prepubertal total serum testosterone is**  
 (A) <100 ng/100 ml (B) < 200 ng/100 ml  
 (C) <300 ng/100 ml (D) < 400 ng/100 ml
- 114. The total serum testosterone in adult men is**  
 (A) 50–100 ng/100 ml  
 (B) 150–250 ng/100 ml  
 (C) 300–1000 ng/100 ml  
 (D) 1000–3000 ng/100 ml
- 115. The total serum testosterone in adult women is**  
 (A) 0–5 ng/100 ml  
 (B) 10–15 ng/100 ml  
 (C) 20–80 ng/100 ml  
 (D) 100–200 ng/100 ml
- 116. The serum estradiol level in men is**  
 (A) 0–5 pg/ml (B) 5–10 pg/ml  
 (C) 24–68 pg/ml (D) 40–60 pg/ml
- 117. The serum estradiol level in women during 1–10 days of menstrual cycle is**  
 (A) 0–10 pg/ml (B) 12–20 pg/ml  
 (C) 24–68 pg/ml (D) 80–100 pg/ml
- 118. The serum estradiol level in women during 11–20 days of menstrual cycle is**  
 (A) 5–30 pg/ml (B) 50–300 pg/ml  
 (C) 500–900 pg/ml (D) 1000 pg/ml
- 119. The serum estradiol level in women during 21–30 days of menstrual cycle is**  
 (A) 10–20 pg/ml (B) 22–66 pg/ml  
 (C) 73–149 pg/ml (D) 1000 pg/ml
- 120. The serum progesterone level in follicular phase is about**  
 (A) 0.2–1.5 ng/100 ml  
 (B) 2.0–2.5 ng/100 ml  
 (C) 3.5–4.5 ng/100 ml  
 (D) 5.0–6.5 ng/100 ml
- 121. Serum progesterone level during pregnancy is**  
 (A) < 12 ng/ml (B) > 12 ng/ml  
 (C) < 20 ng/ml (D) >24 ng/ml
- 122. Serum progesterone level during luteal phase is**  
 (A) 0.2–203 ng/ml (B) 3.0–5.0 ng/ml  
 (C) 6.0–30 ng/ml (D) 750 ng/ml
- 123. Androgens are produced by**  
 (A) Cells of sertoli  
 (B) Leydig cells  
 (C) Rete testis  
 (D) Efferent ductules
- 124. The leydig cell activity is controlled by**  
 (A) Intestinal cell stimulating hormone  
 (B) Adrenocortex stimulating hormone  
 (C) Thyroid stimulating hormone  
 (D) Melanocyte stimulating hormone
- 125. Stein-leventhal syndrome is due to over-production of**  
 (A) Estrogens (B) Androgens  
 (C) Gestagens (D) Ethinyl estradiol
- 126. The production of progesterone by corpus luteum cell is stimulated by**  
 (A) LH (B) TSH  
 (C) ACTH (D) MSH
- 127. In the biosynthesis of testosterone the rate limiting step is conversion of**  
 (A) Cholesterol to pregnenolone  
 (B) Pregnenolone to progesterone  
 (C) Progesterone to 17  $\alpha$ -hydroxy progesterone  
 (D) 17  $\alpha$ -Hydroxy progesterone to androstenedione
- 128. The enzyme catalyzing conversion of androstenedione to testosterone is a**  
 (A) Oxygenase (B) Dehydrogenase  
 (C) Isomerase (D) Decarboxylase
- 129. Conversion of testosterone to estradiol requires the enzyme:**  
 (A) Aromatase (B) Dehydrogenase  
 (C) Lyase (D) Isomerase

**130. The precursor of testosterone is**

- (A) Aldosterone      (B) Methyl testosterone  
(C) Estrone          (D) Pregnenolone

**131. Urinary 17 ketosteroids**

- (A) Are not found in women  
(B) Reflect the total production of androgenic substances  
(C) Indicate the total production of sex hormone  
(D) Are highly active androgens

**132. The hormone measured in urine to test pregnancy is**

- (A) Anterior pituitary luteinizing hormone  
(B) Androgen  
(C) Progesterone  
(D) Chorionic gonadotropin

**133. Total number of amino acids in human chorionic gonadotropin is**

- (A) 53                      (B) 92  
(C) 145                    (D) 237

**134. A hormone produced by corpus luteum and placenta, concerned with relaxation of pelvis tissue is**

- (A) HCG  
(B) Chorionic somatomotropin  
(C) Relaxin  
(D) Progestins

**135. Synthetic progesterone used in oral contraceptive is**

- (A) Norethindrone      (B) Pregnenolone  
(C) Androstenedione   (D) Stilbestrol

**136. Young women are protected against myocardial infarction because of the activity of**

- (A) Estrogen              (B) Progesterone  
(C) Growth hormone   (D) Oxytocin

**137. Hormone receptors possess all the following properties except**

- (A) All of them are proteins  
(B) They possess a recognition domain  
(C) They bind hormones with a high degree of specificity  
(D) Number of receptors in a target cell is constant

**138. The only correct statement about hormone receptors is**

- (A) Receptors for protein hormones are present in cytosol  
(B) Receptors for steroid hormones are membrane bound  
(C) Hormone-receptor binding is irreversible  
(D) Receptors can undergo down regulation and up regulation

**139. Down regulation is**

- (A) Increased destruction of a hormone  
(B) Feed back inhibition of hormone secretion  
(C) Decreased concentration of a hormone in blood  
(D) Decrease in number of receptors for a hormone

**140. All the following statements about hormones are true except**

- (A) All of them require specific carriers in plasma  
(B) All of them require specific receptors in target cells  
(C) Some of them are subject to feedback regulation  
(D) Some of them increase the transcription of certain genes

**141. All the following statements about steroid hormones are true except**

- (A) They are hydrophobic  
(B) They require carriers to transport them in circulation  
(C) Their receptors are intracellular  
(D) They require cyclic AMP as second messenger

**142. Cyclic AMP acts as the second messenger for**

- (A) ADH                      (B) Glucagon  
(C) Calcitonin              (D) All of these

**143. Cyclic AMP acts as the second messenger for all of the following except**

- (A) Oxytocin                (B) TSH  
(C) ACTH                    (D) FSH

- 144. Cyclic GMP acts as the second messenger for**  
 (A) Nerve growth factor  
 (B) Atrial natriuretic factor  
 (C) Epinephrine  
 (D) Norepinephrine
- 145. Some hormones produce their intracellular effects by activating**  
 (A) Phospholipase A<sub>1</sub> (B) Phospholipase B  
 (C) Phospholipase C (D) All of these
- 146. Inositol triphosphate is the second messenger for**  
 (A) Gastrin (B) Cholecystokinin  
 (C) Oxytocin (D) All of these
- 147. G-proteins act as**  
 (A) Hormone carriers  
 (B) Hormone receptors  
 (C) Second messengers  
 (D) Signal transducers
- 148. Signal transducer for glucagons is a**  
 (A) Cyclic nucleotide  
 (B) Phosphoinositide  
 (C) Stimulatory G-protein  
 (D) Inhibitory G-protein
- 149. G-proteins are**  
 (A) Monomers (B) Dimers  
 (C) Trimers (D) Tetramers
- 150. G-proteins have a nucleotide binding site for**  
 (A) ADP/ATP (B) GDP/GTP  
 (C) CDP/CTP (D) UDP/UTP
- 151. The nucleotide binding site of G-proteins is present on their**  
 (A)  $\alpha$ -Subunit (B)  $\beta$ -Subunit  $\alpha$ - and  $\beta$ -  
 (C)  $\gamma$ -Subunit (D)  $\delta$ -Subunit
- 152. Adenylate cyclase is activated by**  
 (A) GDP-bearing  $\alpha$ -Subunit of G-protein  
 (B) GTP-bearing  $\alpha$ -Subunit of G-protein  
 (C) GDP-bearing  $\gamma$ -Subunit of G-protein  
 (D) GTP-bearing  $\gamma$ -Subunit of G-protein
- 153. Tyrosine kinase activity is present in**  
 (A)  $\alpha$ -Adrenergic receptors  
 (B)  $\beta$ -Adrenergic receptors  
 (C) Cholinergic receptors  
 (D) Insulin receptors
- 154. Insulin receptor is a**  
 (A) Monomer (B) Dimer  
 (C) Trimer (D) Tetramer
- 155. Tyrosine kinase activity is present in**  
 (A) Acetylcholine receptor  
 (B) PDGF receptor  
 (C) ADH receptor  
 (D) All of these
- 156. Protein kinase C is activated by**  
 (A) Cyclic AMP (B) Cyclic GMP  
 (C) Diacyl glycerol (D) Inositol triphosphate
- 157. Melatonin is synthesised in**  
 (A) Hypothalamus  
 (B) Posterior pituitary gland  
 (C) Pineal gland  
 (D) Melanocytes
- 158. Melatonin is synthesised from**  
 (A) Phenylalanine (B) Tyrosine  
 (C) Tryptophan (D) None of these
- 159. Melanocyte stimulating hormone is secreted by**  
 (A) Pineal gland  
 (B) Anterior lobe of pituitary gland  
 (C) Posterior lobe of pituitary gland  
 (D) Intermediate lobe of pituitary gland
- 160. MSH causes**  
 (A) Dispersal of melanin granules in melanocytes  
 (B) Increase in melanin concentration in melanocytes  
 (C) Decrease in melanin concentration in melanocytes  
 (D) Increase in number of melanocytes
- 161. Secretion of MSH is regulated by**  
 (A) Feedback mechanism  
 (B) Melatonin  
 (C) Hypothalamic hormones  
 (D) ACTH

- 162. A hormone synthesised in the hypothalamus is**  
(A) Melatonin  
(B) Melanocyte stimulating hormone  
(C) Vasopressin  
(D) Prolactin
- 163. Posterior pituitary gland secretes**  
(A) Catecholamines  
(B) Oxytocin  
(C) Follicle stimulating hormone  
(D) Serotonin
- 164. A nonapeptide among the following is**  
(A) Antidiuretic hormone  
(B) Insulin  
(C) ACTH  
(D) Thyrotropin releasing hormone
- 165. Diabetes insipidus is caused by deficient secretion of**  
(A) Insulin (B) Glucagon  
(C) Vasopressin (D) Oxytocin
- 166. Peripheral vasoconstriction is caused by high concentrations of**  
(A) Antidiuretic hormone  
(B) Melatonin  
(C) Glucagon  
(D) Oxytocin
- 167. Somatotropin is secreted by**  
(A) Hypothalamus (B) Anterior pituitary  
(C) Posterior pituitary (D) Thyroid gland
- 168. Secretion of Insulin-like Growth Factor-I is promoted by**  
(A) Insulin (B) Glucagon  
(C) Growth hormone (D) Somatomedin C
- 169. Growth hormone increases**  
(A) Protein synthesis (B) Lipogenesis  
(C) Glycogenolysis (D) All of these
- 170. Secretion of growth hormone is inhibited by**  
(A) Somatomedin C (B) Somatostatin  
(C) Feedback inhibition (D) All of these
- 171. Secretion of somatotrophin is promoted by**  
(A) Somatomedin C  
(B) Somatostatin  
(C) Growth hormone releasing hormone  
(D) Hypoglycaemia
- 172. Human growth hormone has**  
(A) One polypeptide chain and one intra-chain disulphide bond  
(B) One polypeptide chain and two intra-chain disulphide bond  
(C) Two polypeptide chains joined by one disulphide bond  
(D) Two polypeptide chains joined by two disulphide bond
- 173. Number of amino acid residues in human growth hormone is**  
(A) 51 (B) 84  
(C) 191 (D) 198
- 174. Number of amino acid residues in prolactin is**  
(A) 51 (B) 84  
(C) 191 (D) 198
- 175. Secretion of prolactin is regulated by**  
(A) Feedback inhibition  
(B) Prolactin releasing hormone  
(C) Prolactin release inhibiting hormone  
(D) All of these
- 176. Precursor of ACTH is**  
(A) Cholesterol (B) Pregnenolone  
(C) Corticotropin (D) Pro-opiomelanocortin
- 177. All of the following can be formed from pro-opiomelanocortin except**  
(A)  $\alpha$ -and  $\beta$ -MSH (B)  $\beta$ -and  $\gamma$ -Lipotropins  
(C)  $\alpha$ -and  $\beta$ -Endorphins (D) FSH
- 178. All the following statements about pro-opiomelanocortin are true except**  
(A) It is made up of 285 amino acids  
(B) It is synthesised in pars intermedia and anterior lobe of pituitary gland  
(C) It is the precursor of ACTH and melatonin  
(D) It is the precursor of corticotropin like intermediate lobe peptide and endorphins

- 179. All the following statements about ACTH are true except**
- (A) It is a tropic hormone
  - (B) Its target cells are located in adrenal cortex
  - (C) Its receptors are located in the cell membrane
  - (D) Its second messenger is inositol triphosphate
- 180. Regulation of ACTH secretion occurs through**
- (A) Corticotropin releasing hormone (CRH) and corticotropin release inhibiting hormone (CRIH) of hypothalamus
  - (B) Feedback inhibition by cortisol
  - (C) CRH and feedback inhibition by cortisol
  - (D) CRIH and feedback inhibition by cortisol
- 181. ACTH is a polypeptide made up of**
- (A) 39 amino acids    (B) 41 amino acids
  - (C) 51 amino acids    (D) 84 amino acids
- 182. CRH is a polypeptide made up of**
- (A) 39 amino acids    (B) 41 amino acids
  - (C) 51 amino acids    (D) 84 amino acids
- 183. Hormonal activity of ACTH is completely lost on removal of**
- (A) 5 C-terminal amino acids
  - (B) 10 C-terminal amino acids
  - (C) 15 C-terminal amino acids
  - (D) None of these
- 184. All the following statements about TSH are true except**
- (A) It is a glycoprotein
  - (B) It is made up of  $\alpha$ - and  $\beta$ -subunits
  - (C) Receptor recognition involves both the subunits
  - (D) Its subunit is identical with those of FSH and LH
- 185. All the following statements about TSH are true except**
- (A) It is a tropic hormone
  - (B) It acts on para-follicular cells of thyroid glands
  - (C) Its receptors are membrane-bound
  - (D) Its second messenger is cyclic AMP
- 186. All the following statements about thyrotropin releasing hormone are true except**
- (A) It is secreted by hypothalamus
  - (B) It is a pentapeptide
  - (C) It increases the secretion of TSH
  - (D) Its secretion is inhibited by high level of  $T_3$  and  $T_4$  in blood
- 187. In males, luteinising hormone acts on**
- (A) Leydig cells    (B) Sertoli cells
  - (C) Prostate gland    (D) All of these
- 188. All the following statements about FSH are true except**
- (A) It is a tropic hormone secreted by anterior pituitary
  - (B) Its secretion is increased by gonadotropin releasing hormone
  - (C) It acts on Sertoli cells
  - (D) It increases the synthesis of testosterone
- 189. In males, secretion of luteinising hormone is inhibited by**
- (A) Gonadotropin releasing hormone
  - (B) FSH
  - (C) High blood level of testosterone
  - (D) Inhibin
- 190. Secretion of luteinising hormone is increased by**
- (A) GnRH    (B) FSH
  - (C) Testosterone    (D) None of these
- 191. In structure and function, HCG resembles**
- (A) FSH    (B) LH
  - (C) GnRH    (D) Progesterone
- 192. Acromegaly results from overproduction of**
- (A) ACTH during childhood
  - (B) TSH during adult life
  - (C) Growth hormone during childhood
  - (D) Growth hormone during adult life

- 193. Acromegaly results in all the following except**
- (A) Overgrowth of the bones of face, hands and feet
  - (B) Increased stature
  - (C) Enlargements of viscera
  - (D) Impaired glucose tolerance
- 194. Overproduction of growth hormone during childhood causes**
- (A) Acromegaly (B) Gigantism
  - (C) Cushing's disease (D) Simmond's disease
- 195. Decreased secretion of growth hormone during childhood causes**
- (A) Simmond's disease (B) Cushing's disease
  - (C) Dwarfism (D) Cretinism
- 196. Stature is increased in**
- (A) Gigantism (B) Acromegaly
  - (C) Simmond's disease (D) Cushing's disease
- 197. An amino acid used for the synthesis of thyroid hormone is**
- (A) Tyrosine (B) Tryptophan
  - (C) Histidine (D) Proline
- 198. An enzyme required for the synthesis of thyroid hormones is**
- (A) Iodinase (B) Deiodinase
  - (C) Thyroperoxidase (D) Thyroxine synthetase
- 199. Thyroperoxidase iodinated**
- (A) Free tyrosine in thyroid gland
  - (B) Tyrosine residues of thyroglobulin
  - (C) Tyrosine residues of thyroxine binding globulin
  - (D) Tyrosine residues of thyroxine binding prealbumin
- 200. In thyroxine, tyrosine residues are iodinated at positions:**
- (A) 1 and 3 (B) 2 and 4
  - (C) 3 and 5 (D) 4 and 6
- 201. Thyroid gland takes up circulating iodine**
- (A) By simple diffusion
  - (B) By facilitated diffusion
  - (C) By active uptake
  - (D) In exchange for chloride
- 202. Thyroid hormones are present in blood**
- (A) In free form
  - (B) In association with thyroxine binding globulin (TBG)
  - (C) In association with thyroxine binding prealbumin (TBPA)
  - (D) Mainly in association with TBG, partly in free form and sometimes in association with TBPA also
- 203. When thyroxine binding globulin and thyroxine binding pre-albumin are saturated with thyroxine, the excess hormone is transported by**
- (A) Albumin (B) Gamma globulins
  - (C) Transcortin (D) None of these
- 204. Receptors for thyroid hormones are present**
- (A) On the cell membrane
  - (B) Across the cell membrane
  - (C) Inside the cells
  - (D) In association with G-proteins
- 205. Binding of thyroxine to its receptors**
- (A) Activates Adenylate cyclase
  - (B) Activates guanylate cyclase
  - (C) Activates a stimulatory G-protein
  - (D) Increases transcription
- 206. The most powerful thyroid hormone is**
- (A) Reverse  $T_3$  (B) DIT
  - (C)  $T_3$  (D)  $T_4$
- 207. The most abundant thyroid hormone in blood is**
- (A) Free  $T_3$  (B)  $T_3$  bound to TBG
  - (C) Free  $T_4$  (D)  $T_4$  bound to TBG
- 208. Secretion of thyroid hormones is regulated by**
- (A) Hypothalamus
  - (B) Anterior pituitary
  - (C) Feedback regulation
  - (D) All of these

- 209. Clinical features of hyperthyroidism include**
- (A) Goitre, heat intolerance, weight loss and tachycardia  
 (B) Goitre, tremors, tachycardia and cold intolerance  
 (C) Exophthalmos, goiter, tachycardia and loss of appetite  
 (D) Exophthalmos, goiter, tremors and obesity
- 210. All the following may occur in hyperthyroidism except**
- (A) Goitre (B) Increased appetite  
 (C) Loss of weight (D) Low BMR
- 211. All the following may occur in myxoedema except**
- (A) Cold intolerance (B) Low BMR  
 (C) Tachycardia (D) Dry and coarse skin
- 212. Mental retardation can occur in**
- (A) Cretinism  
 (B) Juvenile myxoedema  
 (C) Myxoedema  
 (D) Juvenile thyrotoxicosis
- 213. Parathyroid hormone (PTH) is synthesised in**
- (A) Chief cells of parathyroid glands  
 (B) Oxyphil cells of parathyroid glands  
 (C) Para follicular cells of thyroid glands  
 (D) Follicular cells of thyroid gland
- 214. The number of amino acid residues in PTH:**
- (A) 51 (B) 84  
 (C) 90 (D) 115
- 215. Amino acid residues which are essential for the biological activity of PTH are**
- (A) N-terminal 34 amino acids  
 (B) N-terminal 50 amino acids  
 (C) C-terminal 34 amino acids  
 (D) C-terminal 50 amino acids
- 216. Half-life of PTH is**
- (A) A few seconds (B) A few minutes  
 (C) A few hours (D) A few days
- 217. The second messenger for PTH is**
- (A) Cyclic AMP (B) Cyclic GMP  
 (C) Diacylglycerol (D) Inositol triphosphate
- 218. PTH causes all of the following except**
- (A) Increased intestinal absorption of calcium  
 (B) Increased intestinal absorption of phosphate  
 (C) Increased tubular reabsorption of calcium  
 (D) Increased tubular reabsorption of phosphate
- 219. Secretion of PTH is regulated by**
- (A) Hypothalamus  
 (B) Anterior pituitary  
 (C) Feedback effect of plasma PTH  
 (D) Feedback effect of plasma calcium
- 220. A high concentration of PTH in blood causes**
- (A) Increase in plasma calcium and inorganic phosphorous  
 (B) Decrease in plasma calcium and inorganic phosphorous  
 (C) Increase in plasma calcium and decrease in plasma inorganic phosphorous  
 (D) Decrease in plasma calcium and increase in plasma inorganic phosphorous
- 221. Tetany can occur**
- (A) In primary hyperparathyroidism  
 (B) In secondary hyperparathyroidism  
 (C) In idiopathic hypoparathyroidism  
 (D) After accidental removal of parathyroid glands
- 222. Crystallisation of insulin occurs in the presence of**
- (A) Chromium (B) Copper  
 (C) Zinc (D) Calcium
- 223. Daily secretion of insulin is about  $\delta$ -**
- (A) 10–20 mg (B) 40–50 mg  
 (C) 10–20 units (D) 40–50 units
- 224. Insulin receptors are decreased in number in**
- (A) Obesity (B) Starvation  
 (C) Hyperinsulinism (D) Kwashiorkor

- 225. Insulin binding sites are present on the**  
(A)  $\alpha$ -subunits of insulin receptor  
(B)  $\beta$ -subunits of insulin receptor  
(C)  $\gamma$ -subunits of insulin receptor  
(D)  $\alpha$ -and  $\beta$ -subunits of insulin receptor
- 226.  $\alpha$ -Subunits of insulin receptor are present**  
(A) Outside the cell membrane  
(B) In the cell membrane  
(C) Across the cell membrane  
(D) In the cytosol
- 227.  $\beta$ -Subunits of insulin receptor are present**  
(A) Outside the cell membrane  
(B) In the cell membrane  
(C) Across the cell membrane  
(D) In the cytosol
- 228. In the insulin receptor, tyrosine kinase domain is present in**  
(A)  $\alpha$ -Subunits (B)  $\beta$ -Subunits  
(C)  $\gamma$ -Subunits (D)  $\delta$ -Subunits
- 229. Binding of insulin to its receptor activates**  
(A) Adenylate cyclase (B) Guanylate cyclase  
(C) Phospholipase C (D) Tyrosine kinase
- 230. Insulin receptor is made up of**  
(A) One  $\alpha$ -and one  $\beta$ -subunit  
(B) Two  $\alpha$ -and two  $\beta$ -subunit  
(C) Two,  $\alpha$  two  $\beta$ -and two  $\gamma$ -subunit  
(D) One  $\alpha$ , one  $\beta$ -one  $\gamma$ -and one  $\delta$ -subunit
- 231. Insulin is required for the active uptake of glucose by most of the cells except**  
(A) Muscle cells (B) Renal tubular cells  
(C) Adipocytes (D) Liver cells
- 232. Insulin decreases**  
(A) Glycogenesis  
(B) Glycolysis  
(C) Gluconeogenesis  
(D) Tubular reabsorption of glucose
- 233. Insulin increases**  
(A) Glycogenesis (B) Gluconeogenesis  
(C) Lipolysis (D) Blood glucose
- 234. Insulin increases**  
(A) Protein synthesis (B) Fatty acid synthesis  
(C) Glycogen synthesis (D) All of these
- 235. Insulin decreases the synthesis of**  
(A) Hexokinase (B) Glucokinase  
(C) PEP carboxykinase (D) Glycogen synthetase
- 236. Diabetes mellitus can occur due to all of the following except**  
(A) Deficient insulin secretion  
(B) Tumour of  $\beta$ -cells  
(C) Decrease in number of insulin receptors  
(D) Formation of insulin antibodies
- 237. Hypoglycaemic coma can occur**  
(A) In untreated diabetes mellitus  
(B) In starvation  
(C) After overdose of oral hypoglycaemic drugs  
(D) After overdose of insulin
- 238. Second messenger for glucagons is**  
(A) Cyclic AMP (B) Diacylglycerol  
(C) Cyclic GMP (D) Inositol triphosphate
- 239. Number of amino acid residues in glucagons is**  
(A) 29 (B) 34  
(C) 51 (D) 84
- 240. Glucagon secretion increases**  
(A) After a carbohydrate-rich meal  
(B) After a fat-rich meal  
(C) When blood glucose is high  
(D) When blood glucose is low
- 241. The main effecting of glucagons is to increase**  
(A) Glycolysis in muscles  
(B) Glycogenolysis in muscles  
(C) Glycogenolysis in liver  
(D) Glycogenesis in liver
- 242. Tyrosine is required for the synthesis of all of the following except**  
(A) Melatonin (B) Epinephrine  
(C) Norepinephrine (D) Thyroxine

**243. Dopamine is synthesised from**

- (A) Dihydroxyphenylalanine
- (B) Epinephrine
- (C) Norepinephrine
- (D) Metanephrine

**244. Blood brain barrier can be crossed by**

- (A) Epinephrine
- (B) Dopamine
- (C) Dopa
- (D) All of these

**245. Epinephrine is synthesised in**

- (A) Chromaffin cells of adrenal medulla
- (B) Sympathetic ganglia
- (C) Brain
- (D) All of these

**246. Immediate precursor of epinephrine is**

- (A) Metanephrine
- (B) Norepinephrine
- (C) Dopa
- (D) Dopamine

**247. The chief metabolite of catecholamines is**

- (A) Metanephrine
- (B) Normetanephrine
- (C) 3, 4-Dihydroxymandelic acid
- (D) Vanillylmandelic acid

**248. An enzyme involved in catabolism of catecholamines is**

- (A) Dopa decarboxylase
- (B) Aromatic amino acid decarboxylase
- (C) Monoamine oxidase
- (D) Catechol oxidase

**249. Norepinephrine binds mainly to**

- (A)  $\alpha$ -Adrenergic receptors
- (B)  $\beta$ -Adrenergic receptors
- (C) Muscarinic receptors
- (D) Nicotinic receptors

**250. A stimulatory G-protein transduces the signals from**

- (A)  $\alpha_1$ - and  $\beta_1$ -adrenergic receptors
- (B)  $\alpha_2$ - and  $\beta_2$ -adrenergic receptors
- (C)  $\alpha_1$ - and  $\alpha_2$ -adrenergic receptors
- (D)  $\beta_1$ - and  $\beta_2$ -adrenergic receptors

**251. Binding of catecholamines to  $\alpha_2$ -adrenergic receptors**

- (A) Increases the intracellular concentration of cAMP
- (B) Increases the intracellular concentration of cGMP
- (C) Decreases the intracellular concentration of cAMP
- (D) Decreases the intracellular concentration of cGMP

**252. Phosphoinositide cascade is activated on binding of catecholamines to**

- (A)  $\alpha_1$ -Adrenergic receptors
- (B)  $\alpha_2$ -Adrenergic receptors
- (C)  $\beta_1$ -Adrenergic receptors
- (D)  $\beta_2$ -Adrenergic receptors

**253. Epinephrine decreases**

- (A) Glycogenesis
- (B) Glycogenolysis
- (C) Gluconeogenesis
- (D) Lipolysis

**254. Epinephrine increases the concentration of free fatty acids in plasma by increasing**

- (A) Extramitochondrial fatty acid synthesis
- (B) Mitochondrial fatty acid chain elongation
- (C) Microsomal fatty acid chain elongation
- (D) Lipolysis in adipose tissue

**255. Epinephrine increases all of the following except**

- (A) Glycogenolysis in muscles
- (B) Lipolysis in adipose tissue
- (C) Gluconeogenesis in muscles
- (D) Glucagon secretion

**256. Secretion of catecholamines is increased in**

- (A) Cushing's syndrome
- (B) Addison's disease
- (C) Pheochromocytoma
- (D) Simmond's disease

**257. Zona glomerulosa of adrenal cortex synthesises**

- (A) Glucocorticoids
- (B) Mineralocorticoids
- (C) Androgens
- (D) Estrogen and progesterone

- 258. Cortisol is a**  
(A) Glucocorticoid (B) Mineralocorticoid  
(C) Androgen (D) Estrogen
- 259. The major mineralcorticoid is**  
(A) Hydrocortisone (B) Aldosterone  
(C) Aldactone A (D) Androstenedione
- 260. Steroid hormones are synthesised in all of the following except**  
(A) Testes (B) Ovaries  
(C) Adrenal medulla (D) Adrenal cortex
- 261. Steroid hormones are synthesised from**  
(A) Cholesterol  
(B) 7-Dehydrocholesterol  
(C) Calcitriol  
(D) 7-Hydroxycholesterol
- 262. A common intermediate in the synthesis of all the steroid hormones is**  
(A) Pregnenolone  
(B) 17-Hydroxypregnenolone  
(C) Corticosterone  
(D) Progesterone
- 263. A common intermediate in the synthesis of cortisol and aldosterone is**  
(A) Progesterone (B) Testosterone  
(C) Estradiol (D) None of these
- 264. A common intermediate in the synthesis of estrogens is**  
(A) Cortisol  
(B) Androstenedione  
(C) Corticosterone  
(D) 11-Deoxycorticosterone
- 265. Glucocorticoids are transported in blood**  
(A) In association with transcortin chiefly  
(B) In association with albumin to some extent  
(C) In free form partly  
(D) All of these
- 266. All the following statements about transcortin are true except**  
(A) It is synthesised in liver  
(B) It transports glucocorticoids  
(C) It transports aldosterone  
(D) It transports progesterone
- 267. The second messenger for glucocorticoids is**  
(A) Cyclic AMP  
(B) Cyclic GMP  
(C) Inositol triphosphate  
(D) No second messenger is required
- 268. Glucocorticoids increase all of the following except**  
(A) Gluconeogenesis  
(B) Lipolysis in extremities  
(C) Synthesis of eicosanoids  
(D) Hepatic glycogenesis
- 269. Glucocorticoids increase the synthesis of all of the following except**  
(A) Glucokinase  
(B) Glucose-6-phosphatase  
(C) Fructose-1, 6-biphosphatase  
(D) Pyruvate carboxylase
- 270. Secretion of glucocorticoids is regulated by all the following except**  
(A) Hypothalamus  
(B) Anterior pituitary  
(C) Feedback control by blood glucose  
(D) Feedback control by glucocorticoids
- 271. Excessive secretion of glucocorticoids raises blood glucose by**  
(A) Decreasing glycogenesis  
(B) Increasing glycogenolysis  
(C) Increasing gluconeogenesis  
(D) Inhibiting HMP shunt
- 272. Mineralcorticoids regulate the metabolism of all of the following except**  
(A) Sodium (B) Potassium  
(C) Calcium (D) Chloride
- 273. Mineralocorticoids increase the tubular reabsorption of**  
(A) Sodium and calcium  
(B) Sodium and potassium  
(C) Sodium and chloride  
(D) Potassium and chloride

- 274. Mineralocorticoids increase the tubular secretion of**  
 (A) Sodium (B) Potassium  
 (C) Chloride (D) Bicarbonate
- 275. Secretion of mineralocorticoids is increased by**  
 (A) ACTH (B) Angiotensin  
 (C) Hypokalaemia (D) Hyponatraemia
- 276. In Addison's disease, there is excessive retention of**  
 (A) Potassium (B) Sodium  
 (C) Chloride (D) Water
- 277. In adrenogenital syndrome due to total absence of 21-hydroxylase in adrenal cortex, there is**  
 (A) Deficient secretion of glucocorticoids  
 (B) Deficient secretion of mineralocorticoids  
 (C) Excessive secretion of androgens  
 (D) All of these
- 278. Spironolactone is an antagonist of**  
 (A) Cortisol (B) Hydrocortisone  
 (C) Aldosterone (D) Testosterone
- 279. Androgens are synthesised in**  
 (A) Leydig cells in testes  
 (B) Sertoli cells in testes  
 (C) Seminiferous tubules  
 (D) Prostate gland
- 280. Testosterone is transported in blood by**  
 (A) Transcortin  
 (B) Testosterone binding globulin  
 (C) Testosterone estrogen binding globulin  
 (D) Albumin
- 281. The metabolites of androgens are**  
 (A) 17-Hydroxysteroids  
 (B) 17-Ketosteroids  
 (C) 11-Hydroxysteroids  
 (D) 11-Ketosteroids
- 282. An androgen which is more powerful than testosterone is**  
 (A) Androstenedione (B) Dihydrotestosterone  
 (C) Androsterone (D) Epiandrosterone
- 283. Secretion of androgens is increased by**  
 (A) LH (B) FSH  
 (C) ACTH (D) Growth hormone
- 284. During late pregnancy, the major source of progesterone is**  
 (A) Adrenal cortex (B) Placenta  
 (C) Corpus luteum (D) Graafian follicles
- 285. Progesterone is transported in blood by**  
 (A) Transcortin  
 (B) Sex hormone binding globulin  
 (C) Albumin  
 (D) Testosterone estrogen binding globulin
- 286. The major metabolite of progesterone is**  
 (A) Pregnenolone (B) Pregnanediol  
 (C) Estradiol (D) Norethindrone
- 287. Secretion of progesterone**  
 (A) Is more in first half of menstrual cycle than in second half  
 (B) Is more in second half of menstrual cycle than in first half  
 (C) Remains constant during menstrual cycle  
 (D) Decreases during pregnancy
- 288. Women become susceptible to osteoporosis after menopause due to decreased**  
 (A) Secretion of Parathormone  
 (B) Conversion of vitamin D into calcitriol  
 (C) Secretion of estrogen  
 (D) Secretion of progesterone
- 289. A hormone used for detection of pregnancy is**  
 (A) Estrogen  
 (B) Progesterone  
 (C) Oxytocin  
 (D) Chorionic gonadotropin
- 290. Placenta secretes all of the following except**  
 (A) FSH  
 (B) Progesterone  
 (C) Estrogen  
 (D) Chorionic gonadotropin

- 291. Gastrin is a polypeptide made up of**  
(A) Five amino acids  
(B) Twelve amino acids  
(C) Seventeen amino acids  
(D) Twenty amino acids
- 292. Biological activity of gastrin is present in the**  
(A) Four N-terminal amino acids  
(B) Four C-terminal amino acids  
(C) Five N-terminal amino acids  
(D) Five C-terminal amino acids
- 293. All the following statements about  $\beta$ -endorphin are true except  $\mu$  :**  
(A) It is a polypeptide  
(B) Its precursor is pro-opio-melanocortin  
(C) Its receptors are represent in brain  
(D) Its action is blocked by morphine
- 294. All the following statements about epidermal growth factor are true except**  
(A) It is a protein  
(B) It possess quaternary structure  
(C) Its receptor is made up of a single polypeptide chain  
(D) Its receptor possesses tyrosine kinase domain
- 295. Met-enkephalin is a**  
(A) Tripeptide (B) Pentapeptide  
(C) Octapeptide (D) Decapeptide
- 296. Vasoconstrictor effect of ADH is mediated by**  
(A) cAMP (B) cGMP  
(C) Protein kinase C (D) Angiotensin II
- 297. The rate limiting step in catecholamine synthesis is catalysed by**  
(A) Phenylalanine hydroxylase  
(B) Tyrosine hydroxylase  
(C) Dopa decarboxylase  
(D) Phenylethanolamine N-methyl transferase
- 298. Dopa decarboxylase is inhibited by**  
(A) Epinephrine (B) Norepinephrine  
(C)  $\alpha$ -Methyldopa (D) None of these
- 299. Tyrosine hydroxylase is inhibited by**  
(A) Catecholamines (B)  $\alpha$ -Methyldopa  
(C) Phenylalanine (D) Vanillyl mandelic acid
- 300. Urinary excretion of vanillyl madelic acid is increased in**  
(A) Phaeochromocytoma  
(B) Cushing's syndrome  
(C) Carcinoid syndrome  
(D) Aldosteronism
- 301. Iodide uptake by thyroid gland is decreased by**  
(A) Thicyanate (B) Thiouracil  
(C) Thiourea (D) Methimazole
- 302. Binding of growth hormone to its receptor results in phosphorylation of**  
(A) JAK-2  
(B) Growth hormone receptor  
(C) STATs  
(D) All of these
- 303. Binding of growth hormone to its receptor results in increased transcription of**  
(A) c-fos gene (B) c-myc gene  
(C) p-53 gene (D) None of these
- 304. Activation of IRS-1, PI-3 kinase and GRB-2 is brought about by**  
(A) Glucagon (B) Insulin  
(C) Prolactin (D) IGF-2
- 305. The protein IRS-1 is phosphorylated by**  
(A) Protein kinase A  
(B) Protein kinase C  
(C) Tyrosine kinase activity of insulin receptor  
(D) Tyrosine kinase activity of IGF-1 receptor
- 306. Phosphorylated IRS-1 activates GRB-2 which is**  
(A) G-protein receptor binding protein-2  
(B) Growth factor receptor binding protein-2  
(C) Growth hormone receptor binding protein-2  
(D) Glucocorticoid receptor binding protein-2

- 307. STAT proteins are**
- (A) Thermostat proteins of brain
  - (B) Glucostat proteins of hepatocyte cell membrane
  - (C) Short term activators of translation
  - (D) Signal transduction and activators of transcription
- 308. Activated phospholipase C acts on**
- (A) Phosphatidyl inositol-4, 5-biphosphate
  - (B) Inositol-1, 4, 5-triphosphate
  - (C) Protein kinase C
  - (D) PI-3 kinase
- 309. Phospholipase C is activated by**
- (A)  $G_s$  proteins            (B)  $G_i$  proteins
  - (C)  $G_q$  proteins            (D)  $G_{12}$  proteins
- 310. Proteoglycans are made up of proteins and**
- (A) Glucosamine            (B) Mannosamine
  - (C) Sialic acid              (D) Mucopolysaccharides
- 311 Sweat chlorides are increased in**
- (A) Cystic fibrosis        (B) Pancreatic cancer
  - (C) Acute pancreatitis    (D) None of these
- 312. All the following statements about cystic fibrosis are correct except**
- (A) It is inherited as an autosomal recessive disease
  - (B) It affects a number of exocrine glands
  - (C) It causes increased sweating
  - (D) Sweat chlorides are above 60 mEq/L in this disease
- 313. Radioactive iodine uptake by thyroid gland 24 hours of a test dose is**
- (A) 1.5–15% of the test done
  - (B) 15–20% of the test done
  - (C) 20–40% of the test done
  - (D) 50–70% of the test done
- 314. Radioactive iodine uptake by thyroid gland is increased in**
- (A) Endemic goitre        (B) Hyperthyroidism
  - (C) Myxoedema            (D) Creatinism
- 315. Normal range of total thyroxine in serum is**
- (A) 0.8–2.4 ng/dl        (B) 0.8–2.4  $\mu$ g/dl
  - (C) 5–12 ng/dl            (D) 5–12  $\mu$ g/dl
- 316. Normal range of total tri-iodothyronine in serum is**
- (A) 0.1–0.2 ng/dl        (B) 0.1–0.2  $\mu$ g/dl
  - (C) 0.8–2.4 ng/dl        (D) 0.8–2.4  $\mu$ g/dl
- 317. Administration of TSH increases serum  $T_3$  and  $T_4$  in**
- (A) Hyperthyroidism of pituitary origin
  - (B) Hyperthyroidism of thyroid origin
  - (C) Hypothyroidism of pituitary origin
  - (D) Hypothyroidism of thyroid origin
- 318. High level of  $T_3$  and  $T_4$  and low TSH in serum indicates**
- (A) Hyperthyroidism of pituitary origin
  - (B) Hypothyroidism of pituitary origin
  - (C) Hyperthyroidism of thyroid origin
  - (D) Hypothyroidism of thyroid origin
- 319. BMR is increased in**
- (A) Endemic goitre        (B) Thyrotoxicosis
  - (C) Myxoedema            (D) Cretinism
- 320. Which one of the following statements correctly describes eukaryotic DNA?**
- (A) It uses DNA polymerase with nuclease activities
  - (B) It is replicated bidirectionally at many points
  - (C) It contains no repetitive DNA
  - (D) It is nonlinear
- 321. Which one of the following causes frame shift mutation?**
- (A) Transition
  - (B) Transversion
  - (C) Deletion
  - (D) Substitution of purine to pyrimidine
- 322. The second messenger for many hormones is**
- (A) ATP                      (B) cyclic AMP
  - (C) cGMP                    (D) UTP

- 323. The most potent hormone concerned with the retention of sodium in the body is**  
(A) Cortisone (B) Aldosterone  
(C) Corticosterone (D) Cortisol
- 324. Aspirin blocks the synthesis of**  
(A) Prostaglandins only  
(B) Prostacyclins only  
(C) Thromboxanes only  
(D) All of these
- 325. Retention of sodium in the body leads to a retention of**  
(A) Potassium  
(B) Water  
(C) Potassium and water  
(D) Neither potassium nor water
- 326. cAMP is so called because it is formed during**  
(A) TCA cycle  
(B) Urea cycle  
(C) Rhodopsin cycle  
(D) It has a cyclic structure
- 327. Protein bound iodine is \_\_\_\_\_ bound to protein.**  
(A) Iodine (B) Thyroid hormones  
(C) Thyroxine (D) Tri iodo thyronine
- 328. In hypophysectomized animals, fasting produces**  
(A) Severe hyperglycemia  
(B) Hypoglycemia  
(C) No change in blood sugar  
(D) Mild hyperglycemia
- 329. Calcitonin is antagonist to**  
(A) Serotonin  
(B) Thyroxine  
(C) Tri iodo thyronine  
(D) Para thyroid hormone
- 330. There is polyuria without glycosuria in this disorder**  
(A) Diabetes insipidus (B) Diabetes mellitus  
(C) Bronze diabetes (D) Juvenile diabetes
- 331. In hyperparathyroidism there is**  
(A) Hypocalcemia (B) Hypophosphatemia  
(C) Hypokalemia (D) Hyperkalemia
- 332. Insulin resistance is encountered in**  
(A) Addison's disease (B) Hypothyroidism  
(C) Hypopituitarism (D) Acromegaly
- 333. Richest source of prostaglandins in a human male is**  
(A) Blood (B) Urine  
(C) Semen (D) C.S.F.
- 334. One of the following is not used as a second messenger by hormones:**  
(A) mRNA  
(B) cAMP  
(C) Calcium ions  
(D) Myoinositol 1, 4, 5 triphosphate
- 335. This pancreatic hormone increases the blood-sugar level:**  
(A) Insulin  
(B) Glucagon  
(C) Pancreozymin  
(D) Pancreatic polypeptide
- 336. Which one of the following statements is fully correct?**  
(A) Hormones are needed in the diet  
(B) Hormones can be elaborated only by endocrine glands  
(C) All the hormones enter the cells and perform their function  
(D) Hormones are substance synthesized in the body in small quantities and control and regulate metabolic events
- 337.  $T_3$  is**  
(A) Thyroxine  
(B) Triiodo thyronine  
(C) Triiodo tyrosine  
(D) Reverse tri iodo thyronine
- 338. Which of the following hormone is a peptide of less than ten amino acids?**  
(A) Insulin (B) Growth hormone  
(C) Oxytocin (D) Parathyroid hormone

- 339. Tyrosine of thyroglobulin is acted upon by \_\_\_\_\_ to give mono and diiodo tyrosines.**  
 (A) Potassium iodide  
 (B) Iodine  
 (C) Iodide I  
 (D) Higher valency state of iodine (I<sup>+</sup>)
- 340. Which of the following hormone does not activate adenylate cyclase?**  
 (A) Epinephrine  
 (B) Glucagon  
 (C) Parathyroid hormone  
 (D) Insulin
- 341. Pheochromocytoma is a tumor of**  
 (A) adrenal medulla  
 (B) bone  
 (C) head of Pancreas  
 (D) pituitary
- 342. Which one of the following statements is incorrect?**  
 (A) Insulin increases glucose phosphorylation  
 (B) Insulin increases glycolysis  
 (C) Insulin augments HMP shunt  
 (D) Insulin promotes gluconeogenesis
- 343. Which of one ring in the structure of the following is aromatic?**  
 (A) Androgens (B) Estrogens  
 (C) Cholesterol (D) Bile acids
- 344. Which of one of the following is not GUT hormone?**  
 (A) Motiline (B) Secretion  
 (C) Gastrin (D) Calcitonin
- 345. Which of the following hormones are synthesized as prehormones**  
 (A) Vasopressin and oxytocin  
 (B) Growth hormone and insulin  
 (C) Insulin and parathyroid hormone  
 (D) Insulin and Glucagon
- 346. This hormone has disulphide group:**  
 (A) Glucagon (B) Insulin  
 (C) T<sub>4</sub> (D) Epinephrine
- 347. The blood sugar raising action of the hormone of suprarenal cortex is due to**  
 (A) Glyconeogenesis  
 (B) Glycogenolysis  
 (C) Glucagon like activity  
 (D) due to inhibition of glomerular filtration of glucose
- 348. Hyper insulinism can cause coma since**  
 (A) The chief nutrient for the brain is glucose  
 (B) The chief nutrient for the heart is glucose  
 (C) The glucostatic role of the liver is damaged  
 (D) The kidneys are damaged
- 349. Which of the following property of prostaglandins has been utilized by clinicians in hospital for**  
 (A) Inducing fever  
 (B) Causing inflammation  
 (C) Effecting smooth muscle contraction  
 (D) Disaggregation of spermatozoa
- 350. A major structural difference between estrogens and androgens is the fact that**  
 (A) The androgens are usually C<sub>21</sub> steroids  
 (B) The estrogens are usually digitonin - precipitable  
 (C) The androgens have an aromatic ring  
 (D) The estrogens have an aromatic ring
- 351. Alloxan can experimentally induce diabetes mellitus due to**  
 (A) Stimulation of  $\alpha$  cells of the islets of langerhans  
 (B) Necrosis of the  $\beta$  cells of the islets  
 (C) Potentiation of insulinase activity  
 (D) Epinephrine like action
- 352. Which of the following alleviates asthma?**  
 (A) PGE<sub>1</sub> only (B) PGE<sub>1</sub> and PGE<sub>2</sub>  
 (C) PGF<sub>2</sub> (D) PGA
- 353. Thyroxine is derived from**  
 (A) Tyrosine (B) Tyranine  
 (C) Taurine (D) Tryptaine
- 354. Adrenal cortical response is poor in**  
 (A) Kwashiorkor (B) Marasmus  
 (C) Fatty liver (D) Atherosclerosis

- 355. Protein bound iodine in blood is present to the extent of \_\_\_\_\_ / dL**  
(A) 3–8 mg (B) 4–8 mg  
(C) 3–8 gm (D) 4–8 gm
- 356. Prostaglandins are**  
(A) C<sub>2</sub> unsaturated acids  
(B) C<sub>27</sub> saturated alcohols  
(C) C<sub>20</sub> saturated acids  
(D) C<sub>27</sub> saturated alcohols
- 357. Which of the following scientists has not worked in the field of prostaglandins?**  
(A) Voneuler (B) Sultan Karim  
(C) Andre robet (D) Kendal
- 358. The suffix number in the names of prostaglandins gives the number of**  
(A) OH groups (B) Double bonds  
(C) Acid groups (D) Ketoacids
- 359. One of the important functions of prostacyclins is**  
(A) Inhibition of platelet aggregation  
(B) Contraction of uterus  
(C) Decrease of gastric secretion  
(D) Relieving osthma
- 360. Vasopressin is also known as**  
(A) Antidiabetogenic hormone  
(B) Antidiuretic hormone  
(C) Somatotropic hormone  
(D) Pitoxin
- 361. Which of the following is used for inducing labour?**  
(A) Prostaglandins (B) Prostacyclins  
(C) Vasopressin (D) Thromboxanes
- 362. Which of the following does not have disulphide bond?**  
(A) Oxytocin (B) Vasopressin  
(C) Insulin (D) Glucagon
- 363. Which is incorrect? Epinephrin promotes the glycogenolysis in**  
(A) Muscle (B) Liver  
(C) Heart (D) None of these
- 364. Which of one of the following is released by hypothalamus?**  
(A) Somatostatin  
(B) Somatotropic hormone  
(C) Somato medin C  
(D) Luteinising hormone
- 365. Which one of the following is not liberated by the adenohipophysis?**  
(A) Growth hormone (B) TSH  
(C) ACTH (D) Gonadotropin
- 366. Which of the following hormone is not under the control of ACTH?**  
(A) Aldosterone (B) Cortisol  
(C) Corticosterone (D) Deoxycorticosterone
- 367. Which of the following organ prefers fructose to glucose**  
(A) Liver (B) Testes  
(C) Pancreas (D) Heart
- 368. Total synthesis of creatine can be done by**  
(A) Liver (B) Kidneys  
(C) Pancreas (D) Heart
- 369. Thyrotropin releasing hormone is a**  
(A) Dipeptide (B) Tripeptide  
(C) Octapeptide (D) Decapeptide
- 370. Hypthalamo \_\_\_\_\_ gonadal axis, fill up the blank with the suitable word.**  
(A) Adrenal (B) Thyroid  
(C) Hypophyseal (D) Pancreatic
- 371. The sequence of amino acids in human growth hormone and the synthesis were done by**  
(A) Sanger (B) Krebs  
(C) Chah Holi (D) Molisch
- 372. Proopiomelanocortin is the precussor of**  
(A) ACTH (B)  $\beta$ -tropin  
(C) Endorphins (D) All of these
- 373. Adrenalin is synthesized from**  
(A) Adenine (B) Adenosine  
(C) Tyrosine (D) Tryptophan

- 374. Corticotropin releasing hormone controls the direct release of**
- (A) Pro-opiomelanocortin  
(B)  $\alpha$ MSH  
(C)  $\beta$ MSH  
(D) Endorphins
- 375. The immediate parent of  $\alpha$ ,  $\beta$  and  $\gamma$  endorphins is**
- (A) Pro-opiomelanocortin  
(B)  $\beta$ -lipotropin  
(C) ATCH  
(D) Lipoprotein
- 376. Prolactin release inhibiting hormone is believed to be**
- (A) Serotonin (B) Norepinephrine  
(C) Dopamine (D) Acetyl choline
- 377. Which one of the following is not a symptom of Cushing's disease?**
- (A) Hyperglycemia (B) Hypernatremia  
(C) Hirsutism (D) Hyperkalemia
- 378. Insulin increases the permeability of glucose across the plasma membrane of muscle cells by**
- (A) Acting on adenylate cycle  
(B) By loosening the integrity of the membrane  
(C) Through  $\text{Ca}^{2+}$  ions  
(D) By membrane cruting the hexose carries of intracellular organelles and making them fuse with the plasma membrane
- 379. Somatostatin is produced by**
- (A) Hypothalamus  
(B) Pancreas  
(C) Hypothalamus and pancreas  
(D) Hypothalamus and Adrenals
- 380. Insulin like growth hormones are produced by**
- (A) Hypophysis (B) Liver  
(C) Pancreas (D) Thyroid
- 381. In pheochromocytoma, urine will have**
- (A) FILGU (B) VMA  
(C) 5 HIAA (D) Lysine and Arginine
- 382. Aldosteronism will present the chemical pathology of**
- (A) Addison's (B) Cushing's  
(C) Grave's (D) Hartnup's
- 383. One of the following does not bind  $\text{T}_3$  and  $\text{T}_4$ :**
- (A) Albumin (B) TBG  
(C) TBPA (D) Haptoglobin
- 384. Epinephrine causes in muscle:**
- (A) Gluconeogenesis (B) Glycogenesis  
(C) Glycolysis (D) Glycogenolysis
- 385. Reverse  $\text{T}_3$  is**
- (A) A synthetic compound given counter the effects of  $\text{T}_3$   
(B) Formed from  $\text{T}_4$  but has no hormone function  
(C) Formed by isomerisation of  $\text{T}_3$   
(D) Formed from  $\text{T}_4$  and has hormone function
- 386. This pancreatic hormone promotes hypogenesis:**
- (A) Insulin (B) Glucagon  
(C) Stomato station (D) Pancreozymin
- 387. It is unique that the following single antidiabetogenic hormone effectively counter acts the several diabetogenic hormones:**
- (A) Glucagon (B) Glucocorticoids  
(C) Insulin (D) Growth hormone
- 388. Which of the following statements is correct?**
- (A) Thyroxine inhibits utilization of glucose  
(B) Insulin increases utilization of glucose  
(C) Glucagon promotes muscle glycogenolysis  
(D) Insulin inhibits lipogenesis from carbohydrates
- 389. Steroid hormones are synthesized from**
- (A) Adenine (B) Protein  
(C) Vitamin (D) Cholesterol
- 390. Hormones act only on specific organs or tissues. These are called**
- (A) Active sites (B) Reaction centre  
(C) Target organ/Tissue (D) Physiological site

- 391.** \_\_\_\_\_ hormone is a single chain polypeptide having 32 amino acids with molecular weight of 3,600.
- (A) Testosterone (B) Thyroxine  
(C) Calcitonine (D) Vasopressin
- 392.** Which of the following is noted in Cushing's syndrome, a tumor associated disease of the adrenal cortex?
- (A) Decreased production of epinephrine  
(B) Excessive production of epinephrine  
(C) Excessive production of vasopressin  
(D) Excessive production of cortisol
- 393.** A cup of strong coffee would be expected to
- (A) Interfere with synthesis of prostaglandins  
(B) Decrease the effects of Glucagon  
(C) Enhance the effects of epinephrine  
(D) Provide the vitamin nicotinic acid
- 394.** Increased reabsorption of water from the kidney is the major consequence of which of the following hormones?
- (A) Cortisol (B) Insulin  
(C) Vasopressin (D) Aldosterone
- 395.** Lack of Glucocorticoids and mineral corticoids might be consequence of which of the following defects in the adrenal cortex?
- (A) Androstenedione deficiency  
(B) Estrone deficiency  
(C) 17  $\alpha$ -OH progesterone deficiency  
(D) C- $\alpha$ -Hydroxylase deficiency
- 396.** ADP ribosylation is the mode of action of
- (A) Cholera toxin  
(B) Acetyl choline  
(C) Muscarinic receptors  
(D) Cyclic AMP
- 397.** Which one of the following hormones is derived most completely from tyrosine?
- (A) Glucagon (B) Thyroxine  
(C) Insulin (D) Prostaglandins
- 398.** Insulin regulates fatty acid synthesis by
- (A) Dephosphorylating of acetyl CoA carboxylase  
(B) Activating phosphorylase  
(C) Inhibiting malonyl CoA formation  
(D) Controlling carnitine-Acyl CoA transferase activity
- 399.** Hormonal stimulation of the formation of the second messenger inositol 1,4,5 triphosphate (IP<sub>3</sub>) quickly leads to the release of which other intracellular messenger?
- (A) cAMP (B) Prostaglandin  
(C) Calcitonin (D) Leukotriene
- 400.** Hormone receptors that stimulate cAMP production
- (A) are part of a complex of two proteins that transform the external signal into internal cAMP production  
(B) are proteins distinct and separate from those that catalyze the production of cAMP  
(C) cause release of the catalytic subunit upon binding of the hormone  
(D) are not very specific and bind a number of different hormones
- 401.** All the following hormones use cAMP as a second messenger except
- (A) Estrogen (B) FSH  
(C) Luteinizing (D) Glucagon
- 402.** All the following hormones promote hyperglycemia except
- (A) Epinephrine (B) Norepinephrine  
(C) Insulin (D) Glucagon
- 403.** Glucagon activates the enzyme adenylcyclase which causes the increase of blood sugar level. Hence this hormone is called
- (A) Hypoglycemic factor  
(B) Hyperglycemic factor  
(C) Antidiabetic factor  
(D) Thyrotropin-releasing factor
- 404.** TSH hormone biochemically is a
- (A) Protein (B) Fat  
(C) Glycoprotein (D) Carbohydrate

- 405. The secondary sexual characters in females is effected by**  
(A) Estrogens (B) Gluco corticoids  
(C) MIS (D) None of these
- 406. A hypochromic microcytic anaemia which increases Fe, store in the bone marrow may be**  
(A) Folic acid responsive  
(B) Vitamin B<sub>12</sub> responsive  
(C) Pyridoxine responsive  
(D) Vitamin C responsive
- 407. Gastric Secretion is regulated by the hormone:**  
(A) Glucagon (B) Gastrin  
(C) Epinephrin (D) ACTH
- 408. An essential agent for converting glucose to glycogen in liver is**  
(A) Latic acid (B) GTP  
(C) UTP (D) Pyruvic acid
- 409. Which of the following hormones is not involved in carbohydrate metabolism?**  
(A) ACTH (B) Glucagon  
(C) Vasopressin (D) Growth hormone
- 410. In the process of transcription, the flow of genetic information is from**  
(A) DNA to DNA (B) DNA to protein  
(C) RNA to protein (D) DNA to RNA
- 411. Anticodon region is an important part of the structure of**  
(A) r-RNA (B) t-RNA  
(C) m-RNA (D) z-DNA
- 412. Thyroid function is determined by the use of isotopes:**  
(A) Na<sup>24</sup> (B) K<sup>42</sup>  
(C) Ca<sup>45</sup> (D) I<sup>131</sup>
- 413. Pernicious anaemia is diagnosed by the radio active substance:**  
(A) C<sup>136</sup> (B) P<sup>32</sup>  
(C) CO<sup>60</sup> (D) Fe<sup>59</sup>

**ANSWERS**

1. C	2. B	3. A	4. A	5. A	6. C
7. A	8. B	9. B	10. D	11. B	12. B
13. A	14. A	15. B	16. A	17. B	18. C
19. A	20. C	21. A	22. C	23. A	24. B
25. C	26. A	27. C	28. A	29. C	30. A
31. C	32. C	33. C	34. A	35. A	36. A
37. A	38. C	39. B	40. B	41. A	42. A
43. A	44. C	45. B	46. C	47. A	48. A
49. A	50. B	51. C	52. B	53. B	54. C
55. C	56. D	57. C	58. C	59. B	60. B
61. A	62. B	63. D	64. C	65. A	66. A
67. D	68. B	69. A	70. D	71. C	72. D
73. B	74. B	75. A	76. C	77. A	78. D
79. C	80. C	81. A	82. D	83. B	84. A
85. A	86. C	87. A	88. B	89. A	90. D
91. C	92. B	93. D	94. D	95. A	96. B
97. B	98. A	99. A	100. A	101. A	102. B
103. D	104. C	105. B	106. B	107. A	108. A
109. B	110. C	111. C	112. B	113. A	114. C
115. C	116. C	117. C	118. B	119. C	120. A
121. D	122. C	123. B	124. A	125. B	126. A
127. A	128. B	129. A	130. D	131. B	132. D
133. D	134. C	135. A	136. A	137. D	138. D
139. D	140. A	141. D	142. D	143. A	144. B
145. C	146. D	147. D	148. C	149. C	150. B
151. A	152. B	153. D	154. D	155. B	156. C
157. C	158. C	159. D	160. B	161. C	162. C
163. B	164. A	165. C	166. A	167. B	168. C
169. A	170. B	171. C	172. B	173. C	174. D
175. C	176. D	177. D	178. C	179. D	180. C
181. A	182. B	183. D	184. D	185. B	186. B
187. A	188. D	189. C	190. A	191. B	192. D
193. B	194. B	195. C	196. A	197. A	198. C
199. B	200. C	201. C	202. D	203. A	204. C
205. D	206. C	207. D	208. D	209. A	210. D
211. C	212. A	213. A	214. B	215. A	216. B
217. A	218. D	219. D	220. C	221. D	222. C
223. D	224. A	225. A	226. A	227. C	228. B
229. D	230. B	231. D	232. C	233. A	234. D
235. C	236. B	237. D	238. A	239. A	240. D
241. C	242. A	243. A	244. C	245. D	246. B

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247. D	248. C	249. A	250. D	251. C	252. A
253. A	254. D	255. C	256. C	257. A	258. B
259. C	260. A	261. A	262. A	263. A	264. B
265. D	266. C	267. D	268. C	269. A	270. C
271. C	272. C	273. C	274. B	275. B	276. A
277. D	278. C	279. A	280. C	281. B	282. B
283. A	284. B	285. A	286. B	287. B	288. C
289. D	290. A	291. C	292. B	293. D	294. B
295. B	296. C	297. B	298. C	299. A	300. A
301. A	302. D	303. A	304. B	305. B	306. B
307. D	308. A	309. C	310. D	311. A	312. C
313. C	314. B	315. D	316. B	317. C	318. C
319. B	320. C	321. C	322. B	323. B	324. D
325. B	326. D	327. B	328. B	329. D	330. A
331. B	332. D	333. C	334. A	335. B	336. D
337. B	338. C	339. D	340. D	341. A	342. D
343. B	344. D	345. C	346. B	347. A	348. A
349. C	350. D	351. B	352. B	353. A	354. A
355. A	356. A	357. D	358. B	359. A	360. A
361. A	362. D	363. C	364. A	365. D	366. A
367. B	368. C	369. B	370. C	371. C	372. D
373. C	374. A	375. B	376. C	377. D	378. D
379. C	380. B	381. B	382. B	383. D	384. D
385. B	386. A	387. C	388. B	389. D	390. C
391. C	392. D	393. C	394. C	395. D	396. A
397. B	398. A	399. C	400. B	401. A	402. C
403. B	404. C	405. A	406. D	407. B	408. C
409. C	410. D	411. B	412. D	413. C	

## CHAPTER 9

# NUCLEIC ACIDS

**1. A nucleoside consists of**

- (A) Nitrogenous base
- (B) Purine or pyrimidine base + sugar
- (C) Purine or pyrimidine base + phosphorous
- (D) Purine + pyrimidine base + sugar + phosphorous

**2. A nucleotide consists of**

- (A) A nitrogenous base like choline
- (B) Purine + pyrimidine base + sugar + phosphorous
- (C) Purine or pyrimidine base + sugar
- (D) Purine or pyrimidine base + phosphorous

**3. A purine nucleotide is**

- (A) AMP
- (B) UMP
- (C) CMP
- (D) TMP

**4. A pyrimidine nucleotide is**

- (A) GMP
- (B) AMP
- (C) CMP
- (D) IMP

**5. Adenine is**

- (A) 6-Amino purine
- (B) 2-Amino-6-oxypurine
- (C) 2-Oxy-4-aminopyrimidine
- (D) 2, 4-Dioxypyrimidine

**6. 2, 4-Dioxypyrimidine is**

- (A) Thymine
- (B) Cytosine
- (C) Uracil
- (D) Guanine

**7. The chemical name of guanine is**

- (A) 2,4-Dioxy-5-methylpyrimidine
- (B) 2-Amino-6-oxypurine
- (C) 2-Oxy-4-aminopyrimidine
- (D) 2, 4-Dioxypyrimidine

**8. Nucleotides and nucleic acids concentration are often also expressed in terms of**

- (A) ng
- (B) mg
- (C) meq
- (D) OD at 260 nm

**9. The pyrimidine nucleotide acting as the high energy intermediate is**

- (A) ATP
- (B) UTP
- (C) UDPG
- (D) CMP

**10. The carbon of the pentose in ester linkage with the phosphate in a nucleotide structure is**

- (A) C<sub>1</sub>
- (B) C<sub>3</sub>
- (C) C<sub>4</sub>
- (D) C<sub>5</sub>

**11. Uracil and ribose form**

- (A) Uridine
- (B) Cytidine
- (C) Guanosine
- (D) Adenosine

**12. The most abundant free nucleotide in mammalian cells is**

- (A) ATP
- (B) NAD
- (C) GTP
- (D) FAD

- 13. The mean intracellular concentration of ATP in mammalian cell is about**  
 (A) 1 mM (B) 2 mM  
 (C) 0.1 mM (D) 0.2 mM
- 14. The nucleic acid base found in mRNA but not in DNA is**  
 (A) Adenine (B) Cytosine  
 (C) Guanine (D) Uracil
- 15. In RNA molecule 'Caps'**  
 (A) Allow tRNA to be processed  
 (B) Are unique to eukaryotic mRNA  
 (C) Occur at the 3' end of tRNA  
 (D) Allow correct translation of prokaryotic mRNA
- 16. In contrast to eukaryotic mRNA, prokaryotic mRNA**  
 (A) Can be polycistronic  
 (B) Is synthesized with introns  
 (C) Can only be monocistronic  
 (D) Has a poly A tail
- 17. The size of small stable RNA ranges from**  
 (A) 0–40 nucleotides  
 (B) 40–80 nucleotides  
 (C) 90–300 nucleotides  
 (D) More than 320 nucleotides
- 18. The number of small stable RNAs per cell ranges from**  
 (A) 10–50,000  
 (B) 50,000–1,00,000  
 (C) 1,00,000–10,00,000  
 (D) More than 10 lakhs
- 19. Molecular weight of heterogenous nuclear RNA (hnRNA) is**  
 (A) More than  $10^7$  (B)  $10^5$  to  $10^6$   
 (C)  $10^4$  to  $10^5$  (D) Less than  $10^4$
- 20. In RNA molecule guanine content does not necessarily equal its cytosine content nor does its adenine content necessarily equal its uracil content since it is a**  
 (A) Single strand molecule  
 (B) Double stranded molecule  
 (C) Double stranded helical molecule  
 (D) Polymer of purine and pyrimidine ribonucleotides
- 21. The nitrogenous base present in the RNA molecule is**  
 (A) Thymine (B) Uracil  
 (C) Xanthine (D) Hypoxanthine
- 22. RNA does not contain**  
 (A) Uracil (B) Adenine  
 (C) Thymine (D) Ribose
- 23. The sugar moiety present in RNA is**  
 (A) Ribulose (B) Arabinose  
 (C) Ribose (D) Deoxyribose
- 24. In RNA molecule**  
 (A) Guanine content equals cytosine  
 (B) Adenine content equals uracil  
 (C) Adenine content equals guanine  
 (D) Guanine content does not necessarily equal its cytosine content.
- 25. Methylated purines and pyrimidines are characteristically present in**  
 (A) mRNA (B) hnRNA  
 (C) tRNA (D) rRNA
- 26. Thymine is present in**  
 (A) tRNA (B) Ribosomal RNA  
 (C) Mammalian mRNA (D) Prokaryotic mRNA
- 27. The approximate number of nucleotides in tRNA molecule is**  
 (A) 25 (B) 50  
 (C) 75 (D) 100
- 28. In every cell, the number of tRNA molecules is at least**  
 (A) 10 (B) 20  
 (C) 30 (D) 40
- 29. The structure of tRNA appears like a**  
 (A) Helix (B) Hair pin  
 (C) Clover leaf (D) Coil
- 30. Although each specific tRNA differs from the others in its sequence of nucleotides, all tRNA molecules contain a base paired stem that terminates in the sequence CCA at**  
 (A) 3' Termini (B) 5' Termini  
 (C) Anticodon arm (D) 3'5'-Termini

- 31. Transfer RNAs are classified on the basis of the number of base pairs in**  
(A) Acceptor arm (B) Anticodon arm  
(C) D arm (D) Extra arm
- 32. In tRNA molecule D arm is named for the presence of the base:**  
(A) Uridine (B) Pseudouridine  
(C) Dihydrouridine (D) Thymidine
- 33. The acceptor arm in the tRNA molecule has**  
(A) 5 Base pairs (B) 7 Base pairs  
(C) 10 Base pairs (D) 20 Base pairs
- 34. In tRNA molecule, the anticodon arm possesses**  
(A) 5 Base pairs (B) 7 Base pairs  
(C) 8 Base pairs (D) 10 Base pairs
- 35. The T $\psi$ C arm in the tRNA molecule possesses the sequence**  
(A) T, pseudouridine and C  
(B) T, uridine and C  
(C) T, dihydrouridine and C  
(D) T, adenine and C
- 36. Double helical structure model of the DNA was proposed by**  
(A) Pauling and Corey  
(B) Peter Mitchell  
(C) Watson and Crick  
(D) King and Wooten
- 37. DNA does not contain**  
(A) Thymine (B) Adenine  
(C) Uracil (D) Deoxyribose
- 38. The sugar moiety present in DNA is**  
(A) Deoxyribose (B) Ribose  
(C) Lyxose (D) Ribulose
- 39. DNA rich in A-T pairs have**  
(A) 1 Hydrogen bond (B) 2 Hydrogen bonds  
(C) 3 Hydrogen bonds (D) 4 Hydrogen bonds
- 40. In DNA molecule**  
(A) Guanine content does not equal cytosine content  
(B) Adenine content does not equal thymine content  
(C) Adenine content equals uracil content  
(D) Guanine content equals cytosine content
- 41. DNA rich in G-C pairs have**  
(A) 1 Hydrogen bond (B) 2 Hydrogen bonds  
(C) 3 Hydrogen bonds (D) 4 Hydrogen bonds
- 42. The fact that DNA bears the genetic information of an organism implies that**  
(A) Base composition should be identical from species to species  
(B) DNA base composition should change with age  
(C) DNA from different tissues in the same organism should usually have the same base composition  
(D) DNA base composition is altered with nutritional state of an organism
- 43. The width (helical diameter) of the double helix in B-form DNA in nm is**  
(A) 1 (B) 2  
(C) 3 (D) 4
- 44. The number of base pair in a single turn of B-form DNA about the axis of the molecule is**  
(A) 4 (B) 8  
(C) 10 (D) 12
- 45. The distance spanned by one turn of B-form DNA is**  
(A) 1.0 nm (B) 2.0 nm  
(C) 3.0 nm (D) 3.4 nm
- 46. In a DNA molecule the thymine concentration is 30%, the guanosine concentration will be**  
(A) 10% (B) 20%  
(C) 30% (D) 40%
- 47. IN a DNA molecule, the guanosine content is 40%, the adenine content will be**  
(A) 10% (B) 20%  
(C) 30% (D) 40%
- 48. An increased melting temperature of duplex DNA results from a high content of**  
(A) Adenine + Guanine  
(B) Thymine + Cytosine  
(C) Cytosine + Guanine  
(D) Cytosine + Adenine

- 49. A synthetic nucleotide analogue, 4-hydroxypyrazolopyrimidine is used in the treatment of**
- (A) Acute nephritis  
(B) Gout  
(C) Cystic fibrosis of lung  
(D) Multiple myeloma
- 50. A synthetic nucleotide analogue, used in the chemotherapy of cancer and viral infections is**
- (A) Arabinosyl cytosine  
(B) 4-Hydroxypyrazolopyrimidine  
(C) 6-Mercaptopurine  
(D) 6-Thioguanine
- 51. Histamine is formed from histidine by the enzyme histidine decarboxylase in the presence of**
- (A) NAD (B) FMN  
(C) HS-CoA (D) B<sub>6</sub>-PO<sub>4</sub>
- 52. Infantile convulsions due to lesser formation of gamma amino butyric acid from glutamic acid is seen in the deficiency of**
- (A) Glutamate-dehydrogenase  
(B) Pyridoxine  
(C) Folic acid  
(D) Thiamin
- 53. Which of the following amino acids produce a vasoconstrictor on decarboxylation?**
- (A) Histidine (B) Tyrosine  
(C) Threonine (D) Arginine
- 54. The degradation of RNA by pancreatic ribonuclease produces**
- (A) Nucleoside 2-Phosphates  
(B) Nucleoside 5'-phosphates  
(C) Oligonucleosides  
(D) Nucleoside 3'-phosphate and oligonucleotide
- 55. Intestinal nucleosidases act on nucleosides and produce**
- (A) Purine base only (B) Phosphate only  
(C) Sugar only (D) Purine or pyrimidine bases and sugars
- 56. In purine biosynthesis carbon atoms at 4 and 5 position and N at 7 position are contributed by**
- (A) Glycine (B) Glutamine  
(C) Alanine (D) Threonine
- 57. N<sup>10</sup>-formyl and N<sup>5</sup>N<sup>10</sup>-methenyl tetrahydrofolate contributes purine carbon atoms at position**
- (A) 4 and 6 (B) 4 and 5  
(C) 5 and 6 (D) 2 and 8
- 58. In purine nucleus nitrogen atom at 1 position is derived from**
- (A) Aspartate (B) Glutamate  
(C) Glycine (D) Alanine
- 59. The key substance in the synthesis of purine, phosphoribosyl pyrophosphate is formed by**
- (A) α-D-ribose 5-phosphate  
(B) 5-phospho β-D-ribosylamine  
(C) D-ribose  
(D) Deoxyribose
- 60. In purine biosynthesis ring closure in the molecule formyl glycinamide ribosyl-5-phosphate requires the cofactors:**
- (A) ADP (B) NAD  
(C) FAD (D) ATP and Mg<sup>++</sup>
- 61. Ring closure of formimidoimidazole carboxamide ribosyl-5-phosphate yields the first purine nucleotide:**
- (A) AMP (B) IMP  
(C) XMP (D) GMP
- 62. The cofactors required for synthesis of adenylosuccinate are**
- (A) ATP, Mg<sup>++</sup> (B) ADP  
(C) GTP, Mg<sup>++</sup> (D) GDP
- 63. Conversion of inosine monophosphate to xanthine monophosphate is catalysed by**
- (A) IMP dehydrogenase  
(B) Formyl transferase  
(C) Xanthine-guanine phosphoribosyl transferase  
(D) Adenine phosphoribosyl transferase

- 64. Phosphorylation of adenosine to AMP is catalysed by**  
 (A) Adenosine kinase  
 (B) Deoxycytidine kinase  
 (C) Adenylosuccinase  
 (D) Adenylosuccinate synthetase
- 65. The major determinant of the overall rate of denovo purine nucleotide biosynthesis is the concentration of**  
 (A) 5-phosphoribosyl 1-pyrophosphate  
 (B) 5-phospho  $\beta$ -D-ribosylamine  
 (C) Glycinamide ribosyl-5-phosphate  
 (D) Formylglycinamide ribosyl-5-phosphate
- 66. An enzyme which acts as allosteric regulator and sensitive to both phosphate concentration and to the purine nucleotides is**  
 (A) PRPP synthetase  
 (B) PRPP glutamyl midotransferase  
 (C) HGPR Tase  
 (D) Formyl transferase
- 67. PRPP glutamyl amidotransferase, the first enzyme uniquely committed to purine synthesis is feed back inhibited by**  
 (A) AMP (B) IMP  
 (C) XMP (D) CMP
- 68. Conversion of formylglycinamide ribosyl-5-phosphate to formyl-glycinamide ribosyl-5-phosphate is inhibited by**  
 (A) Azaserine (B) Diazonorleucine  
 (C) 6-Mercaptopurine (D) Mycophenolic acid
- 69. In the biosynthesis of purine nucleotides the AMP feed back regulates**  
 (A) Adenylosuccinase  
 (B) Adenylosuccinate synthetase  
 (C) IMP dehydrogenase  
 (D) HGPR Tase
- 70. 6-Mercapto purine inhibits the conversion of**  
 (A)  $\text{IMP} \rightarrow \text{XMP}$   
 (B) Ribose 5 phosphate  $\rightarrow$  PRPP  
 (C)  $\text{PRPP} \rightarrow 5\text{-phospho} \rightarrow \beta\text{-D-ribosylamine}$   
 (D)  $\text{Glycinamide ribosyl 5-phosphate} \rightarrow \text{formylglycinamide ribosyl-5-phosphate}$
- 71. Purine biosynthesis is inhibited by**  
 (A) Aminopterin (B) Tetracyclin  
 (C) Methotrexate (D) Chloramphenicol
- 72. Pyrimidine and purine nucleoside biosynthesis share a common precursor:**  
 (A) PRPP (B) Glycine  
 (C) Fumarate (D) Alanine
- 73. Pyrimidine biosynthesis begins with the formation from glutamine, ATP and  $\text{CO}_2$ , of**  
 (A) Carbamoyl aspartate  
 (B) Orotate  
 (C) Carbamoyl phosphate  
 (D) Dihydroorotate
- 74. The two nitrogen of the pyrimidine ring are contributed by**  
 (A) Ammonia and glycine  
 (B) Aspartate and carbamoyl phosphate  
 (C) Glutamine and ammonia  
 (D) Aspartate and ammonia
- 75. A cofactor in the conversion of dihydroorotate to orotic acid, catalysed by the enzyme dihydroorotate dehydrogenase is**  
 (A) FAD (B) FMN  
 (C) NAD (D) NADP
- 76. The first true pyrimidine ribonucleotide synthesized is**  
 (A) UMP (B) UDP  
 (C) TMP (D) CTP
- 77. UDP and UTP are formed by phosphorylation from**  
 (A) AMP (B) ADP  
 (C) ATP (D) GTP
- 78. Reduction of ribonucleotide diphosphates (NDPs) to their corresponding deoxy ribonucleotide diphosphates (dNDPs) involves**  
 (A) FMN (B) FAD  
 (C) NAD (D) NADPH

- 79. Conversion of deoxyuridine monophosphate to thymidine monophosphate is catalysed by the enzyme:**
- (A) Ribonucleotide reductase  
(B) Thymidylate synthetase  
(C) CTP synthetase  
(D) Orotidylic acid decarboxylase
- 80. d-UMP is converted to TMP by**
- (A) Methylation (B) Decarboxylation  
(C) Reduction (D) Deamination
- 81. UTP is converted to CTP by**
- (A) Methylation (B) Isomerisation  
(C) Amination (D) Reduction
- 82. Methotrexate blocks the synthesis of thymidine monophosphate by inhibiting the activity of the enzyme:**
- (A) Dihydrofolate reductase  
(B) Orotate phosphoribosyl transferase  
(C) Ribonucleotide reductase  
(D) Dihydroorotate
- 83. A substrate for enzymes of pyrimidine nucleotide biosynthesis is**
- (A) Allopurinol (B) Tetracylin  
(C) Chloramphenicol (D) Puromycin
- 84. An enzyme of pyrimidine nucleotide biosynthesis sensitive to allosteric regulation is**
- (A) Aspartate transcarbamoylase  
(B) Dihydroorotate  
(C) Dihydroorotate dehydrogenase  
(D) Orotidylic acid decarboxylase
- 85. An enzyme of pyrimidine nucleotides biosynthesis regulated at the genetic level by apparently coordinate repression and derepression is**
- (A) Carbamoyl phosphate synthetase  
(B) Dihydroorotate dehydrogenase  
(C) Thymidine kinase  
(D) Deoxycytidine kinase
- 86. The enzyme aspartate transcarbamoylase of pyrimidine biosynthesis is inhibited by**
- (A) ATP (B) ADP  
(C) AMP (D) CTP
- 87. In humans end product of purine catabolism is**
- (A) Uric acid (B) Urea  
(C) Allantoin (D) Xanthine
- 88. In humans purine are catabolised to uric acid due to lack of the enzyme:**
- (A) Urease (B) Uricase  
(C) Xanthine oxidase (D) Guanase
- 89. In mammals other than higher primates uric acid is converted by**
- (A) Oxidation to allantoin  
(B) Reduction to ammonia  
(C) Hydrolysis to ammonia  
(D) Hydrolysis to allantoin
- 90. The correct sequence of the reactions of catabolism of adenosine to uric acid is**
- (A) Adenosine→hypoxanthine→xanthine→uric acid  
(B) Adenosine→xanthine→inosine→uric acid  
(C) Adenosine→inosine→hypoxanthine→xanthine uric acid  
(D) Adenosine→xanthine→inosine→hypoxanthine uric acid
- 91. Gout is a metabolic disorder of catabolism of**
- (A) Pyrimidine (B) Purine  
(C) Alanine (D) Phenylalanine
- 92. Gout is characterized by increased plasma levels of**
- (A) Urea (B) Uric acid  
(C) Creatine (D) Creatinine
- 93. Lesch-Nyhan syndrome, the sex linked recessive disorder is due to the lack of the enzyme:**
- (A) Hypoxanthine-guanine phosphoribosyl transferase  
(B) Xanthine oxidase  
(C) Adenine phosphoribosyl transferase  
(D) Adenosine deaminase

- 94. Lesch-Nyhan syndrome, the sex linked, recessive absence of HGPRTase, may lead to**
- (A) Compulsive self destructive behaviour with elevated levels of urate in serum
  - (B) Hypouricemia due to liver damage
  - (C) Failure to thrive and megaloblastic anemia
  - (D) Protein intolerance and hepatic encephalopathy
- 95. The major catabolic product of pyrimidines in human is**
- (A)  $\beta$ -Alanine
  - (B) Urea
  - (C) Uric acid
  - (D) Guanine
- 96. Orotic aciduria type I reflects the deficiency of enzymes:**
- (A) Orotate phosphoribosyl transferase and orotidylate decarboxylase
  - (B) Dihydroorotate dehydrogenase
  - (C) Dihydroorotase
  - (D) Carbamoyl phosphate synthetase
- 97. Orotic aciduria type II reflects the deficiency of the enzyme:**
- (A) Orotate phosphoribosyl transferase
  - (B) Orotidylate decarboxylase
  - (C) Dihydroorotase
  - (D) Dihydroorotate dehydrogenase
- 98. An autosomal recessive disorder, xanthinuria is due to deficiency of the enzymes:**
- (A) Adenosine deaminase
  - (B) Xanthine oxidase
  - (C) HGPRTase
  - (D) Transaminase
- 99. Enzymic deficiency in  $\beta$ -aminoisobutyric aciduria is**
- (A) Adenosine deaminase
  - (B) Xanthine oxidase
  - (C) Orotidylate decarboxylase
  - (D) Transaminase
- 100. Polysomes lack in**
- (A) DNA
  - (B) mRNA
  - (C) rRNA
  - (D) tRNA
- 101. Genetic information flows from**
- (A) DNA to DNA
  - (B) DNA to RNA
  - (C) RNA to cellular proteins
  - (D) DNA to cellular proteins
- 102. Genetic code is**
- (A) Collection of codon
  - (B) Collection of amino acids
  - (C) Collection of purine nucleotide
  - (D) Collection of pyrimidine nucleotide
- 103. Degeneracy of genetic code implies that**
- (A) Codons do not code for specific amino acid
  - (B) Multiple codons must decode the same amino acids
  - (C) No anticodon on tRNA molecule
  - (D) Specific codon decodes many amino acids
- 104. Genetic code is**
- (A) Overlapping
  - (B) Non-overlapping
  - (C) Not universal
  - (D) Ambiguous
- 105. mRNA is complementary to the nucleotide sequence of**
- (A) Coding strand
  - (B) Ribosomal RNA
  - (C) tRNA
  - (D) Template strand
- 106. In DNA replication the enzyme required in the first step is**
- (A) DNA directed polymerase
  - (B) Unwinding proteins
  - (C) DNA polymerase
  - (D) DNA ligase
- 107. The smallest unit of DNA capable of coding for the synthesis of a polypeptide is**
- (A) Operon
  - (B) Repressor gene
  - (C) Cistron
  - (D) Replicon
- 108. Termination of the synthesis of the RNA molecule is signaled by a sequence in the template strand of the DNA molecule, a signal that is recognized by a termination protein, the**
- (A) Rho ( $\rho$ ) factor
  - (B)  $\sigma$  factor
  - (C)  $\delta$  factor
  - (D)  $\epsilon$  factor

- 109. After termination of the synthesis of RNA molecule, the core enzymes separate from the DNA template. The core enzymes then recognize a promoter at which the synthesis of a new RNA molecule commences, with the assistance of**
- (A) Rho ( $\rho$ ) factor      (B)  $\delta$  factor  
(C)  $\beta$  factor              (D)  $\sigma$  factor
- 110. In the process of transcription in bacterial cells**
- (A) Initiation requires rho protein  
(B) RNA polymerase incorporates methylated bases in correct sequence  
(C) Both the sigma unit and core enzymes of RNA polymerase are required for accurate promoter site binding  
(D) Primase is necessary for initiation
- 111. The correct statement concerning RNA and DNA polymerases is**
- (A) RNA polymerase use nucleoside diphosphates  
(B) RNA polymerase require primers and add bases at 5' end of the growing polynucleotide chain  
(C) DNA polymerases can add nucleotides at both ends of the chain  
(D) All RNA and DNA polymerases can add nucleotides only at the 3' end of the growing polynucleotide chain
- 112. The eukaryotic nuclear chromosomal DNA**
- (A) Is a linear and unbranched molecule  
(B) Is not associated with a specific membranous organelle  
(C) Is not replicated semiconservatively  
(D) Is about of the same size as each prokaryotic chromosomes
- 113. The function of a repressor protein in an operon system is to prevent synthesis by binding to**
- (A) The ribosome  
(B) A specific region of the operon preventing transcription of structural genes  
(C) The RNA polymerase  
(D) A specific region of the mRNA preventing translation to protein
- 114. All pribnow boxes are variants of the sequence:**
- (A) 5'-TATAAT-3'      (B) 5'-GAGCCA-3'  
(C) 5'-UAACAA-3'      (D) 5'-TCCTAG-3'
- 115. 5'-Terminus of mRNA molecule is capped with**
- (A) Guanosine triphosphate  
(B) 7-Methylguanosine triphosphate  
(C) Adenosine triphosphate  
(D) Adenosine diphosphate
- 116. The first codon to be translated on mRNA is**
- (A) AUG                      (B) GGU  
(C) GGA                      (D) AAA
- 117. AUG, the only identified codon for methionine is important as**
- (A) A releasing factor for peptide chains  
(B) A chain terminating codon  
(C) Recognition site on tRNA  
(D) A chain initiating codon
- 118. In biosynthesis of proteins the chain terminating codons are**
- (A) UAA, UAG and UGA  
(B) UGG, UGU and AGU  
(C) AAU, AAG and GAU  
(D) GCG, GCA and GCU
- 119. The formation of initiation complex during protein synthesis requires a factor:**
- (A) IF-III                      (B) EF-I  
(C) EF-II                      (D) IF-I
- 120. The amino terminal of all polypeptide chain at the time of synthesis in E. coli is tagged to the amino acid residue:**
- (A) Methionine              (B) Serine  
(C) N-formyl methinine (D) N-formal serine
- 121. Initiation of protein synthesis begins with binding of**
- (A) 40S ribosomal unit on mRNA  
(B) 60S ribosomal unit  
(C) Charging of tRNA with specific amino acid  
(D) Attachment of aminoacyl tRNA on mRNA

- 122. Initiation of protein synthesis requires**  
(A) ATP (B) AMP  
(C) GDP (D) GTP
- 123. The enzyme amino acyl tRNA synthetase is involved in**  
(A) Dissociation of discharged tRNA from 80S ribosome  
(B) Charging of tRNA with specific amino acids  
(C) Termination of protein synthesis  
(D) Nucleophilic attack on esterified carboxyl group of peptidyl tRNA
- 124. In the process of activation of amino acids for protein synthesis, the number of high energy phosphate bond equivalent utilised is**  
(A) 0 (B) 1  
(C) 2 (D) 4
- 125. Translation results in a product known as**  
(A) Protein (B) tRNA  
(C) mRNA (D) rRNA
- 126. In the process of elongation of chain binding of amino acyl tRNA to the A site requires**  
(A) A proper codon recognition  
(B) GTP  
(C) EF-II  
(D) GDP
- 127. The newly entering amino acyl tRNA into A site requires**  
(A) EF-II (B) Ribosomal RNA  
(C) mRNA (D) EF-I
- 128. The  $\alpha$ -amino group of the new amino acyl tRNA in the A site carries out a nucleophilic attack on the esterified carboxyl group of the peptidyl tRNA occupying the P site. This reaction is catalysed by**  
(A) DNA polymerase  
(B) RNA polymerase  
(C) Peptidyl transferase  
(D) DNA ligase
- 129. The nucleophilic attack on the esterified carboxyl group of the peptidyl-tRNA occupying the P site and the  $\alpha$ -amino group of the new amino acyl tRNA, the number of ATP required by the amino acid on the charged tRNA is**  
(A) Zero (B) One  
(C) Two (D) Four
- 130. Translocation of the newly formed peptidyl tRNA at the A site into the empty P site involves**  
(A) EF-II, GTP  
(B) EF-I, GTP  
(C) EF-I, GDP  
(D) Peptidyl transferase, GTP
- 131. In eukaryotic cells**  
(A) Formylated tRNA is important for initiation of translation  
(B) Cyclohexamide blocks elongation during translation  
(C) Cytosolic ribosomes are smaller than those found in prokaryotes  
(D) Erythromycin inhibits elongation during translation
- 132. The mushroom poison amanitin is an inhibitor of**  
(A) Protein synthesis (B) mRNA synthesis  
(C) DNA synthesis (D) Adenosine synthesis
- 133. Tetracyclin prevents synthesis of polypeptide by**  
(A) Blocking mRNA formation from DNA  
(B) Releasing peptides from mRNA-tRNA complex  
(C) Competing with mRNA for ribosomal binding sites  
(D) Preventing binding of aminoacyl tRNA
- 134. In prokaryotes, chloramphenicol**  
(A) Causes premature release of the polypeptide chain  
(B) Causes misreading of the mRNA  
(C) Depolymerises DNA  
(D) Inhibits peptidyl transferase activity

- 135. Streptomycin prevents synthesis of polypeptide by**  
 (A) Inhibiting initiation process  
 (B) Releasing premature polypeptide  
 (C) Inhibiting peptidyl transferase activity  
 (D) Inhibiting translocation
- 136. Erythromycin acts on ribosomes and inhibit**  
 (A) Formation of initiation complex  
 (B) Binding of aminoacyl tRNA  
 (C) Peptidyl transferase activity  
 (D) Translocation
- 137. The binding of prokaryotic DNA dependent RNA polymerase to promoter sites of genes is inhibited by the antibiotic:**  
 (A) Puromycin (B) Rifamycin  
 (C) Terramycin (D) Streptomycin
- 138. The gene which is transcribed during repression is**  
 (A) Structural (B) Regulator  
 (C) Promoter (D) Operator
- 139. The gene of lac operon which has constitutive expression is**  
 (A) i (B) c  
 (C) z (D) p
- 140. The minimum effective size of an operator for lac repressor binding is**  
 (A) 5 base pairs (B) 10 base pairs  
 (C) 15 base pairs (D) 17 base pairs
- 141. To commence structural gene transcription the region which should be free on lac operation is**  
 (A) Promoter site (B) Operator locus  
 (C) Y gene (D) A gene
- 142. In the lac operon concept, a protein molecule is**  
 (A) Operator (B) Inducer  
 (C) Promoter (D) Repressor
- 143. The catabolite repression is mediated by a catabolite gene activator protein (CAP) in conjunction with**  
 (A) AMP (B) GMP  
 (C) cAMP (D) Cgmp
- 144. The enzyme DNA ligase**  
 (A) Introduces superhelical twists  
 (B) Connects the end of two DNA chains  
 (C) Unwinds the double helix  
 (D) Synthesises RNA primers
- 145. Restriction endonucleases**  
 (A) Cut RNA chains at specific locations  
 (B) Excise introns from hnRNA  
 (C) Remove Okazaki fragments  
 (D) Act as defensive enzymes to protect the host bacterial DNA from DNA of foreign organisms
- 146. The most likely lethal mutation is**  
 (A) Substitution of adenine for cytosine  
 (B) Insertion of one nucleotide  
 (C) Deletion of three nucleotides  
 (D) Substitution of cytosine for guanine
- 147. In the following partial sequence of mRNA, a mutation of the template DNA results in a change in codon 91 to UAA. The type of mutation is**  
 88 89 90 91 92 93 94  
 GUC GAC CAG UAG GGC UAA CCG  
 (A) Missense (B) Silent  
 (C) Nonsense (D) Frame shift
- 148. Restriction endonucleases recognize and cut a certain sequence of**  
 (A) Single stranded DNA  
 (B) Double stranded DNA  
 (C) RNA  
 (D) Protein
- 149. Positive control of induction is best described as a control system in which an operon functions**  
 (A) Unless it is switched off by a derepressed repressor protein  
 (B) Only after a repressor protein is inactivated by an inducer  
 (C) Only after an inducer protein, which can be inactivated by a corepressor, switches it on  
 (D) Only after an inducer protein, which is activated by an inducer, switch it on

**150. Interferon**

- (A) Is virus specific
- (B) Is a bacterial product
- (C) Is a synthetic antiviral agent
- (D) Requires expression of cellular genes

**151. Repressor binds to DNA sequence and regulate the transcription. This sequence is called**

- (A) Attenuator
- (B) Terminator
- (C) Anti terminator
- (D) Operator

**152. Okazaki fragment is related to**

- (A) DNA synthesis
- (B) Protein synthesis
- (C) mRNA formation
- (D) tRNA formation

**153. The region of DNA known as TATA BOX is the site for binding of**

- (A) DNA polymerase
- (B) DNA topoisomerase
- (C) DNA dependent RNA polymerase
- (D) Polynucleotide phosphorylase

**154. Reverse transcriptase is capable of synthesising**

- (A) RNA → DNA
- (B) DNA → RNA
- (C) RNA → RNA
- (D) DNA → DNA

**155. A tetrovirus is**

- (A) Polio virus
- (B) HIV
- (C) Herpes virus
- (D) Tobacco mosaic virus

**156. Peptidyl transferase activity is located in**

- (A) Elongation factor
- (B) A charged tRNA molecule
- (C) Ribosomal protein
- (D) A soluble cytosolic protein

**157. Ultraviolet light can damage a DNA strand causing**

- (A) Two adjacent purine residue to form a covalently bounded dimer
- (B) Two adjacent pyrimidine residues to form covalently bonded dimer
- (C) Disruption of phosphodiesterase linkage
- (D) Disruption of non-covalent linkage

**158. Defective enzyme in Hurler's syndrome is**

- (A)  $\alpha$ -L-diuronidase
- (B) Iduronate sulphatase
- (C) Arylsulphatase B
- (D) C-acetyl transferase

**159. Presence of arginine can be detected by**

- (A) Sakaguchi reaction
- (B) Million-Nasse reaction
- (C) Hopkins-Cole reaction
- (D) Gas chromatography

**160. A nitrogenous base that does not occur in mRNA is**

- (A) Cytosine
- (B) Thymine
- (C) Uracil
- (D) All of these

**161. In nucleotides, phosphate is attached to sugar by**

- (A) Salt bond
- (B) Hydrogen bond
- (C) Ester bond
- (D) Glycosidic bond

**162. Cyclic AMP can be formed from**

- (A) AMP
- (B) ADP
- (C) ATP
- (D) All of these

**163. A substituted pyrimidine base of pharmacological value is**

- (A) 5-Iododeoxyuridine
- (B) Cytisine arabinoside
- (C) 5-Fluorouracil
- (D) All of these

**164. The 'transforming factor' discovered by Avery, McLeod and McCarty was later found to be**

- (A) mRNA
- (B) tRNA
- (C) DNA
- (D) None of these

**165. In DNA, the complementary base of adenine is**

- (A) Guanine
- (B) Cytosine
- (C) Uracil
- (D) Thymine

**166. In DNA, three hydrogen bonds are formed between**

- (A) Adenine and guanine
- (B) Adenine and thymine
- (C) Guanine and cytosine
- (D) Thymine and cytosine

- 167. Left handed double helix is present in**  
 (A) Z-DNA (B) A-DNA  
 (C) B-DNA (D) None of these
- 168. Nuclear DNA is present in combination with**  
 (A) Histones (B) Non-histones  
 (C) Both (A) and (B) (D) None of these
- 169. Number of guanine and cytosine residues is equal in**  
 (A) mRNA (B) tRNA  
 (C) DNA (D) None of these
- 170. Alkalies cannot hydrolyse**  
 (A) mRNA (B) tRNA  
 (C) rRNA (D) DNA
- 171. Codons are present in**  
 (A) Template strand of DNA  
 (B) mRNA  
 (C) tRNA  
 (D) rRNA
- 172. Amino acid is attached to tRNA at**  
 (A) 5'-End (B) 3'-End  
 (C) Anticodon (D) DHU loop
- 173. In prokaryotes, the ribosomal subunits are**  
 (A) 30 S and 40 S (B) 40 S and 50 S  
 (C) 30 S and 50 S (D) 40 S and 60 S
- 174. Ribozymes are**  
 (A) Enzymes present in ribosomes  
 (B) Enzymes which combine the ribosomal subunits  
 (C) Enzymes which dissociate  
 (D) Enzymes made up of RNA
- 175. The smallest RNA among the following is**  
 (A) rRNA (B) hnRNA  
 (C) mRNA (D) tRNA
- 176. The number of adenine and thymine bases is equal in**  
 (A) DNA (B) mRNA  
 (C) tRNA (D) rRNA
- 177. The number of hydrogen bonds between adenine and thymine in DNA is**  
 (A) One (B) Two  
 (C) Three (D) Four
- 178. The complementary base of adenine in RNA is**  
 (A) Thymine (B) Cytosine  
 (C) Guanine (D) Uracil
- 179. Extranuclear DNA is present in**  
 (A) Ribosomes  
 (B) Endoplasmic reticulum  
 (C) Lysosomes  
 (D) Mitochondria
- 180. Mitochondrial DNA is present in**  
 (A) Bacteria (B) Viruses  
 (C) Eukaryotes (D) All of these
- 181. Ribothymidine is present in**  
 (A) DNA (B) tRNA  
 (C) rRNA (D) hnRNA
- 182. Ten base pairs are present in one turn of the helix in**  
 (A) A-DNA (B) B-DNA  
 (C) C-DNA (D) Z-DNA
- 183. Transfer RNA transfers**  
 (A) Information from DNA to ribosomes  
 (B) Information from mRNA to cytosol  
 (C) Amino acids from cytosol to ribosomes  
 (D) Proteins from ribosomes to cytosol
- 184. Ceramidase is deficient in**  
 (A) Fabry's disease (B) Farber's disease  
 (C) Krabbe's disease (D) Tay-Sachs disease
- 185. Ceramide is present in all of the following except**  
 (A) Plasmalogens (B) Cerebrosides  
 (C) Sulphatides (D) Sphingomyelin
- 186. Nucleotides required for the synthesis of nucleic acids can be obtained from**  
 (A) Dietary nucleic acids and nucleotides  
 (B) De novo synthesis  
 (C) Salvage of pre-existing bases and nucleosides  
 (D) De novo synthesis and salvage

- 187. De novo synthesis of purine nucleotide occurs in**  
(A) Mitochondria (B) Cytosol  
(C) Microsomes (D) Ribosomes
- 188. The nitrogen atoms for de novo synthesis of purine nucleotides are provided by**  
(A) Aspartate and glutamate  
(B) Aspartate and glycine  
(C) Aspartate, glutamine and glycine  
(D) Aspartate, glutamate and glycine
- 189. For de novo synthesis of purine nucleotides, glycine provides**  
(A) One nitrogen atom  
(B) One nitrogen and one carbon atom  
(C) Two carbon atoms  
(D) One nitrogen and two carbon atoms
- 190. For de novo synthesis of purine nucleotides, aspartate provides**  
(A) Nitrogen 1 (B) Nitrogen 3  
(C) Nitrogen 7 (D) Nitrogen 9
- 191. In the purine nucleus, carbon 6 is contributed by**  
(A) Glycine (B) CO<sub>2</sub>  
(C) Aspartate (D) Glutamine
- 192. 5-Phosphoribosyl-1-pyrophosphate is required for the synthesis of**  
(A) Purine nucleotides (B) Pyrimidine nucleotides  
(C) Both (A) and (B) (D) None of these
- 193. Inosine monophosphate is an intermediate during the de novo synthesis of**  
(A) AMP and GMP (B) CMP and UMP  
(C) CMP and TMP (D) All of these
- 194. Xanthosine monophosphate is an intermediate during de novo synthesis of**  
(A) TMP (B) CMP  
(C) AMP (D) GMP
- 195. In the pathway of de novo synthesis of purine nucleotides, all the following are allosteric enzymes except**  
(A) PRPP glutamyl amido transferase  
(B) Adenylosuccinate synthetase  
(C) IMP dehydrogenase  
(D) Adenylosuccinase
- 196. All of the following enzymes are unique to purine nucleotide synthesis except**  
(A) PRPP synthetase  
(B) PRPP glutamyl amido transferase  
(C) Adenylosuccinate synthetase  
(D) IMP dehydrogenase
- 197. PRPP synthetase is allosterically inhibited by**  
(A) AMP (B) ADP  
(C) GMP (D) All of these
- 198. An allosteric inhibitor of PRPP glutamyl amido transferase is**  
(A) AMP (B) ADP  
(C) GMP (D) All of these
- 199. An allosteric inhibitor of adenylosuccinate synthetase is**  
(A) AMP (B) ADP  
(C) GMP (D) GDP
- 200. An allosteric inhibitor of IMP dehydrogenase is**  
(A) AMP (B) ADP  
(C) GMP (D) GDP
- 201. GMP is an allosteric inhibitor of all the following except**  
(A) PRPP synthetase  
(B) PRPP glutamyl amido synthetase  
(C) IMP dehydrogenase  
(D) Adenylosuccinate synthetase
- 202. AMP is an allosteric inhibitor of**  
(A) PRPP synthetase  
(B) Adenylosuccinate synthetase  
(C) Both (A) and (B)  
(D) None of these
- 203. The first reaction unique to purine nucleotide synthesis is catalysed by**  
(A) PRPP synthetase  
(B) PRPP glutamyl amido transferase  
(C) Phosphoribosyl glycinamide synthetase  
(D) Formyl transferase

- 204. Free purine bases which can be salvaged are**
- (A) Adenine and guanine  
 (B) Adenine and hypoxanthine  
 (C) Guanine and hypoxanthine  
 (D) Adenine, guanine and hypoxanthine
- 205. The enzyme required for salvage of free purine bases is**
- (A) Adenine phosphoribosyl transferase  
 (B) Hypoxanthine guanine phosphoribosyl transferase  
 (C) Both (A) and (B)  
 (D) None of these
- 206. Deoxycytidine kinase can salvage**
- (A) Adenosine  
 (B) Adenosine and deoxyadenosine  
 (C) Adenosine and guanosine  
 (D) Adenine and adenosine
- 207. Adenosine kinase can salvage**
- (A) Adenosine  
 (B) Adenosine and deoxyadenosine  
 (C) Adenosine and guanosine  
 (D) Adenine and adenosine
- 208. Salvage of purine bases is regulated by**
- (A) Adenosine phosphoribosyl transferase  
 (B) Hypoxanthine guanine phosphoribosyl transferase  
 (C) Availability of PRPP  
 (D) None of these
- 209. The available PRPP is used preferentially for**
- (A) De novo synthesis of purine nucleotides  
 (B) De novo synthesis of pyrimidine nucleotides  
 (C) Salvage of purine bases  
 (D) Salvage of pyrimidine bases
- 210. The end product of purine catabolism in man is**
- (A) Inosine (B) Hypoxanthine  
 (C) Xanthine (D) Uric acid
- 211. The enzyme common to catabolism of all the purines is**
- (A) Adenosine deaminase  
 (B) Purine nucleoside phosphorylase  
 (C) Guanase  
 (D) None of these
- 212. Uric acid is the end product of purine as well as protein catabolism in**
- (A) Man (B) Fish  
 (C) Birds (D) None of these
- 213. Daily uric acid excretion in adult men is**
- (A) 2–6 mg (B) 20–40 mg  
 (C) 150–250 mg (D) 40–600 mg
- 214. Dietary purines are catabolised in**
- (A) Liver (B) Kidneys  
 (C) Intestinal mucosa (D) All of these
- 215. De novo synthesis of pyrimidine nucleotides occurs in**
- (A) Mitochondria (B) Cytosol  
 (C) Microsomes (D) Ribosomes
- 216. An enzyme common to de novo synthesis of pyrimidine nucleotides and urea is**
- (A) Urease  
 (B) Carbamoyl phosphate synthetase  
 (C) Aspartate transcarbamoylase  
 (D) Argininosuccinase
- 217. The nitrogen atoms of pyrimidine nucleus are provided by**
- (A) Glutamate  
 (B) Glutamate and aspartate  
 (C) Glutamine  
 (D) Glutamine and aspartate
- 218. The carbon atoms of pyrimidine nucleus are provided by**
- (A) Glycine and aspartate  
 (B) CO<sub>2</sub> and aspartate  
 (C) CO<sub>2</sub> and glutamate  
 (D) CO<sub>2</sub> and glutamine

- 219. Nitrogen at position 1 of pyrimidine nucleus comes from**  
(A) Glutamine (B) Glutamate  
(C) Glycine (D) Aspartate
- 220. Nitrogen at position 3 of pyrimidine nucleus comes from**  
(A) Glutamine (B) Glutamate  
(C) Glycine (D) Aspartate
- 221. The carbon atom at position 2 of pyrimidine nucleus is contributed by**  
(A) CO<sub>2</sub> (B) Glycine  
(C) Aspartate (D) Glutamine
- 222. Aspartate contributes the following carbon atoms of the pyrimidine nucleus:**  
(A) C<sub>2</sub> and C<sub>4</sub> (B) C<sub>5</sub> and C<sub>6</sub>  
(C) C<sub>2</sub>, C<sub>4</sub> and C<sub>6</sub> (D) C<sub>4</sub>, C<sub>5</sub> and C<sub>6</sub>
- 223. The first pyrimidine nucleotide to be formed in de novo synthesis pathway is**  
(A) UMP (B) CMP  
(C) CTP (D) TMP
- 224. Conversion of uridine diphosphate into deoxyuridine diphosphate requires all the following except**  
(A) Ribonucleotide reductase  
(B) Thioredoxin  
(C) Tetrahydrobiopterin  
(D) NADPH
- 225. Amethopterin and aminopterin decrease the synthesis of**  
(A) TMP (B) UMP  
(C) CMP (D) All of these
- 226. For synthesis of CTP and UTP, the amino group comes from**  
(A) Amide group of Asparagine  
(B) Amide group of glutamine  
(C) α-Amino group of glutamine  
(D) α-Amino group of glutamate
- 227. CTP synthetase forms CTP from**  
(A) CDP and inorganic phosphate  
(B) CDP and ATP  
(C) UTP and glutamine  
(D) UTP and glutamate
- 228. For the synthesis of TMP from dUMP, a coenzyme is required which is**  
(A) N<sup>10</sup>-Formyl tetrahydrofolate  
(B) N<sup>5</sup>-Methyl tetrahydrofolate  
(C) N<sup>5</sup>, N<sup>10</sup>-Methylene tetrahydrofolate  
(D) N<sup>5</sup>-Formimino tetrahydrofolate
- 229. All the enzymes required for de novo synthesis of pyrimidine nucleotides are cytosolic except**  
(A) Carbamoyl phosphate synthetase  
(B) Aspartate transcarbamoylase  
(C) Dihydro-orotase  
(D) Dihydro-orotate dehydrogenase
- 230. During de novo synthesis of pyrimidine nucleotides, the first ring compound to be formed is**  
(A) Carbamoyl aspartic acid  
(B) Dihydro-orotic acid  
(C) Orotic acid  
(D) Orotidine monophosphate
- 231. Tetrahydrofolate is required as a coenzyme for the synthesis of**  
(A) UMP (B) CMP  
(C) TMP (D) All of these
- 232. All of the following statements about thioredoxin reductase are true except:**  
(A) It requires NADH as a coenzyme  
(B) Its substrates are ADP, GDP, CDP and UDP  
(C) It is activated by ATP  
(D) It is inhibited by dADP
- 233. De novo synthesis of pyrimidine nucleotides is regulated by**  
(A) Carbamoyl phosphate synthetase  
(B) Aspartate transcarbamoylase  
(C) Both (A) and (B)  
(D) None of these
- 234. Cytosolic carbamoyl phosphate synthetase is inhibited by**  
(A) UTP (B) CTP  
(C) PRPP (D) TMP

- 235. Cytosolic carbamoyl phosphate synthetase is activated by**  
 (A) Glutamine (B) PRPP  
 (C) ATP (D) Aspartate
- 236. Aspartate transcarbamoylase is inhibited by**  
 (A) CTP (B) PRPP  
 (C) ATP (D) TMP
- 237. The following cannot be salvaged in human beings:**  
 (A) Cytidine (B) Deoxycytidine  
 (C) Cytosine (D) Thymidine
- 238.  $\beta$ -Aminoisobutyrate is formed from catabolism of**  
 (A) Cytosine (B) Uracil  
 (C) Thymine (D) Xanthine
- 239. Free ammonia is liberated during the catabolism of**  
 (A) Cytosine (B) Uracil  
 (C) Thymine (D) All of these
- 240.  $\beta$ -Alanine is formed from catabolism of**  
 (A) Thymine  
 (B) Thymine and cytosine  
 (C) Thymine and uracil  
 (D) Cytosine and uracil
- 241. The following coenzyme is required for catabolism of pyrimidine bases:**  
 (A) NADH (B) NADPH  
 (C) FADH<sub>2</sub> (D) None of these
- 242. Inheritance of primary gout is**  
 (A) Autosomal recessive  
 (B) Autosomal dominant  
 (C) X-linked recessive  
 (D) X-linked dominant
- 243. The following abnormality in PRPP synthetase can cause primary gout:**  
 (A) High  $V_{max}$   
 (B) Low  $K_m$   
 (C) Resistance to allosteric inhibition.  
 (D) All of these
- 244. All the following statements about primary gout are true except**  
 (A) Its inheritance is X-linked recessive  
 (B) It can be due to increased activity of PRPP synthetase  
 (C) It can be due to increased activity of hypoxanthine guanine phosphoribosyl transferase  
 (D) De novo synthesis of purines is increased in it
- 245. All of the following statements about uric acid are true except**  
 (A) It is a catabolite of purines  
 (B) It is excreted by the kidneys  
 (C) It is undissociated at pH above 5.8  
 (D) It is less soluble than sodium urate
- 246. In inherited deficiency of hypoxanthine guanine phosphoribosyl transferase**  
 (A) De novo synthesis of purine nucleotides is decreased  
 (B) Salvage of purines is decreased  
 (C) Salvage of purines is increased  
 (D) Synthesis of uric acid is decreased
- 247. All of the following statements about uric acid are true except**  
 (A) It can be formed from allantoin  
 (B) Formation of uric acid stones in kidneys can be decreased by alkalinisation of urine  
 (C) Uric acid begins to dissociate at pH above 5.8  
 (D) It is present in plasma mainly as monosodium urate
- 248. All of the following statements about primary gout are true except**  
 (A) Uric acid stones may be formed in kidneys  
 (B) Arthritis of small joints occurs commonly  
 (C) Urinary excretion of uric acid is decreased  
 (D) It occurs predominantly in males
- 249. All of the following statements about allopurinol are true except**  
 (A) It is a structural analogue of uric acid  
 (B) It can prevent uric acid stones in the kidneys  
 (C) It increases the urinary excretion of xanthine and hypoxanthine  
 (D) It is a competitive inhibitor of xanthine oxidase

- 250. Orotic aciduria can be controlled by**
- (A) Oral administration of orotic acid
  - (B) Decreasing the dietary intake of orotic acid
  - (C) Decreasing the dietary intake of pyrimidines
  - (D) Oral administration of uridine
- 251. All of the following occur in orotic aciduria except**
- (A) Increased synthesis of pyrimidine nucleotides
  - (B) Increased excretion of orotic acid in urine
  - (C) Decreased synthesis of cytidine triphosphate
  - (D) Retardation of growth
- 252. Inherited deficiency of adenosine deaminase causes**
- (A) Hyperuricaemia and gout
  - (B) Mental retardation
  - (C) Immunodeficiency
  - (D) Dwarfism
- 253. Complete absence of hypoxanthine guanine phosphoribosyl transferase causes**
- (A) Primary gout
  - (B) Immunodeficiency
  - (C) Uric acid stones
  - (D) Lesh-Nyhan syndrome
- 254. Increased urinary excretion of orotic acid can occur in deficiency of**
- (A) Orotate phosphoribosyl transferase
  - (B) OMP decarboxylase
  - (C) Mitochondrial ornithine transcarbamoylase
  - (D) Any of the above
- 255. All of the following can occur in Lesch-Nyhan syndrome except**
- (A) Gouty arthritis
  - (B) Uric acid stones
  - (C) Retarded growth
  - (D) Self-mutilating behaviour
- 256. Inherited deficiency of purine nucleoside phosphorylase causes**
- (A) Dwarfism
  - (B) Mental retardation
  - (C) Immunodeficiency
  - (D) Gout
- 257. Deoxyribonucleotides are formed by reduction of**
- (A) Ribonucleosides
  - (B) Ribonucleoside monophosphates
  - (C) Ribonucleoside diphosphates
  - (D) Ribonucleoside triphosphates
- 258. An alternate substrate for orotate phosphoribosyl transferase is**
- (A) Allopurinol
  - (B) Xanthine
  - (C) Hypoxanthine
  - (D) Adenine
- 259. Mammals other than higher primates do not suffer from gout because they**
- (A) Lack xanthine oxidase
  - (B) Lack adenosine deaminase
  - (C) Lack purine nucleoside phosphorylase
  - (D) Possess uricase
- 260. Hypouricaemia can occur in**
- (A) Xanthine oxidase deficiency
  - (B) Psoriasis
  - (C) Leukaemia
  - (D) None of these
- 261. Synthesis of DNA is also known as**
- (A) Duplication
  - (B) Replication
  - (C) Transcription
  - (D) Translation
- 262. Replication of DNA is**
- (A) Conservative
  - (B) Semi-conservative
  - (C) Non-conservative
  - (D) None of these
- 263. Direction of DNA synthesis is**
- (A) 5' → 3'
  - (B) 3' → 5'
  - (C) Both (A) and (B)
  - (D) None of these
- 264. Formation of RNA primer:**
- (A) Precedes replication
  - (B) Follows replication
  - (C) Precedes transcription
  - (D) Follows transcription
- 265. Okazaki pieces are made up of**
- (A) RNA
  - (B) DNA
  - (C) RNA and DNA
  - (D) RNA and proteins
- 266. Okazaki pieces are formed during the synthesis of**
- (A) mRNA
  - (B) tRNA
  - (C) rRNA
  - (D) DNA

**267. After formation of replication fork**

- (A) Both the new strands are synthesized discontinuously
- (B) One strand is synthesized continuously and the other discontinuously
- (C) Both the new strands are synthesized continuously
- (D) RNA primer is required only for the synthesis of one new strand

**268. An Okazaki fragment contains about**

- (A) 10 Nucleotides
- (B) 100 Nucleotides
- (C) 1,000 Nucleotides
- (D) 10,000 Nucleotides

**269. RNA primer is formed by the enzyme:**

- (A) Ribonuclease
- (B) Primase
- (C) DNA polymerase I
- (D) DNA polymerase III

**270. In RNA, the complementary base of adenine is**

- (A) Cytosine
- (B) Guanine
- (C) Thymine
- (D) Uracil

**271. During replication, the template DNA is unwound**

- (A) At one of the ends
- (B) At both the ends
- (C) At multiple sites
- (D) Nowhere

**272. During replication, unwinding of double helix is initiated by**

- (A) DNAA protein
- (B) DnaB protein
- (C) DNAC protein
- (D) Rep protein

**273. For unwinding of double helical DNA,**

- (A) Energy is provided by ATP
- (B) Energy is provided by GTP
- (C) Energy can be provided by either ATP or GTP
- (D) No energy is required

**274. Helicase and DNAB protein cause**

- (A) Rewinding of DNA and require ATP as a source of energy
- (B) Rewinding of DNA but do not require any source of energy
- (C) Unwinding of DNA and require ATP as a source of energy
- (D) Unwinding of DNA but do not require any source of energy

**275. The unwound strands of DNA are held apart by**

- (A) Single strand binding protein
- (B) Double strand binding protein
- (C) Rep protein
- (D) DNAA protein

**276. Deoxyribonucleotides are added to RNA primer by**

- (A) DNA polymerase I
- (B) DNA polymerase II
- (C) DNA polymerase III holoenzyme
- (D) All of these

**277. Ribonucleotides of RNA primer are replaced by deoxyribonucleotides by the enzyme:**

- (A) DNA polymerase I
- (B) DNA polymerase II
- (C) DNA polymerase III holoenzyme
- (D) All of these

**278. DNA fragments are sealed by**

- (A) DNA polymerase II
- (B) DNA ligase
- (C) DNA gyrase
- (D) DNA topoisomerase II

**279. Negative supercoils are introduced in DNA by**

- (A) Helicase
- (B) DNA ligase
- (C) DNA gyrase
- (D) DNA polymerase III holoenzyme

**280. Reverse transcriptase activity is present in the eukaryotic:**

- (A) DNA polymerase  $\alpha$
- (B) DNA polymerase  $\gamma$
- (C) Telomerase
- (D) DNA polymerase II

**281. DNA polymerase III holoenzyme possesses**

- (A) Polymerase activity
- (B) 3'→5' Exonuclease activity
- (C) 5'→3' Exonuclease and polymerase activities
- (D) 3'→5' Exonuclease and polymerase activities

- 282. DNA polymerase I possesses**
- (A) Polymerase activity
  - (B) 3'→5' Exonuclease activity
  - (C) 5'→3' Exonuclease activity
  - (D) All of these
- 283. 3'→5' Exonuclease activity of DNA polymerase I**
- (A) Removes ribonucleotides
  - (B) Adds deoxyribonucleotides
  - (C) Corrects errors in replication
  - (D) Hydrolyses DNA into mononucleotides
- 284. All of the following statements about RNA-dependent DNA polymerase are true except:**
- (A) It synthesizes DNA using RNA as a template
  - (B) It is also known as reverse transcriptase
  - (C) It synthesizes DNA in 5'→3' direction
  - (D) It is present in all the viruses
- 285. Reverse transcriptase catalyses**
- (A) Synthesis of RNA
  - (B) Breakdown of RNA
  - (C) Synthesis of DNA
  - (D) Breakdown of DNA
- 286. DNA A protein can bind only to**
- (A) Positively supercoiled DNA
  - (B) Negatively supercoiled DNA
  - (C) Both (A) and (B)
  - (D) None of these
- 287. DNA topoisomerase I of *E. coli* catalyses**
- (A) Relaxation of negatively supercoiled DNA
  - (B) Relaxation of positively supercoiled DNA
  - (C) Conversion of negatively supercoiled DNA into positively supercoiled DNA
  - (D) Conversion of double helix into supercoiled DNA
- 288. In mammalian cell cycle, synthesis of DNA occurs during**
- (A) S phase
  - (B) G<sub>1</sub> phase
  - (C) Mitotic Phase
  - (D) G<sub>2</sub> phase
- 289. Melting temperature of DNA is the temperature at which**
- (A) Solid DNA becomes liquid
  - (B) Liquid DNA evaporates
  - (C) DNA changes from double helix into supercoiled DNA
  - (D) Native double helical DNA is denatured
- 290. Melting temperature of DNA is increased by its**
- (A) A and T content
  - (B) G and C content
  - (C) Sugar content
  - (D) Phosphate content
- 291. Buoyant density of DNA is increased by its**
- (A) A and T content
  - (B) G and C content
  - (C) Sugar content
  - (D) None of these
- 292. Relative proportions of G and C versus A and T in DNA can be determined by its**
- (A) Melting temperature
  - (B) Buoyant density
  - (C) Both (A) and (B)
  - (D) None of these
- 293. Some DNA is present in mitochondria of**
- (A) Prokaryotes
  - (B) Eukaryotes
  - (C) Both (A) and (B)
  - (D) None of these
- 294. Satellite DNA contains**
- (A) Highly repetitive sequences
  - (B) Moderately repetitive sequences
  - (C) Non-repetitive sequences
  - (D) DNA-RNA hybrids
- 295. Synthesis of RNA and a DNA template is known as**
- (A) Replication
  - (B) Translation
  - (C) Transcription
  - (D) Mutation
- 296. Direction of RNA synthesis is**
- (A) 5' → 3'
  - (B) 3' → 5'
  - (C) Both (A) and (B)
  - (D) None of these
- 297. DNA-dependent RNA polymerase is a**
- (A) Monomer
  - (B) Dimer
  - (C) Trimer
  - (D) Tetramer

- 298. DNA-dependent RNA polymerase requires the following for its catalytic activity:**  
 (A)  $Mg^{++}$  (B)  $Mn^{++}$   
 (C) Both (A) and (B) (D) None of these
- 299. The initiation site for transcription is recognized by**  
 (A)  $\alpha$ -Subunit of DNA-dependent RNA polymerase  
 (B)  $\beta$ -Subunit of DNA-dependent RNA polymerase  
 (C) Sigma factor  
 (D) Rho factor
- 300. The termination site for transcription is recognized by**  
 (A)  $\alpha$ -Subunit of DNA-dependent RNA polymerase  
 (B)  $\beta$ -Subunit of DNA-dependent RNA polymerase  
 (C) Sigma factor  
 (D) Rho factor
- 301. Mammalian RNA polymerase I synthesises**  
 (A) mRNA (B) rRNA  
 (C) tRNA (D) hnRNA
- 302. Mammalian RNA polymerase III synthesises**  
 (A) rRNA (B) mRNA  
 (C) tRNA (D) hnRNA
- 303. In mammals, synthesis of mRNA is catalysed by**  
 (A) RNA polymerase I (B) RNA polymerase II  
 (C) RNA polymerase III (D) RNA polymerase IV
- 304. Heterogeneous nuclear RNA is the precursor of**  
 (A) mRNA (B) rRNA  
 (C) tRNA (D) None of these
- 305. Post-transcriptional modification of hnRNA involves all of the following except**  
 (A) Addition of 7-methylguanosine triphosphate cap  
 (B) Addition of polyadenylate tail  
 (C) Insertion of nucleotides  
 (D) Deletion of introns
- 306. Newly synthesized tRNA undergoes post-transcriptional modifications which include all the following except**  
 (A) Reduction in size  
 (B) Methylation of some bases  
 (C) Formation of pseudouridine  
 (D) Addition of C-C-A terminus at 5' end
- 307. Post-transcriptional modification does not occur in**  
 (A) Eukaryotic tRNA (B) Prokaryotic tRNA  
 (C) Eukaryotic hnRNA (D) Prokaryotic mRNA
- 308. A consensus sequence on DNA, called TATA box, is the site for attachment of**  
 (A) RNA-dependent DNA polymerase  
 (B) DNA-dependent RNA polymerase  
 (C) DNA-dependent DNA polymerase  
 (D) DNA topoisomerase II
- 309. Polyadenylate tail is not present in mRNA synthesising**  
 (A) Globin (B) Histone  
 (C) Apoferritin (D) Growth hormone
- 310. Introns are present in DNA of**  
 (A) Viruses (B) Bacteria  
 (C) Man (D) All of these
- 311. A mammalian DNA polymerase among the following is**  
 (A) DNA polymerase  $\alpha$   
 (B) DNA polymerase I  
 (C) DNA polymerase II  
 (D) DNA polymerase IV
- 312. Mammalian DNA polymerase  $\gamma$  is located in**  
 (A) Nucleus (B) Nucleolus  
 (C) Mitochondria (D) Cytosol
- 313. Replication of nuclear DNA in mammals is catalysed by**  
 (A) DNA polymerase  $\alpha$   
 (B) DNA polymerase  $\beta$   
 (C) DNA polymerase  $\gamma$   
 (D) DNA polymerase III
- 314. Primase activity is present in**  
 (A) DNA polymerase II  
 (B) DNA polymerase  $\alpha$   
 (C) DNA polymerase  $\beta$   
 (D) DNA polymerase  $\delta$

- 315. The mammalian DNA polymerase involved in error correction is**
- (A) DNA polymerase  $\alpha$
  - (B) DNA polymerase  $\beta$
  - (C) DNA polymerase  $\gamma$
  - (D) DNA polymerase  $\delta$
- 316. Novobicin inhibits the synthesis of**
- (A) DNA
  - (B) mRNA
  - (C) tRNA
  - (D) rRNA
- 317. Ciprofloxacin inhibits the synthesis of**
- (A) DNA
  - (B) mRNA
  - (C) tRNA
  - (D) rRNA
- 318. Ciprofloxacin inhibits**
- (A) DNA topoisomerase II
  - (B) DNA polymerase I
  - (C) DNA polymerase III
  - (D) DNA gyrase
- 319. Rifampicin inhibits**
- (A) Unwinding of DNA
  - (B) Initiation of replication
  - (C) Initiation of translation
  - (D) Initiation of transcription
- 320. Actinomycin D binds to**
- (A) Double stranded DNA
  - (B) Single stranded DNA
  - (C) Single stranded RNA
  - (D) DNA-RNA hybrid
- 321. DNA contains some palindromic sequences which**
- (A) Mark the site for the formation of replication forks
  - (B) Direct DNA polymerase to turn back to replicate the other strand
  - (C) Are recognized by restriction enzymes
  - (D) Are found only in bacterial DNA
- 322. Introns in genes**
- (A) Encode the amino acids which are removed during post-translational modification
  - (B) Encode signal sequences which are removed before secretion of the proteins
  - (C) Are the non-coding sequences which are not translated
  - (D) Are the sequences that intervene between two genes
- 323. All of the following statements about post-transcriptional processing of tRNA are true except**
- (A) Introns of some tRNA precursors are removed
  - (B) CCA is added at 3' end
  - (C) 7-Methylguanosine triphosphate cap is added at 5' end
  - (D) Some bases are methylated
- 324.  $\alpha$ -Amanitin inhibits**
- (A) DNA polymerase II of prokaryotes
  - (B) DNA polymerase  $\alpha$  of eukaryotes
  - (C) RNA polymerase II of eukaryotes
  - (D) RNA-dependent DNA polymerase
- 325. Ciprofloxacin inhibits the synthesis of**
- (A) DNA in prokaryotes
  - (B) DNA in prokaryotes and eukaryotes
  - (C) RNA in prokaryotes
  - (D) RNA in prokaryotes and eukaryotes
- 326. All of the following statements about bacterial promoters are true except**
- (A) They are smaller than eukaryotic promoters
  - (B) They have two consensus sequences upstream from the transcription start site
  - (C) TATA box is the site for attachment of RNA polymerase
  - (D) TATA box has a high melting temperature
- 327. All of the following statements about eukaryotic promoters are true except**
- (A) They may be located upstream or down stream from the structural gene
  - (B) They have two consensus sequences
  - (C) One consensus sequence binds RNA polymerase
  - (D) Mutations in promoter region can decrease the efficiency of transcription of the structural gene
- 328. In sanger's method of DNA sequence determination, DNA synthesis is stopped by using**
- (A) 1', 2'-Dideoxyribonucleoside triphosphates
  - (B) 2', 3'-Dideoxyribonucleoside triphosphates
  - (C) 2', 4'-Dideoxyribonucleoside triphosphates
  - (D) 2', 5'-Dideoxyribonucleoside triphosphates

- 329. tRNA genes have**  
 (A) Upstream promoters  
 (B) Downstream promoters  
 (C) Intragenic promoters  
 (D) No promoters
- 330. All of the following statements about tRNA are true except**  
 (A) It is synthesized as a large precursor  
 (B) It is processed in the nucleolus  
 (C) It has no codons or anticodons  
 (D) Genes for rRNA are present in single copies
- 331. Anticodons are present on**  
 (A) Coding strand of DNA  
 (B) mRNA  
 (C) tRNA  
 (D) rRNA
- 332. Codons are present on**  
 (A) Non-coding strand of DNA  
 (B) hnRNA  
 (C) tRNA  
 (D) None of these
- 333. Nonsense codons are present on**  
 (A) mRNA (B) tRNA  
 (C) rRNA (D) None of these
- 334. Genetic code is said to be degenerate because**  
 (A) It can undergo mutations  
 (B) A large proportion of DNA is non-coding  
 (C) One codon can code for more than one amino acids  
 (D) More than one codons can code for the same amino acids
- 335. All the following statements about genetic code are correct except**  
 (A) It is degenerate (B) It is unambiguous  
 (C) It is nearly universal (D) It is overlapping
- 336. All of the following statements about nonsense codons are true except**  
 (A) They do not code for amino acids  
 (B) They act as chain termination signals  
 (C) They are identical in nuclear and mitochondrial DNA  
 (D) They have no complementary anticodons
- 337. A polycistronic mRNA can be seen in**  
 (A) Prokaryotes (B) Eukaryotes  
 (C) Mitochondria (D) All of these
- 338. Non-coding sequence are present in the genes of**  
 (A) Bacteria (B) Viruses  
 (C) Eukaryotes (D) All of these
- 339. Non-coding sequences in a gene are known as**  
 (A) Cistrons (B) Nonsense codons  
 (C) Introns (D) Exons
- 340. Splice sites are present in**  
 (A) Prokaryotic mRNA (B) Eukaryotic mRNA  
 (C) Eukaryotic hnRNA (D) All of these
- 341. The common features of introns include all the following except**  
 (A) The base sequence begins with GU  
 (B) The base sequence ends with AG  
 (C) The terminal AG sequence is preceded by a purine rich tract of ten nucleotides  
 (D) An adenosine residue in branch site participates in splicing
- 342. A splice some contains all the following except**  
 (A) hnRNA (B) snRNAs  
 (C) Some proteins (D) Ribosome
- 343. Self-splicing can occur in**  
 (A) Some precursors of rRNA  
 (B) Some precursors of tRNA  
 (C) hnRNA  
 (D) None of these
- 344. Pribnow box is present in**  
 (A) Prokaryotic promoters  
 (B) Eukaryotic promoters  
 (C) Both (A) and (B)  
 (D) None of these
- 345. Hogness box is present in**  
 (A) Prokaryotic promoters

- (B) Eukaryotic promoters
- (C) Both (A) and (B)
- (D) None of these

**346. CAAT box is present in**

- (A) Prokaryotic promoters 10 bp upstream of transcription start site
- (B) Prokaryotic promoters 35 bp upstream of transcription start site
- (C) Eukaryotic promoters 25 bp upstream of transcription start site
- (D) Eukaryotic promoters 70–80 bp upstream of transcription start site

**347. Eukaryotic promoters contain**

- (A) TATA box 25bp upstream of transcription start site
- (B) CAAT box 70-80 bp upstream of transcription start site
- (C) Both (A) and (B)
- (D) None of these

**348. All the following statements about tRNA are correct except**

- (A) A given tRNA can be charged with only one particular amino acid
- (B) The amino acid is recognized by the anticodon of tRNA
- (C) The amino acid is attached to end of tRNA
- (D) The anticodon of tRNA finds the complementary codon on mRNA

**349. All the following statements about charging of tRNA are correct except**

- (A) It is catalysed by amino acyl tRNA synthetase
- (B) ATP is converted into ADP and Pi in this reaction
- (C) The enzyme recognizes the tRNA and the amino acid
- (D) There is a separate enzyme for each tRNA

**350. All the following statements about recognition of a codon on mRNA by an anticodon on tRNA are correct except**

- (A) The recognition of the third base of the codon is not very precise
- (B) Imprecise recognition of the third base results in wobble
- (C) Wobble is partly responsible for the degeneracy of the genetic code

- (D) Wobble results in incorporation of incorrect amino acids in the protein

**351. The first amino acyl tRNA which initiates translation in eukaryotes is**

- (A) Methionyl tRNA
- (B) Formylmethionyl tRNA
- (C) Tyrosinyl tRNA
- (D) Alanyl tRNA

**352. The first amino acyl tRNA which initiates translation in prokaryotes is**

- (A) Methionyl tRNA
- (B) Formylmethionyl tRNA
- (C) Tyrosinyl tRNA
- (D) Alanyl tRNA

**353. In eukaryotes, the 40 S pre-initiation complex contains all the following initiation factors except**

- (A) eIF-1A
- (B) eIF-2
- (C) eIF-3
- (D) eIF-4

**354. Eukaryotic initiation factors 4A, 4B and 4F bind to**

- (A) 40 S ribosomal subunit
- (B) 60 S ribosomal subunit
- (C) mRNA
- (D) Amino acyl tRNA

**355. The codon which serves as translation start signal is**

- (A) AUG
- (B) UAG
- (C) UGA
- (D) UAA

**356. The first amino acyl tRNA approaches 40 S ribosomal subunit in association with**

- (A) eIF-1A and GTP
- (B) eIF-2 and GTP
- (C) eIF-2C and GTP
- (D) eIF-3 and GTP

**357. eIF-1A and eIF-3 are required**

- (A) For binding of amino acyl tRNA to 40 S ribosomal subunit
- (B) For binding of mRNA to 40 S ribosomal subunit
- (C) For binding of 60 S subunit to 40 S subunit
- (D) To prevent binding of 60 S subunit to 40 S subunit

- 358. eIF-4 A possesses**  
 (A) ATPase activity (B) GTPase activity  
 (C) Helicase activity (D) None of these
- 359. eIF-4 B**  
 (A) Binds to 3' chain initiation codon on mRNA  
 (B) Binds to 3' end of mRNA  
 (C) Binds to 5' end of mRNA  
 (D) Unwinds mRNA near its 5' end
- 360. Peptidyl transferase activity is present in**  
 (A) 40 S ribosomal subunit  
 (B) 60 S ribosomal subunit  
 (C) eEF-2  
 (D) Amino acyl tRNA
- 361. After formation of a peptide bond, mRNA is translocated along the ribosome by**  
 (A) eEF-1 and GTP  
 (B) eEF-2 and GTP  
 (C) Peptidyl transferase and GTP  
 (D) Peptidyl transferase and ATP
- 362. Binding of formylmethionyl tRNA to 30 S ribosomal subunit of prokaryotes is inhibited by**  
 (A) Streptomycin (B) Chloramphenicol  
 (C) Erythromycin (D) Mitomycin
- 363. Tetracyclines inhibit binding of amino acyl tRNAs to**  
 (A) 30 S ribosomal subunits  
 (B) 40 S ribosomal subunits  
 (C) 50 S ribosomal subunits  
 (D) 60 S ribosomal subunits
- 364. Peptidyl transferase activity of 50 S ribosomal subunits is inhibited by**  
 (A) Rifampicin (B) Cycloheximide  
 (C) Chloramphenicol (D) Erythromycin
- 365. Erythromycin binds to 50 S ribosomal subunit and**  
 (A) Inhibits binding of amino acyl tRNA  
 (B) Inhibits Peptidyl transferase activity  
 (C) Inhibits translocation  
 (D) Causes premature chain termination
- 366. Puromycin causes premature chain termination in**  
 (A) Prokaryotes (B) Eukaryotes  
 (C) Both (A) and (B) (D) None of these
- 367. Diphtheria toxin inhibits**  
 (A) Prokaryotic EF-1 (B) Prokaryotic EF-2  
 (C) Eukaryotic EF-1 (D) Eukaryotic EF-2
- 368. The proteins destined to be transported out of the cell have all the following features except**  
 (A) They possess a signal sequence  
 (B) Ribosomes synthesizing them are bound to endoplasmic reticulum  
 (C) After synthesis, they are delivered into Golgi apparatus  
 (D) They are tagged with ubiquitin
- 369. SRP receptors involved in protein export are present on**  
 (A) Ribosomes  
 (B) Endoplasmic reticulum  
 (C) Golgi apparatus  
 (D) Cell membrane
- 370. The signal sequence of proteins is cleaved off**  
 (A) On the ribosomes immediately after synthesis  
 (B) In the endoplasmic reticulum  
 (C) During processing in Golgi apparatus  
 (D) During passage through the cell membrane
- 371. The half-life of a protein depends upon its**  
 (A) Signal sequence  
 (B) N-terminus amino acid  
 (C) C-terminus amino acid  
 (D) Prosthetic group
- 372. Besides structural genes that encode proteins, DNA contains some regulatory sequences which are known as**  
 (A) Operons (B) Cistrons  
 (C) Cis-acting elements (D) Trans-acting factors
- 373. Inducers and repressors are**  
 (A) Enhancer and silencer elements respectively  
 (B) Trans-acting factors

- (C) Cis-acting elements
- (D) Regulatory proteins

**374. cis-acting elements include**

- (A) Steroid hormones (B) Calcitriol
- (C) Histones (D) Silencers

**375. Silencer elements**

- (A) Are trans-acting factors
- (B) Are present between promoters and the structural genes
- (C) Decrease the expression of some structural genes
- (D) Encode specific repressor proteins

**376. trans-acting factors include**

- (A) Promoters (B) Repressors
- (C) Enhancers (D) Silencers

**377. Enhancer elements have all the following features except**

- (A) They increase gene expression through a promoter
- (B) Each enhancer activates a specific promoter
- (C) They may be located far away from the promoter
- (D) They may be upstream or downstream from the promoter

**378. Amplification of dihydrofolate reductase gene may be brought about by**

- (A) High concentrations of folic acid
- (B) Deficiency of folic acid
- (C) Low concentration of thymidylate
- (D) Amethopterin

**379. Proteins which interact with DNA and affect the rate of transcription possess the following structural motif:**

- (A) Helix-turn-helix motif
- (B) Zinc finger motif
- (C) Leucine zipper motif
- (D) All of these

**380. Lac operon is a cluster of genes present in**

- (A) Human beings (B) *E. coli*
- (C) Lambda phage (D) All of these

**381. Lac operon is a cluster of**

- (A) Three structural genes
- (B) Three structural genes and their promoter
- (C) A regulatory gene, an operator and a promoter
- (D) A regulatory gene, an operator, a promoter and three structural genes

**382. The regulatory i gene of lac operon**

- (A) Is inhibited by lacotose
- (B) Is inhibited by its own product, the repressor protein
- (C) Forms a regulatory protein which increases the expression of downstream structural genes
- (D) Is constitutively expressed

**383. RNA polymerase holoenzyme binds to lac operon at the following site:**

- (A) i gene (B) z gene
- (C) Operator locus (D) Promoter region

**384. Transcription of z, y and a genes of lac operon is prevented by**

- (A) Lactose (B) Allo-lactose
- (C) Repressor (D) cAMP

**385. Transcription of structural genes of lac operon is prevented by binding of the repressor tetramer to**

- (A) i gene (B) Operator locus
- (C) Promoter (D) z gene

**386. The enzymes encoded by z, y and a genes of lac operon are inducible, and their inducer is**

- (A) Lactose
- (B) Allo-lactose
- (C) Catabolite gene activator protein
- (D) All of these

**387. Binding of RNA polymerase holoenzyme to the promoter region of lac operon is facilitated by**

- (A) Catabolite gene activator protein (CAP)
- (B) cAMP
- (C) CAP-cAMP complex
- (D) None of these

- 388. Lactose or its analogues act as positive regulators of lac operon by**
- (A) Attaching to *i* gene and preventing its expression
  - (B) Increasing the synthesis of catabolite gene activator protein
  - (C) Attaching to promoter region and facilitating the binding of RNA polymerase holoenzyme
  - (D) Binding to repressor subunits so that the repressor cannot attach to the operator locus
- 389. Expression of structural genes of lac operon is affected by all the following except**
- (A) Lactose or its analogues
  - (B) Repressor tetramer
  - (C) cAMP
  - (D) CAP-cAMP complex
- 390. The coding sequences in lac operon include**
- (A) *i* gene
  - (B) *i* gene, operator locus and promoter
  - (C) *z*, *y* and *a* genes
  - (D) *i*, *z*, *y* and *a* genes
- 391. Mutations can be caused by**
- (A) Ultraviolet radiation
  - (B) Ionising radiation
  - (C) Alkylating agents
  - (D) All of these
- 392. Mutations can be caused by**
- (A) Nitrosamine            (B) Dimethyl sulphate
  - (C) Acridine                (D) All of these
- 393. Nitrosamine can deaminate**
- (A) Cytosine to form uracil
  - (B) Adenine to form xanthine
  - (C) Guanine to form hypoxanthine
  - (D) All of these
- 394. Exposure of DNA to ultraviolet radiation can lead to the formation of**
- (A) Adenine dimers    (B) Guanine dimers
  - (C) Thymine dimers    (D) Uracil dimers
- 395. Damage to DNA caused by ultraviolet radiation can be repaired by**
- (A) *uvr ABC* excinuclease
  - (B) DNA polymerase I
  - (C) DNA ligase
  - (D) All of these
- 396. Xeroderma pigmentosum results from a defect in**
- (A) *uvr ABC* excinuclease
  - (B) DNA polymerase I
  - (C) DNA ligase
  - (D) All of these
- 397. All the following statements about xeroderma pigmentosum are true except**
- (A) It is a genetic disease
  - (B) Its inheritance is autosomal dominant
  - (C) *uvr ABC* excinuclease is defective in this disease
  - (D) It results in multiple skin cancers
- 398. Substitution of an adenine base by guanine in DNA is known as**
- (A) Transposition            (B) Transition
  - (C) Transversion            (D) Frameshift mutation
- 399. Substitution of a thymine base by adenine in DNA is known as**
- (A) Transposition            (B) Transition
  - (C) Transversion            (D) Frameshift mutation
- 400. A point mutation results from**
- (A) Substitution of a base
  - (B) Insertion of a base
  - (C) Deletion of a base
  - (D) All of these
- 401. Substitution of a base can result in a**
- (A) Silent mutation    (B) Mis-sense mutation
  - (C) Nonsense mutation (D) All of these
- 402. A silent mutation is most likely to result from**
- (A) Substitution of the first base of a codon
  - (B) Substitution of the third base of a codon
  - (C) Conversion of a nonsense codon into a sense codon
  - (D) Conversion of a sense codon into a nonsense codon
- 403. The effect of a mis-sense mutation can be**
- (A) Acceptable            (B) Partially acceptable
  - (C) Unacceptable        (D) All of these

- 404. Amino acid sequence of the encoded protein is not changed in**  
(A) Silent mutation  
(B) Acceptable mis-sense mutation  
(C) Both (A) and (B)  
(D) None of these
- 405. Haemoglobin S is an example of a/an**  
(A) Silent mutation  
(B) Acceptable mis-sense mutation  
(C) Unacceptable mis-sense mutation  
(D) Partially acceptable mis-sense mutation
- 406. If the codon UAC on mRNA changes into UAG as a result of a base substitution in DNA, it will result in**  
(A) Silent mutation  
(B) Acceptable mis-sense mutation  
(C) Nonsense mutation  
(D) Frameshift mutation
- 407. Insertion of a base in a gene can cause**  
(A) Change in reading frame  
(B) Garbled amino acid sequence in the encoded protein  
(C) Premature termination of translation  
(D) All of these
- 408. A frameshift mutation changes the reading frame because the genetic code**  
(A) Is degenerate  
(B) Is overlapping  
(C) Has no punctuations  
(D) Is universal
- 409. Suppressor mutations occur in**  
(A) Structural genes (B) Promoter regions  
(C) Silencer elements (D) Anticodons of tRNA
- 410. Suppressor tRNAs can neutralize the effects of mutations in**  
(A) Structural genes (B) Promoter regions  
(C) Enhancer elements (D) All of these
- 411. Mutations in promoter regions of genes can cause**  
(A) Premature termination of translation  
(B) Change in reading frame of downstream structural gene  
(C) Decreased efficiency of transcription  
(D) All of these
- 412. Mitochondrial protein synthesis is inhibited by**  
(A) Cycloheximide (B) Chloramphenicol  
(C) Diphtheria toxin (D) None of these
- 413. All of the following statements about puromycin are true except**  
(A) It is an alanyl tRNA analogue  
(B) It causes premature termination of protein synthesis  
(C) It inhibits protein synthesis in prokaryotes  
(D) It inhibits protein synthesis in eukaryotes
- 414. Leucine zipper motif is seen in some helical proteins when leucine residues appear at every**  
(A) 3rd position (B) 5th position  
(C) 7th position (D) 9th position
- 415. Zinc finger motif is formed in some proteins by binding of zinc to**  
(A) Two cysteine residues  
(B) Two histidine residues  
(C) Two arginine residues  
(D) Two cysteine and two histidine residues or two pairs of two cysteine residues each
- 416. Restriction endonucleases are present in**  
(A) Viruses (B) Bacteria  
(C) Eukaryotes (D) All of these
- 417. Restriction endonucleases split**  
(A) RNA  
(B) Single stranded DNA  
(C) Double stranded DNA  
(D) DNA-RNA hybrids
- 418. Restriction endonucleases can recognise**  
(A) Palindromic sequences  
(B) Chimeric DNA  
(C) DNA-RNA hybrids  
(D) Homopolymer sequences

- 419. All of the following statements about restriction endonucleases are true except:**
- (A) They are present in bacteria
  - (B) They act on double stranded DNA
  - (C) They recognize palindromic sequences
  - (D) They always produce sticky ends
- 420. Which of the following is a palindromic sequence**
- (A) 5' – ATGCAG – 3'
  - (B) 3' – TACGTC – 5'
  - (C) 5' – CGAAGC – 3'
  - (D) 3' – GCTTCG – 5'
- 421. In sticky ends produced by restriction endonucleases**
- (A) The 2 strands of DNA are joined to each other
  - (B) The DNA strands stick to the restriction endonuclease
  - (C) The ends of a double stranded fragment are overlapping
  - (D) The ends of a double stranded fragment are non overlapping
- 422. All of the following may be used as expression vectors except**
- (A) Plasmid
  - (B) Bacteriophage
  - (C) Baculovirus
  - (D) *E. coli*
- 423. A plasmid is a**
- (A) Single stranded linear DNA
  - (B) Single stranded circular DNA
  - (C) Double stranded linear DNA
  - (D) Double stranded circular DNA
- 424. Fragments of DNA can be identified by the technique of**
- (A) Western blotting
  - (B) Eastern blotting
  - (C) Northern blotting
  - (D) Southern blotting
- 425. A particular RNA in a mixture can be identified by**
- (A) Western blotting
  - (B) Eastern blotting
  - (C) Northern blotting
  - (D) Southern blotting
- 426. A radioactive isotope labeled cDNA probe is used in**
- (A) Southern blotting
  - (B) Northern blotting
  - (C) Both (A) and (B)
  - (D) None of these
- 427. An antibody probe is used in**
- (A) Southern blotting
  - (B) Northern blotting
  - (C) Western blotting
  - (D) None of these
- 428. A particular protein in a mixture can be detected by**
- (A) Southern blotting
  - (B) Northern blotting
  - (C) Western blotting
  - (D) None of these
- 429. The first protein synthesized by recombinant DNA technology was**
- (A) Streptokinase
  - (B) Human growth hormone
  - (C) Tissue plasminogen activator
  - (D) Human insulin
- 430. For production of eukaryotic protein by recombinant DNA technology in bacteria, the template used is**
- (A) Eukaryotic gene
  - (B) hnRNA
  - (C) mRNA
  - (D) All of these
- 431. Monoclonal antibodies are prepared by cloning**
- (A) Myeloma cells
  - (B) Hybridoma cells
  - (C) T-Lymphocytes
  - (D) B-Lymphocytes
- 432. Myeloma cells are lacking in**
- (A) TMP synthetase
  - (B) Formyl transferase
  - (C) HGPRT
  - (D) All of these
- 433. Hybridoma cells are selected by culturing them in a medium containing**
- (A) Adenine, guanine, cytosine and thymine
  - (B) Adenine, guanine, cytosine and uracil
  - (C) Hypoxanthine, aminopterin and thymine
  - (D) Hypoxanthine, aminopterin and thymidine
- 434. Myeloma cells and lymphocytes can be fused by using**
- (A) Calcium chloride
  - (B) Ethidium bromide
  - (C) Polyethylene glycol
  - (D) DNA polymerase

- 435. Trials for gene therapy in human beings were first carried out, with considerable success, in a genetic disease called**
- (A) Cystic fibrosis
  - (B) Thalassaemia
  - (C) Adenosine deaminase deficiency
  - (D) Lesch-Nyhan syndrome
- 436. Chimeric DNA**
- (A) Is found in bacteriophages
  - (B) Contains unrelated genes
  - (C) Has no restriction sites
  - (D) Is palindromic
- 437. Which of the following may be used as a cloning vector?**
- (A) Prokaryotic plasmid (B) Lambda phage
  - (C) Cosmid (D) All of these
- 438. The plasmid pBR322 has**
- (A) Ampicillin resistance gene
  - (B) Tetracycline resistance gene
  - (C) Both (A) and (B)
  - (D) None of these
- 439. Lambda phage can be used to clone DNA fragments of the size**
- (A) Upto 3 kilobases (B) Upto 20 kilobases
  - (C) Upto 45 kilobases (D) Upto 1,000 kilobases
- 440. DNA fragments upto 45 kilobases in size can be cloned in**
- (A) Bacterial plasmids
  - (B) Lambda phage
  - (C) Cosmids
  - (D) Yeast artificial chromosomes
- 441. A cosmid is a**
- (A) Large bacterial plasmid
  - (B) Viral plasmid
  - (C) Hybrid of plasmid and phage
  - (D) Yeast plasmid
- 442. Polymerase chain reaction can rapidly amplify DNA sequences of the size**
- (A) Upto 10 kilobases (B) Upto 45 kilobases
  - (C) Upto 100 kilobases (D) Upto 1,000 kilobases
- 443. The DNA polymerase commonly used in polymerase chain reaction is obtained from**
- (A) *E. coli* (B) Yeast
  - (C) *T. aquaticus* (D) Eukaryotes
- 444. Base sequence of DNA can be determined by**
- (A) Maxam-Gilbert method
  - (B) Sanger's dideoxy method
  - (C) Both (A) and (B)
  - (D) None of these
- 445. From a DNA-RNA hybrid, DNA can be obtained by addition of**
- (A) DNA B protein and ATP
  - (B) Helicase and ATP
  - (C) DNA topoisomerase I
  - (D) Alkali
- 446. Optimum temperature of DNA polymerase of *T. aquaticus* is**
- (A) 30°C (B) 37°C
  - (C) 54°C (D) 72°C
- 447. In addition to Taq polymerase, polymerase chain reaction requires all of the following except**
- (A) A template DNA
  - (B) Deoxyribonucleoside triphosphates
  - (C) Primers
  - (D) Primase
- 448. DNA polymerase of *T. aquaticus* is preferred to that of *E. coli* in PCR because**
- (A) It replicates DNA more efficiently
  - (B) It doesn't require primers
  - (C) It is not denatured at the melting temperature of DNA
  - (D) It doesn't cause errors in replication
- 449. Twenty cycles of PCR can amplify DNA:**
- (A)  $2^{20}$  fold (B)  $20^2$  fold
  - (C)  $20 \times 2$  fold (D) 20 fold
- 450. Transgenic animals may be prepared by introducing a foreign gene into**
- (A) Somatic cells of young animals
  - (B) Testes and ovaries of animals
  - (C) A viral vector and infecting the animals with the viral vector
  - (D) Fertilised egg and implanting the egg into a foster mother

- 451. Yeast artificial chromosome can be used to amplify DNA sequences of the size**  
 (A) Upto 10 kb (B) Upto 45 kb  
 (C) Upto 100 kb (D) Upto 1,000 kb
- 452. DNA finger printing is based on the presence in DNA of**  
 (A) Constant number of tandem repeats  
 (B) Variable number of tandem repeats  
 (C) Non-repetitive sequences in each DNA  
 (D) Introns in eukaryotic DNA
- 453. All the following statements about restriction fragment length polymorphism are true except**  
 (A) It results from mutations in restriction sites  
 (B) Mutations in restriction sites can occur in coding or non-coding regions of DNA  
 (C) It is inherited in Mendelian fashion  
 (D) It can be used to diagnose any genetic disease
- 454. Inborn errors of urea cycle can cause all the following except**  
 (A) Vomiting (B) Ataxia  
 (C) Renal failure (D) Mental retardation
- 455. Hyperammonaemia type I results from congenital absence of**  
 (A) Glutamate dehydrogenase  
 (B) Carbamoyl phosphate synthetase  
 (C) Ornithine transcarbamoylase  
 (D) None of these
- 456. Congenital deficiency of ornithine transcarbamoylase causes**  
 (A) Hyperammonaemia type I  
 (B) Hyperammonaemia type II  
 (C) Hyperornithinaemia  
 (D) Citrullinaemia
- 457. A ketogenic amino acid among the following is**  
 (A) Leucine (B) Serine  
 (C) Threonine (D) Proline
- 458. Carbon skeleton of the following amino acid can serve as a substance for gluconeogenesis**  
 (A) Cysteine (B) Aspartate  
 (C) Glutamate (D) All of these
- 459. N-Formiminoglutamate is a metabolite of**  
 (A) Glutamate (B) Histidine  
 (C) Tryptophan (D) Methionine
- 460. Methylmalonyl CoA is a metabolite of**  
 (A) Valine (B) Leucine  
 (C) Isoleucine (D) All of these
- 461. Homogentisic acid is formed from**  
 (A) Homoserine (B) Homocysteine  
 (C) Tyrosine (D) Tryptophan
- 462. Maple syrup urine disease results from absence or severe deficiency of**  
 (A) Homogentisate oxidase  
 (B) Phenylalanine hydroxylase  
 (C) Branched chain amino acid transaminase  
 (D) None of these
- 463. Which of the following is present as a marker in lysosomal enzymes to direct them to their destination?**  
 (A) Glucose-6-phosphate  
 (B) Mannose-6-phosphate  
 (C) Galactose-6-phosphate  
 (D) N-Acetyl neuraminic acid
- 464. Marfan's syndrome results from a mutation in the gene coding:**  
 (A) Collagen (B) Elastin  
 (C) Fibrillin (D) Keratin
- 465. All the following statements about fibronectin are true except**  
 (A) It is glycoprotein  
 (B) It is a triple helix  
 (C) It is present in extra cellular matrix  
 (D) It binds with integrin receptors of cell
- 466. Fibronectin has binding sites for all of the following except**  
 (A) Glycophorin (B) Collagen  
 (C) Heparin (D) Integrin receptor
- 467. Fibronectin is involved in**  
 (A) Cell adhesion (B) Cell movement  
 (C) Both (A) and (B) (D) None of these

- 468. Glycoproteins are marked for destruction by removal of their**
- (A) Oligosaccharide prosthetic group
  - (B) Sialic acid residues
  - (C) Mannose residues
  - (D) N-terminal amino acids
- 469. Glycophorin is present in cell membranes of**
- (A) Erythrocytes
  - (B) Platelets
  - (C) Neutrophils
  - (D) Liver
- 470. Selectins are proteins that can recognise specific**
- (A) Carbohydrates
  - (B) Lipids
  - (C) Amino acids
  - (D) Nucleotides
- 471. Hunter's syndrome results from absence of**
- (A) Hexosaminidase A
  - (B) Iduronate sulphatase
  - (C) Neuraminidase
  - (D) Arylsulphatase B
- 472. A cancer cell is characterized by**
- (A) Uncontrolled cell division
  - (B) Invasion of neighbouring cells
  - (C) Spread to distant sites
  - (D) All of these
- 473. If DNA of a cancer cell is introduced into a normal cell, the recipient cell**
- (A) Destroys the DNA
  - (B) Loses its ability to divide
  - (C) Dies
  - (D) Changes into a cancer cell
- 474. A normal cell can be transformed into a cancer cell by all of the following except**
- (A) Ionising radiation
  - (B) Mutagenic chemicals
  - (C) Oncogenic bacteria
  - (D) Some viruses
- 475. Proto-oncogens are present in**
- (A) Oncoviruses
  - (B) Cancer cells
  - (C) Healthy human cells
  - (D) Prokaryotes
- 476. All the following statements about proto-oncogenes are true except**
- (A) They are present in human beings
  - (B) They are present in healthy cells
  - (C) Proteins encoded by them are essential
  - (D) They are expressed only when a healthy cell has been transformed into a cancer cell
- 477. Various oncogenes may encode all of the following except:**
- (A) Carcinogens
  - (B) Growth factors
  - (C) Receptors for growth factors
  - (D) Signal transducers for growth factors
- 478. Ras proto-oncogene is converted into oncogene by**
- (A) A point mutation
  - (B) Chromosomal translocation
  - (C) Insertion of a viral promoter upstream of the gene
  - (D) Gene amplification
- 479. Ras proto-oncogene encodes**
- (A) Epidermal growth factor (EGF)
  - (B) Receptor for EGF
  - (C) Signal transducer for EGF
  - (D) Nuclear transcription factor
- 480. P 53 gene:**
- (A) A proto-oncogene
  - (B) An oncogene
  - (C) A tumour suppressor gene
  - (D) None of these
- 481. Retinoblastoma can result from a mutation in**
- (A) ras proto-oncogene
  - (B) erbB proto-oncogene
  - (C) p 53 gene
  - (D) RB 1 gene
- 482. All the following statements about retinoblastoma are true except**
- (A) At least two mutations are required for its development
  - (B) One mutation can be inherited from a parent

- (C) Children who have inherited one mutation develop retinoblastoma at a younger age  
 (D) RB 1 gene promotes the development of retinoblastoma

**483. Ames assay is a rapid method for detection of**

- (A) Oncoviruses  
 (B) Retroviruses  
 (C) Chemical carcinogens  
 (D) Typhoid

**484. Amplification of dihydrofolate reductase gene in a cancer cell makes the cell**

- (A) Susceptible to folic acid deficiency  
 (B) Less malignant  
 (C) Resistant to amethopterin therapy  
 (D) Responsive to amethopterin therapy

**485. Conversion of a procarcinogen into a carcinogen often requires**

- (A) Proteolysis  
 (B) Microsomal hydroxylation  
 (C) Exposure to ultraviolet radiation  
 (D) Exposure to X-rays

**486. The only correct statement about oncoviruses is**

- (A) All the oncoviruses are RNA viruses  
 (B) Reverse transcriptase is present in all oncoviruses  
 (C) Viral oncogenes are identical to human protooncogenes  
 (D) Both DNA and RNA viruses can be oncoviruses

**487. RB 1 gene is**

- (A) A tumour suppressor gene  
 (B) Oncogene  
 (C) Proto-oncogene  
 (D) Activated proto-oncogene

**488. Cancer cells may become resistant to amethopterin by**

- (A) Developing mechanisms to destroy amethopterin

- (B) Amplification of dihydrofolate reductase gene  
 (C) Mutation in the dihydrofolate reductase gene so that the enzyme is no longer inhibited by amethopterin  
 (D) Developing alternate pathway of thymidylate synthesis

**489. The major source of  $\text{NH}_3$  produced by the kidney is**

- (A) Leucine (B) Glycine  
 (C) Alanine (D) Glutamine

**490. Which of these methyl donors is not a quaternary ammonium compound?**

- (A) Methionine (B) Choline  
 (C) Betain (D) Betainaldehyde

**491. L-glutamic acid is subjected to oxidative deamination by**

- (A) L-amino acid dehydrogenase  
 (B) L-glutamate dehydrogenase  
 (C) Glutaminase  
 (D) Glutamine synthetase

**492. A prokaryotic ribosome is made up of \_\_\_\_\_ sub units.**

- (A) 20 S and 50S (B) 30S and 50S  
 (C) 30S and 60S (D) 20S and 50S

**493. AN Eukaryotic ribosome is made up of \_\_\_\_\_ sub unit.**

- (A) 40S and 60S (B) 40S and 50S  
 (C) 40S and 80S (D) 60S and 80S

**494. GTP is not required for**

- (A) Capping L of mRNA  
 (B) Fusion of 40S and 60S of ribosome  
 (C) Accommodation of tRNA amino acid  
 (D) Formation of tRNA amino acid complex

**495. The antibiotic which inhibits DNA dependent RNA polymerase is**

- (A) Mitomycin C (B) Actinomycin d  
 (C) Streptomycin (D) Puromycin

**496. The antibiotic which cleaves DNA is**

- (A) Actinomycin d (B) Streptomycin  
 (C) Puromycin (D) Mitomycin C

- 497. The antibiotic which has a structure similar to the amino acyl end of tRNA tyrosine is**  
(A) Actinomycin d (B) Streptomycin  
(C) Puromycin (D) Mitomycin c
- 498. ATP is required for**  
(A) Fusion of 40S and 60S of ribosome  
(B) Accommodation tRNA amino acid in a site of ribosome  
(C) Movement of ribosome along mRNA  
(D) formation of tRNA amino acid complex
- 499. What is the subcellular site for the bio-synthesis of proteins?**  
(A) Chromosomes (B) Lysosomes  
(C) Ribosomes (D) Centrosomes
- 500. An animal is in negative nitrogen balance when**  
(A) Intake exceeds output  
(B) New tissue is being synthesized  
(C) Output exceeds intake  
(D) Intake is equal to output
- 501. When  $\text{NH}_3$  is perfused through a dog's liver \_\_\_\_\_ is formed, while \_\_\_\_\_ is formed in the birds liver.**  
(A) Urea, Uric acid (B) Urea, allantoin  
(C) Uric acid, creatinine  
(D) Uric acid, Urea
- 502. Aspartate amino transferase uses the following for transamination:**  
(A) Glutamic acid and pyruvic acid  
(B) Glutamic acid and oxaloacetic acid  
(C) Aspartic acid and pyruvic acid  
(D) aspartic acid and keto adipic acid
- 503. Which among the following compounds is not a protein?**  
(A) Insulin (B) Heparin  
(C) Mucin (D) Pepsin
- 504. Almost all the urea is formed in this tissue:**  
(A) Kidney (B) Urethra  
(C) Uterus (D) Liver
- 505. A polyribosome will have about \_\_\_\_\_ individual ribosomes.**  
(A) 20 (B) 10  
(C) 5 (D) 2
- 506. Progressive transmethylation of ethan-amine gives**  
(A) Creatinine  
(B) Choline  
(C) Methionine  
(D) N-methyl nicotinamide
- 507. Genetic information originates from**  
(A) Cistron of DNA  
(B) Codons of mRNA  
(C) Anticodons of tRNA  
(D) Histones of nucleoproteins
- 508. The genetic code operates through**  
(A) The protein moiety of DNA  
(B) Cistrom of DNA  
(C) Nucleotide sequence of m RNA  
(D) The anticodons of tRNA
- 509. DNA synthesis in laboratory was first achieved by**  
(A) Watson and crick (B) Khorana  
(C) A.Kornberg (D) Ochoa
- 510. Among the different types of RNA, which one has the highest M.W.?**  
(A) mRNA (B) rRNA  
(C) yeast RNA (D) tRNA
- 511. From DNA the genetic message is transcribed into this compound:**  
(A) Protein (B) mRNA  
(C) tRNA (D) rRNA
- 512. This compound has a double helical structure.**  
(A) Deoxyribonucleic acid  
(B) RNA  
(C) Flavine-adevine dinucleotide  
(D) Nicotinamide adamine dinucleotide
- 513. The structural stability of the double helix of DNA is as cribbed largely to**  
(A) Hydrogen bonding between adjacent purine bases  
(B) Hydrophobic bonding between staked purine and pyrinuidine nuclei

- (C) Hydrogen bonding between adjacent pyrimidine bases  
 (E) Hydrogen bonding between purine and pyrimidine bases

**514. Which of the following statements about nucleic acid is most correct?**

- (A) Both pentose nucleic acid and deoxypentose nucleic acid contain the same pyrimidines  
 (B) Both pentose nucleic acid and deoxypentose nucleic acid contain the same purines  
 (C) RNA contains cytosine and thymine  
 (D) DNA and RNA are hydrolysed by weak alkali

**515. Acid hydrolysis of ribonucleic acid would yield the following major products:**

- (A) d- deoxyribose, cytosine, adenine  
 (B) d-ribose, thymine, Guanine  
 (C) d-ribose, cytosine, uracil, thymine  
 (D) d-ribose, uracil, adenine, guanine, cytosine

**516. RNA does not contain**

- (A) adenine (B) OH methyl cytosine  
 (C) d-ribose (D) Uracil

**517. Which of the following statements is correct?**

- (A) a nucleoprotein usually contain deoxy sugars of the hexose type  
 (B) Nucleoproteins are usually absent from the cytoplasm  
 (C) Nucleoproteins usually are present in the nucleus only  
 (D) Nucleoproteins usually occur in the nucleus and cytoplasm

**518. Which of the following compound is present in RNA but absent from DNA?**

- (A) Thymine (B) Cytosine  
 (C) Uracil (D) Guanine

**519. Nucleic acids can be detected by means of their absorption maxima near 260 nm. Their absorption in this range is due to**

- (A) Proteins  
 (B) Purines and pyrimidines  
 (C) Ribose  
 (D) Deoxyribose

**520. Which of the following contains a deoxy sugar?**

- (A) RNA (B) DNA  
 (C) ATP (D) UTP

**521. DNA is**

- (A) Usually present in tissues as a nucleoprotein and cannot be separated from its protein component  
 (B) A long chain polymer in which the internucleotide linkages are of the diester type between C-3' and C-5'  
 (C) Different from RNA since in the latter the internucleotide linkages are between C-2' and C-5'  
 (D) Hydrolyzed by weak alkali (pH<sub>7</sub> to 100°C)

**522. Nobody is the name given to**

- (A) Ribosome (B) Microsome  
 (C) Centrosome (D) Nucleosome

**523. Transcription is the formation of**

- (A) DNA from a parent DNA  
 (B) mRNA from a parent mRNA  
 (C) pre mRNA from DNA  
 (D) protein through mRNA

**524. Translation is the formation of**

- (A) DNA from DNA  
 (B) mRNA from DNA  
 (C) Protein through mRNA  
 (D) mRNA from pre mRNA

**525. Sigma and Rho factors are required for**

- (A) Replication (B) Transcription  
 (C) Translation (D) Polymerisation

**526. The genome of  $\phi$ ×174 bacteriophage is interesting in that it contains**

- (A) No DNA  
 (B) DNA with uracil  
 (C) Single stranded DNA  
 (D) Triple standard DNA

**527. Okasaki fragments are small bits of**

- (A) RNA  
 (B) DNA  
 (C) DNA with RNA heads  
 (D) RNA with DNA heads

- 528. In addition to the DNA of nucleus there DNA is**  
 (A) Mitochondrion  
 (B) Endoplasmic reticulum  
 (C) Golgi apparatus  
 (D) Plasma membrane
- 529. The mitochondrial DNA is**  
 (A) Like the nuclear DNA in structure  
 (B) Single stranded, linear  
 (C) Double stranded, circular  
 (D) Single stranded, circular
- 530. A synthetic RNA having the sequence of UUUUUU (Poly U) will give a protein having poly \_\_\_\_.**  
 (A) Alanine (B) Phenyl alanine  
 (C) Glycine (D) Methionine
- 531. Lac operon of E. coli contains \_\_\_\_\_ is continuity.**  
 (A) Regulator and operator genes only  
 (B) Operator and structural genes only  
 (C) Regular and structural genes only  
 (D) Regulator, operator and structural genes
- 532. A mRNA of eukaryotes can code for**  
 (A) Only one polypeptide  
 (B) Two polypeptides  
 (C) Three polypeptides  
 (D) Five polypeptides
- 533. mRNA of prokaryotes can code for**  
 (A) More than one polypeptide  
 (B) Only one polypeptide  
 (C) Many exons and introns  
 (D) Introns only
- 534. DNA directed RNA polymerase is**  
 (A) Replicase  
 (B) Transcriptase  
 (C) Reverse transcriptase  
 (D) Polymerase III
- 535. RNA directed DNA polymerase is**  
 (A) Replicase  
 (B) Transcriptase  
 (C) Reverse transcriptase  
 (D) Polymerase-III
- Q536. RNA synthesis requires**  
 (A) RNA primer (B) RNA template  
 (C) DNA template (D) DNA primer
- 537. The mRNA ready for protein synthesis has the \_\_\_\_\_ cap.**  
 (A) ATP (B) CTP  
 (C) GTP (D) UTP
- 538. mRNA ready for protein synthesis has the poly \_\_\_\_\_ tail.**  
 (A) G (B) A  
 (C) U (D) C
- 539. The codon for phenyl Alanine is**  
 (A) AAA (B) CCC  
 (C) GGG (D) UUU
- 540. Blue print for genetic information resides in**  
 (A) mRNA (B) tRNA  
 (C) rRNA (D) DNA
- 541. Genes are**  
 (A) RNA (B) DNA  
 (C) lipoproteins and (D) Chromoproteins
- 542. Codons are in**  
 (A) DNA (B) mRNA  
 (C) tRNA (D) rRNA
- 543. The genetic code operates via**  
 (A) The protein moiety of DNA  
 (B) The base sequences of DNA  
 (C) The nucleotide sequence of mRNA  
 (D) The base sequence of tRNA
- 544. Urine bases with methyl substituents occurring in plants are**  
 (A) Caffeine (B) Theophylline  
 (C) Theobromine (D) All of these
- 545. Genetic information in human beings is stored in**  
 (A) DNA (B) RNA  
 (C) Both (A) and (B) (D) None of these

- 546. All following are naturally occurring nucleotides except**  
 (A) Cyclic AMP  
 (B) ATP  
 (C) DNA  
 (D) Inosine monophosphate
- 547. If the amino group and a carboxylic group of the amino acid are attached to same carbon atom, the amino acid is called as**  
 (A) Alpha (B) Beta  
 (C) Gamma (D) Epsilon
- 548. If in a nucleic acid there are more than 8000 nucleotides it is most likely**  
 (A) RNA (B) DNA  
 (C) Both (A) and (B) (D) None of these
- 549. Genetic information in human beings is stored in**  
 (A) RNA (B) DNA  
 (C) Both (A) and (B) (D) mRNA
- 550. In RNA, apart from ribose and phosphate, all following are present except**  
 (A) Adenine (B) Guanine  
 (C) Thymine (D) Cytosine
- 551. Which of the following gives a positive Ninhydrin test?**  
 (A) Reducing sugar (B) Triglycerides  
 (C)  $\alpha$ -amino acids (D) Phospholipids
- 552. A Gene is**  
 (A) A single protein molecule  
 (B) A group of chromosomes  
 (C) An instruction for making a protein molecule  
 (D) A bit of DNA molecule
- 553. In DNA, genetic information is located in**  
 (A) Purine bases  
 (B) Pyrimidine bases  
 (C) Purine and pyrimidine bases  
 (D) sugar
- 554. Which one of the following is not a constituent of RNA?**  
 (A) Deoxyribose (B) Uracil  
 (C) Adenine (D) Thymine
- 555. Which of the following are nucleoproteins?**  
 (A) Protamines  
 (B) Histones  
 (C) Deoxy and Ribo nucleoproteins  
 (D) All of these
- 556. The total RNA in cell tRNA constitutes**  
 (A) 1–10% (B) 10–20%  
 (C) 30–50% (D) 50–80%
- 557. Unit of genetic information:**  
 (A) DNA (B) RNA  
 (C) Cistron (D) None of these
- 558. Anticodon sequence are seen in**  
 (A) tRNA and transcribed DNA strand  
 (B) tRNA and complementary DNA strand  
 (C) mRNA  
 (D) mRNA and complementary DNA strand
- 559. cAMP is destroyed by**  
 (A) Adenylate cyclase  
 (B) Phosphodiesterase  
 (C) Synthetase phosphatase  
 (D) Synthetase kinase
- 560. Restriction enzymes have been found in**  
 (A) Humans (B) Birds  
 (C) Bacteria (D) Bacteriophage
- 561. Sulphur is not present in**  
 (A) Thiamine (B) Lipic acid  
 (C) Thymine (D) Biotin
- 562. Which one of the following binds to specific nucleotide sequences?**  
 (A) RNA polymerase (B) Repressor  
 (C) Inducer (D) Restriction
- 563. Using written conversion which one of the following sequences is complimentary to TGGCAGCT?**  
 (A) ACC GTC GGA (B) ACC GUC GGA  
 (C) AGG CTG CCA (D) TGG CTC GGA
- 564. Ribosomes similar to those of bacterial found in**

- (A) Plant nucei  
(B) Cardiac muscle cytoplasm  
(C) Liver endoplasmic reticulum  
(D) Neuronal cytoplasm
- 565. The mechanism of synthesis of DNA and RNA are similar in all the following ways except**
- (A) They involve release of pyrophosphate from each nucleotide added  
(B) They require activated nucleotide precursor and  $Mg^{2+}$   
(C) The direction of synthesis is  $5' \rightarrow 3'$   
(D) They require a primer
- 566. Template-directed DNA synthesis occurs in all the following except**
- (A) The replication fork  
(B) Polymerase chain reaction  
(C) Growth of RNA tumor viruses  
(D) Expression of oncogenes
- 567. Which one of the following statements correctly describes eukaryotic DNA?**
- (A) They involve release of pyrophosphate from each nucleotide precursor and  $Mg^{2+}$   
(B) The direction of synthesis is  
(C) They require a primer  $5' \rightarrow 3'$   
(D) None of these
- 568. Which one of the following causes frame shift mutation?**
- (A) Transition  
(B) Transversion  
(C) Deletion  
(D) Substitution of purine to pyrimidine
- 569. Catabolism of thymidylate gives**
- (A)  $\alpha$ -alanine  
(B)  $\beta$ -alanine  
(C)  $\alpha$ -aminoisobutyrate  
(D)  $\beta$ -aminoisobutyrate
- 570. Glycine gives \_\_\_\_\_ atoms of purine.**
- (A)  $C_2, C_3$  (B)  $C_4, C_5$  and  $N_7$   
(C)  $C_4, C_5$  and  $N_9$  (D)  $C_4, C_6$  and  $N_7$
- 571. A common substrate of HGPRTase, APRTase and PRPP glutamyl amidotransferase is**
- (A) Ribose 5 phosphate  
(B) Phosphoribosyl pyrophosphate  
(C) Hypoxanthine  
(D) Adenosine
- 572. Carbon 6-of purine skeleton comes from**
- (A) Atmospheric  $CO_2$   
(B) 1 carbon carried by folate  
(C) Betoine  
(D) Methionine
- 573. Uric acid is the catabolic end product of**
- (A) Porphyrine (B) Purines  
(C) Pyrimidines (D) Pyridoxine
- 574. Diphenylamine method is employed in the quantitation of**
- (A) Nucleic acid (B) RNA  
(C) DNA (D) Proteins
- 575. Orcinol method is employed in the quantitation of**
- (A) Nucleic acid (B) DNA  
(C) RNA (D) Proteins
- 576. Nucleic acid show strong absorption at one of the wavelength:**
- (A) 280 nm (B) 220 nm  
(C) 360 nm (D) 260 nm
- 577. tRNA has**
- (A) Clover leaf structure  
(B) anticodon arm  
(C) poly 'A' tay 3'  
(D) Cap at 5' end
- 578. Which one of the following contributes nitrogen atoms to both purine and pyrimidine rings?**
- (A) Aspartate  
(B) Carbanoyl phosphate  
(C) Carbondioxide  
(D) Tetrahydrofolate
- 579. The four nitrogen atoms of purines are derived from**
- (A) Urea and  $NH_3$   
(B)  $NH_3$ , Glycine and Glutamate  
(C)  $NH_3$ , Asparate and Glutamate  
(D) Aspartate, Glutamine and Glycine

- 580. A drug which prevents uric acid synthesis by inhibiting the enzyme Xanthine oxidase is**  
 (A) Aspirin (B) Allopurinol  
 (C) Colchicine (D) Phenyl benzoate
- 581. Glycine contributes to the following C and N of purine nucleus:**  
 (A) C<sub>1</sub>, C<sub>2</sub> and N<sub>7</sub> (B) C<sub>8</sub>, C<sub>8</sub> and N<sub>9</sub>  
 (C) C<sub>4</sub>, C<sub>5</sub> and N<sub>7</sub> (D) C<sub>4</sub>, C<sub>5</sub> and N<sub>9</sub>
- 582. Inosinic acid is the biological precursor of**  
 (A) Cytosine and Uric acid  
 (B) Adenylve acid and Glucine floc acid  
 (C) Orotic acid and Uridylic acid  
 (D) Adenosine acid Thymidine
- 583. The probable metabolic defect in gents is**  
 (A) A defect in excretion of uric acid by kidney  
 (B) An overproduction of pyrimidines  
 (C) An overproduction of uric acid  
 (D) Rise in calcium leading to deposition of calcium urate
- 584. In humans, the principal break down product of purines is**  
 (A) NH<sub>3</sub> (B) Allantin  
 (C) Alanine (D) Uric acid
- 585. A key substance in the committed step of pyrimidines biosynthesis is**  
 (A) Ribose-5-phosphate  
 (B) Carbamoyl phosphate  
 (C) ATP  
 (D) Glutamine
- 586. In humans, the principal metabolic product of pyrimidines is**  
 (A) Uric acid (B) Allantoin  
 (C) Hypoxanthine (D) β-alanine
- 587. In most mammals, except primates, uric acid is metabolized by**  
 (A) Oxidation to allantoin  
 (B) Reduction to NH<sub>3</sub>  
 (C) Hydrolysis to allantoin  
 (D) Hydrolysis to NH<sub>3</sub>
- 588. Two nitrogen of the pyrimidines ring are obtained from**  
 (A) Glutamine and Carbamoyl-p  
 (B) Asparate and Carbamoyl-p  
 (C) Glutamate and NH<sub>3</sub>  
 (D) Glutamine and NH<sub>3</sub>
- 589. All are true about lesch-nyhan syndrome except**  
 (A) Produces self-mutilation  
 (B) Genetic deficiency of the enzyme  
 (C) Elevated levels of uric acid in blood  
 (D) Inheritance is autosomal recessive
- 590. Synthesis of GMP and IMP requires the following:**  
 (A) NH<sub>3</sub> NAD<sup>+</sup>, ATP  
 (B) Glutamine, NAD<sup>+</sup>, ATP  
 (C) NH<sub>3</sub>, GTP, NADP<sup>+</sup>  
 (D) Glutamine, GTP, NADP<sup>+</sup>
- 591. Which pathway is correct for catabolism of purines to form uric acid?**  
 (A) Guanylate→Adenylate→Xanthine→hypoxanthine→Uric acid  
 (B) Guanylate→inosinate→Xanthine→hypoxanthine→Uric acid  
 (C) Adenylate→Inosinate→Xanthine hypoxanthine→Uric acid  
 (D) Adenylate→Inosinate→hypoxanthine Xanthine→Uric acid
- 592. Polysemes do not contain**  
 (A) Protein (B) DNA  
 (C) mRNA (D) rRNA
- 593. The formation of a peptide bond during the elongation step of protein synthesis results in the splitting of how many high energy bonds?**  
 (A) 1 (B) 2  
 (C) 3 (D) 4
- 594. Translocase is an enzyme required in the process of**  
 (A) DNA replication  
 (B) RNA synthesis  
 (C) Initiation of protein synthesis  
 (D) Elongation of peptides
- 595. Nonsense codons bring about**

- (A) Amino acid activation
- (B) Initiation of protein synthesis
- (C) Termination of protein synthesis
- (D) Elongation of polypeptide chains

**596. Which of the following genes of the E.coli "Lac operon" codes for a constitutive protein?**

- (A) The 'a' gene      (B) The 'i' gene
- (C) The 'c' gene      (D) The 'z' gene

**597. In the process of transcription, the flow of genetic information is from**

- (A) DNA to DNA      (B) DNA to protein
- (C) RNA to protein      (D) DNA to RNA

**598. The anticodon region is an important part of the structure of**

- (A) rRNA      (B) tRNA
- (C) mRNA      (D) hrRNA

**599. The region of the Lac operon which must be free from structural gene transcription to occur is**

- (A) The operator locus
- (B) The promoter site
- (C) The 'a' gene
- (D) The 'i' gene

**600. Another name for reverse transcriptase is**

- (A) DNA dependent DNA polymerase
- (B) DNA dependent RNA polymerase
- (C) RNA dependent DNA polymerase
- (D) RNA dependent RNA polymerase

**601. In the 'lac operon' concept, which of the following is a protein?**

- (A) Operator      (B) Repressor
- (C) Inducer      (D) Vector

**602. Degeneracy of the genetic code denotes the existence of**

- (A) Base triplets that do not code for any amino acids
- (B) Codons consisting of only two bases
- (C) Codons that include one or more of the unusual bases

- (D) Multiple codons for a single amino acid

**603. The normal function of restriction endonucleases is to**

- (A) Excise introns from hrRNA
- (B) Polymerize nucleotides to form RNA
- (C) Remove primer from okazaki fragments
- (D) Protect bacteria from foreign DNA

**604. In contrast to Eukaryotic mRNA, prokaryotic mRNA is characterized by**

- (A) Having 7-methyl guanosine triphosphate at the 5' end
- (B) Being polycistronic
- (C) Being only monocistronic
- (D) Being synthesized with introns

**605. DNA ligase of E. coli requires which of the following co-factors?**

- (A) FAD      (B) NAD<sup>+</sup>
- (C) NADP<sup>+</sup>      (D) NADH

**606. Which of the following is transcribed during repression?**

- (A) Structural gene      (B) Promoter gene
- (C) Regulator gene      (D) Operator gene

**607. mRNA is complementary copy of**

- (A) 5'-3' strand of DNA<sup>+</sup>
- (B) 3'-5' strand of DNA
- (C) Antisense strand of DNA
- (D) tRNA

**608. Synthesis of RNA molecule is terminated by a signal which is recognised by**

- (A)  $\alpha$ -factor      (B)  $\beta$ -factor
- (C)  $\delta$ -factor      (D)  $\rho$

**609. The binding of prokaryotic DNA dependent RNA polymerase to promoter sites of genes is inhibited by the antibiotic:**

- (A) Streptomycin      (B) Rifamcin
- (C) Aueromycin      (D) Puromycin

**610. In E. coli the chain initiating amino acid in protein synthesis is**

- (A) N-formyl methionine      (B) Methionine
- (C) Serine      (D) Cysteine

- 611. Amanitin the mushroom poison inhibits**  
(A) Glycoprotein synthesis  
(B) ATP synthesis  
(C) DNA synthesis  
(D) mRNA synthesis
- 612. How many high-energy phosphate bond equivalents are required for amino acid activation in protein synthesis?**  
(A) One (B) Two  
(C) Three (D) Four
- 613. Translation results in the formation of**  
(A) mRNA (B) tRNA  
(C) rRNA (D) A protein molecule
- 614. Elongation of a peptide chain involves all the following except**  
(A) mRNA (B) GTP  
(C) Formyl-Met-tRNA (D) Tu, TS and G factors
- 615. The 'rho' ( $\rho$ ) factor is involved**  
(A) To increase the rate of RNA synthesis  
(B) In binding catabolite repressor to the promoter region  
(C) In proper termination of transcription  
(D) To allow proper initiation of transcriptide
- 616. In the biosynthesis of c-DNA, the joining enzyme *ligase* requires**  
(A) GTP (B) ATP  
(C) CTP (D) UTP
- 617. Which one of the following binds to specific nucleotide sequences that are upstream and most distant from the start site?**  
(A) RNA polymerase (B) Repressor  
(C) Inducer (D) Restriction
- 618. Using written convention which one of the following sequences is complimentary to TGGCAGCCT?**  
(A) ACCGTCGGA (B) ACCGUCGGA  
(C) AGGCTGCCA (D) TGGCTCGGA
- 619. Ribosomes similar to those of bacteria found in**  
(A) Plant nuclei  
(B) Cardiac muscle cytoplasm  
(C) Liver endoplasmic reticulum  
(D) Neuronal cytoplasm
- 620. The mechanism of synthesis of DNA and RNA are similar to all the following ways except**  
(A) They involve release of pyrophosphate from each nucleotide added  
(B) They require activated nucleotide precursor and  $Mg^{2+}$   
(C) The direction of synthesis is  
(D) They require a primer
- 621. Template-directed DNA synthesis occurs in all the following except**  
(A) The replication fork  
(B) Polymerase chain reaction  
(C) Growth of RNA tumor viruses  
(D) Expression of oncogenes

**ANSWERS**

1. B	2. B	3. A	4. C	5. A	6. C
7. B	8. D	9. C	10. D	11. A	12. A
13. A	14. D	15. B	16. A	17. C	18. C
19. A	20. A	21. B	22. C	23. C	24. D
25. C	26. A	27. C	28. B	29. C	30. A
31. D	32. A	33. B	34. A	35. A	36. C
37. C	38. A	39. B	40. D	41. C	42. C
43. B	44. C	45. D	46. B	47. A	48. C
49. B	50. A	51. D	52. B	53. B	54. D
55. D	56. A	57. D	58. A	59. A	60. D
61. B	62. C	63. A	64. A	65. A	66. A
67. A	68. A	69. B	70. A	71. A	72. A
73. C	74. B	75. C	76. A	77. C	78. D
79. B	80. A	81. C	82. A	83. A	84. A
85. A	86. D	87. A	88. B	89. A	90. C
91. B	92. B	93. A	94. A	95. A	96. A
97. B	98. B	99. D	100. A	101. B	102. A
103. B	104. B	105. A	106. B	107. C	108. A
109. D	110. C	111. D	112. A	113. B	114. A
115. B	116. A	117. D	118. A	119. A	120. C
121. A	122. D	123. B	124. C	125. A	126. A
127. D	128. C	129. A	130. A	131. B	132. B
133. D	134. A	135. A	136. D	137. B	138. B
139. A	140. D	141. B	142. D	143. C	144. B
145. D	146. B	147. B	148. B	149. D	150. D
151. D	152. A	153. C	154. A	155. B	156. C
157. B	158. A	159. A	160. A	161. C	162. C
163. C	164. C	165. D	166. C	167. A	168. C
169. C	170. D	171. B	172. B	173. C	174. D
175. D	176. A	177. B	178. D	179. D	180. C
181. B	182. B	183. C	184. B	185. A	186. D
187. B	188. C	189. D	190. A	191. B	192. C
193. A	194. D	195. D	196. A	197. D	198. C
199. A	200. C	201. D	202. C	203. B	204. D
205. C	206. D	207. B	208. C	209. C	210. D
211. B	212. C	213. D	214. C	215. B	216. B
217. D	218. B	219. D	220. A	221. A	222. D
223. A	224. C	225. A	226. B	227. C	228. C
229. D	230. B	231. C	232. A	233. C	234. A
235. B	236. A	237. C	238. C	239. D	240. D
241. B	242. C	243. D	244. C	245. C	246. B
247. A	248. C	249. A	250. D	251. A	252. C

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253. D	254. D	255. C	256. C	257. C	258. D
259. D	260. A	261. B	262. B	263. A	264. A
265. C	266. D	267. B	268. C	269. B	270. D
271. C	272. B	273. A	274. C	275. A	276. C
277. A	278. B	279. C	280. C	281. D	282. D
283. C	284. D	285. C	286. B	287. A	288. A
289. D	290. B	291. B	292. C	293. B	294. A
295. C	296. A	297. D	298. C	299. C	300. D
301. B	302. C	303. B	304. A	305. C	306. D
307. D	308. B	309. B	310. C	311. A	312. C
313. A	314. B	315. B	316. A	317. A	318. D
319. D	320. A	321. C	322. C	323. C	324. C
325. A	326. D	327. A	328. B	329. C	330. D
331. C	332. B	333. A	334. D	335. D	336. C
337. A	338. C	339. C	340. C	341. C	342. D
343. A	344. A	345. B	346. D	347. C	348. B
349. B	350. D	351. A	352. B	353. D	354. C
355. A	356. B	357. D	358. A	359. D	360. B
361. B	362. A	363. A	364. C	365. C	366. C
367. D	368. D	369. B	370. B	371. B	372. C
373. B	374. D	375. C	376. B	377. B	378. D
379. D	380. B	381. D	382. D	383. D	384. C
385. B	386. B	387. C	388. D	389. C	390. D
391. C	392. D	393. A	394. C	395. D	396. A
397. B	398. B	399. C	400. A	401. D	402. B
403. D	404. A	405. D	406. C	407. D	408. C
409. D	410. A	411. C	412. B	413. A	414. C
415. D	416. B	417. C	418. A	419. D	420. C
421. C	422. D	423. D	424. D	425. C	426. C
427. C	428. C	429. D	430. C	431. B	432. C
433. D	434. C	435. C	436. B	437. D	438. C
439. B	440. C	441. C	442. A	443. C	444. C
445. D	446. D	447. D	448. C	449. A	450. D
451. D	452. B	453. D	454. D	455. B	456. C
457. A	458. D	459. B	460. A	461. C	462. D
463. C	464. B	465. A	466. C	467. B	468. D
469. A	470. A	471. B	472. D	473. D	474. C
475. C	476. D	477. A	478. A	479. C	480. C
481. D	482. D	483. C	484. C	485. B	486. D
487. A	488. B	489. D	490. A	491. B	492. B
493. A	494. D	495. B	496. D	497. C	498. D
499. C	500. C	501. A	502. B	503. D	504. D
505. C	506. C	507. A	508. C	509. C	510. B

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511. B	512. A	513. D	514. B	515. D	516. B
517. D	518. C	519. B	520. B	521. B	522. C
523. C	524. B	525. C	526. C	527. C	528. A
529. C	530. B	531. D	532. A	533. A	534. B
535. C	536. C	537. C	538. B	539. D	540. D
541. B	542. B	543. C	544. D	545. A	546. C
547. A	548. B	549. B	550. C	551. C	552. D
553. C	554. A	555. D	556. B	557. C	558. A
559. B	560. C	561. C	562. A	563. A	564. A
565. A	566. C	567. C	568. C	569. D	570. B
571. B	572. A	573. A	574. C	575. C	576. D
577. A	578. A	579. D	580. B	581. C	582. B
583. C	584. D	585. B	586. D	587. A	588. B
589. B	590. B	591. D	592. B	593. B	594. D
595. C	596. B	597. D	598. B	599. A	600. C
601. B	602. B	603. D	604. A	605. B	606. C
607. B	608. D	609. B	610. A	611. D	612. B
613. D	614. C	615. C	616. B	617. A	618. A
619. A	620. D	621. C			

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## CHAPTER 10

# WATER & ELECTROLYTE BALANCE

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- The total body water in various subjects is relatively constant when expressed as percentage of the lean body mass and is about**  
(A) 30% (B) 40%  
(C) 50% (D) 70%
- The percentage of water contained in the body of an individual is less because of**  
(A) High fat content (B) Low fat content  
(C) High protein content (D) Low protein content
- In intracellular compartment the fluid present in ml/kg body weight is about**  
(A) 100 (B) 200  
(C) 200 (D) 330
- In extra cellular compartment, the fluid present in ml/kg of body weight is about**  
(A) 120 (B) 220  
(C) 270 (D) 330
- Fluid present in dense connective tissue and cartilage in ml/kg body weight is about**  
(A) 10 (B) 20  
(C) 45 (D) 55
- The total body water in ml/kg body weight in average normal young adult male is about**  
(A) 200 (B) 400  
(C) 600 (D) 1000
- The fluid present in bones which can not be exchanged readily because of relative avascularity is about**  
(A) 20 ml/kg (B) 25 ml/kg  
(C) 45 ml/kg (D) 60 ml/kg
- Water derived in gm from complete oxidation of each gm of carbohydrate is about**  
(A) 0.15 (B) 0.25  
(C) 0.35 (D) 0.55
- The oxidation of 100 gm of fat yields**  
(A) 50 gm water (B) 107 gm water  
(C) 150 gm water (D) 200 gm water
- Each gm of protein on complete oxidation yields**  
(A) 0.21 gm water (B) 0.31 gm water  
(C) 0.41 gm water (D) 0.51 gm water
- The daily total body water derived from oxidation of food stuffs is about**  
(A) 100 ml (B) 300 ml  
(C) 600 ml (D) 1000 ml
- The daily water allowance for normal infant is about**  
(A) 100–200 ml (B) 250–300 ml  
(C) 330–1000 ml (D) 1000–2000 ml

- 13. The daily water allowance for normal adult (60 kg) is about**  
 (A) 200–600 ml (B) 500–800 ml  
 (C) 800–1500 ml (D) 1800–2500 ml
- 14. Insensible loss of body water of normal adult is about**  
 (A) 50–100 ml (B) 100–200 ml  
 (C) 300–500 ml (D) 600–1000 ml
- 15. The predominant cation of plasma is**  
 (A)  $\text{Na}^+$  (B)  $\text{K}^+$   
 (C)  $\text{Ca}^+$  (D)  $\text{Mg}^{++}$
- 16. The predominant action of plasma is**  
 (A)  $\text{HCO}_3^-$  (B)  $\text{Cl}^-$   
 (C)  $\text{HPO}_4^{--}$  (D)  $\text{SO}_4^{--}$
- 17. Vasopressin (ADH)**  
 (A) Enhance facultative reabsorption of water  
 (B) Decreases reabsorption of water  
 (C) Increases excretion of calcium  
 (D) Decreases excretion of calcium
- 18. Enhanced facultative reabsorption of water by Vasopressin is mediated by**  
 (A) Cyclic AMP (B)  $\text{Ca}^{++}$   
 (C) Cyclic GMP (D)  $\text{Mg}^{++}$
- 19. Action of kinins is to**  
 (A) Increase salt excretion  
 (B) Decrease salt retention  
 (C) Decrease water retention  
 (D) Increase both salt and water excretion
- 20. The activity of kinins is modulated by**  
 (A) Prostaglandins  
 (B)  $\text{Ca}^{++}$   
 (C) Increased cAMP level  
 (D) Increased cGMP level
- 21. An important cause of water intoxication is**  
 (A) Nephrogenic diabetes insipidus  
 (B) Renal failure  
 (C) Gastroenteritis  
 (D) Fanconi syndrome
- 22. Minimum excretory urinary volume for waste products elimination during 24 hrs is**  
 (A) 200–300 ml (B) 200–400 ml  
 (C) 500–600 ml (D) 800 ml
- 23. In primary dehydration**  
 (A) Intracellular fluid volume is reduced  
 (B) Intracellular fluid volume remains normal  
 (C) Extracellular fluid volume is much reduced  
 (D) Extracellular fluid volume is much increased
- 24. An important cause of secondary dehydration is**  
 (A) Dysphagia  
 (B) Oesophageal varices  
 (C) Oesophageal varices  
 (D) Gastroenteritis
- 25. Important finding of secondary dehydration is**  
 (A) Intracellular oedema  
 (B) Cellular dehydration  
 (C) Thirst  
 (D) Muscle cramps
- 26. Urine examination in secondary dehydration shows**  
 (A) Ketonuria  
 (B) Low specific gravity  
 (C) High specific gravity  
 (D) Albuminuria
- 27. The total calcium of the human body is about**  
 (A) 100–150 g (B) 200–300 g  
 (C) 1–1.5 kg (D) 2–3 kg
- 28. Daily requirement of calcium for normal adult human is**  
 (A) 100 mg (B) 800 mg  
 (C) 2 g (D) 4 g
- 29. Normal total serum calcium level varies between**  
 (A) 4–5 mg (B) 9–11 mg  
 (C) 15–20 mg (D) 50–100 mg

- 30. The element needed in quantities greater than 100 mg for human beings is**  
(A) Calcium (B) Zinc  
(C) Selenium (D) Cobalt
- 31. The mineral present in the human body in larger amounts than any other cation is**  
(A) Sodium (B) Calcium  
(C) Potassium (D) Iron
- 32. The percentage of the total body calcium present in bones is**  
(A) 1 (B) 11  
(C) 55 (D) 99
- 33. The percentage of calcium present in extracellular fluid is**  
(A) 1 (B) 5  
(C) 10 (D) 50
- 34. The physiologically active form of calcium is**  
(A) Protein bond  
(B) Ionised  
(C) Complexed with citrate  
(D) Complexed with carbonate
- 35. The normal concentration of calcium in C.S.F is**  
(A) 1.5–2.5 mg/100 ml  
(B) 2.5–4 mg/100 ml  
(C) 4.5–5 mg/100 ml  
(D) 9–10 mg/100 ml
- 36. Absorption of calcium is increased on a**  
(A) High protein diet (B) Low protein diet  
(C) High fat diet (D) Low fat diet
- 37. Calcium absorption is interfered by**  
(A) Protein in diet  
(B) Phytic acid in cereals  
(C) Alkaline intestinal pH  
(D) Vitamin D
- 38. Calcium absorption is increased by**  
(A) Vitamin D (B) Vitamin C  
(C) Vitamin K (D) Vitamin E
- 39. In serum product of  $Ca \times p$  (in mg/100ml) in children is normally**  
(A) 20 (B) 30  
(C) 50 (D) 60
- 40. In ricket, the product of  $Ca \times p$  (in mg/100 ml) in serum is below**  
(A) 30 (B) 50  
(C) 70 (D) 100
- 41. In man, the amount of calcium in gms filtered in 24 hrs period by the renal glomeruli is**  
(A) 5 (B) 10  
(C) 15 (D) 20
- 42. The percentage of the calcium eliminated in feces is**  
(A) 10–20 (B) 30–40  
(C) 50–60 (D) 70–90
- 43. The maximal renal tubular reabsorptive capacity for calcium ( $Tm_{Ca}$ ) in mg/min is about**  
(A)  $1.5 \pm 0.1$  (B)  $4.99 \pm 0.21$   
(C)  $5.5 \pm 1.2$  (D)  $10.2 \pm 2.2$
- 44. Renal ricket is caused by renal tubular defect (usually inherited) which interferes with reabsorption of**  
(A) Calcium (B) Phosphorous  
(C) Sodium (D) Chloride
- 45. After operative removal of the parathyroid glands resulting into hypoparathyroidism the concentration of the serum calcium may drop below**  
(A) 11 mg (B) 10 mg  
(C) 9 mg (D) 7 mg
- 46. One of the principal cations of soft tissue and body fluids is**  
(A) Mg (B) S  
(C) Mn (D) Co
- 47. The normal concentration of magnesium in whole blood is**  
(A) 0–1 mg/100 ml (B) 1–2 mg/100 ml  
(C) 2–4 mg/100 ml (D) 4–8 mg/100 ml

- 48. The normal concentration of magnesium in C.S.F is about**  
(A) 1 mg/100 ml (B) 3 mg/100 ml  
(C) 5 mg/100 ml (D) 8 mg/100 ml
- 49. The magnesium content of muscle is about**  
(A) 5 mg/100 ml (B) 10 mg/100 ml  
(C) 21 mg/100 ml (D) 50 mg/100 ml
- 50. Intestinal absorption of magnesium is increased in**  
(A) Calcium deficient diet  
(B) High calcium diet  
(C) High oxalate diet  
(D) High phytate diet
- 51. Deficiency of magnesium may occur with**  
(A) Alcoholism  
(B) Diabetes mellitus  
(C) Hypothyroidism  
(D) Advanced renal failure
- 52. Hypermagnesemia may be observed in**  
(A) Hyperparathyroidism  
(B) Diabetes mellitus  
(C) Kwashiorkor  
(D) Primary aldosteronism
- 53.  $\text{Na}^+/\text{K}^+$ -ATPase along with ATP requires**  
(A) Ca (B) Mn  
(C) Mg (D) Cl
- 54. The principal cation in extracellular fluid is**  
(A) Sodium (B) Potassium  
(C) Calcium (D) Magnesium
- 55. The normal concentration of sodium (in mg/100 ml) of human plasma is**  
(A) 100 (B) 200  
(C) 250 (D) 330
- 56. A decrease in serum sodium may occur in**  
(A) Adrenocortical insufficiency  
(B) Hypoparathyroidism  
(C) Hyperparathyroidism  
(D) Thyrotoxicosis
- 57. Hyponatremia may occur in**  
(A) Diabetes insipidus  
(B) Diuretic medication  
(C) Heavy sweating  
(D) Kidney disease
- 58. The metabolism of sodium is regulated by the hormone:**  
(A) Insulin (B) Aldosterone  
(C) PTH (D) Somatostatin
- 59. The principal cation in intracellular fluid is**  
(A) Sodium (B) Potassium  
(C) Calcium (D) Magnesium
- 60. The normal concentration of potassium in whole blood is**  
(A) 50 mg/100 ml (B) 100 mg/100 ml  
(C) 150 mg/100 ml (D) 200 mg/100 ml
- 61. The normal concentration of potassium in human plasma in meq/l is about**  
(A) 1 (B) 2  
(C) 3 (D) 5
- 62. The normal concentration of potassium in cells in ng/100 ml is about**  
(A) 100 (B) 200  
(C) 350 (D) 440
- 63. Potassium content of nerve tissue in mg/100 ml is about**  
(A) 200 (B) 330  
(C) 400 (D) 530
- 64. Potassium content of muscle tissue in mg/100 ml is about**  
(A) 50–100 (B) 100–150  
(C) 250–400 (D) 150–200
- 65. One of the symptoms of low serum potassium concentration includes**  
(A) Muscle weakness  
(B) Confusion  
(C) Numbness  
(D) Tingling of extremities

- 66. Potassium metabolism is regulated by the hormone:**  
(A) Aldosterone (B) PTH  
(C) Somatostatin (D) Estrogen
- 67. A high serum potassium, accompanied by a high intracellular potassium occurs in**  
(A) Adrenal insufficiency  
(B) Any illness  
(C) Gastrointestinal losses  
(D) Cushing's syndrome
- 68. Hypokalemia occurs in**  
(A) Cushing's syndrome  
(B) Addison's disease  
(C) Renal failure  
(D) Advanced dehydration
- 69. Cardiac arrest may occur due to over doses of**  
(A) Sodium (B) Potassium  
(C) Zinc (D) Magnesium
- 70. The normal concentration of chloride in mg/100 ml of whole blood is about**  
(A) 200 (B) 250  
(C) 400 (D) 450
- 71. The normal concentration of chloride in mg/100 ml of plasma is about**  
(A) 100 (B) 200  
(C) 365 (D) 450
- 72. The normal concentration of chlorine in mg/100 ml of C.S.F is about**  
(A) 200 (B) 250  
(C) 300 (D) 440
- 73. Hypokalemia with an accompanying hypochloremic alkalosis may be observed in**  
(A) Cushing's syndrome (B) Addison's disease  
(C) Hypothyroidism (D) Malnutrition
- 74. Hyperchloremia is associated with**  
(A) Hyponatremia (B) Hypernatremia  
(C) Metabolic alkalosis (D) Respiratory acidosis
- 75. The exclusive function of iron in the body is confined to the process of**  
(A) Muscular contraction  
(B) Nerve excitation  
(C) Cellular respiration  
(D) Blood coagulation
- 76. The normal pH of the blood is**  
(A) 7.0 (B) 7.1  
(C) 7.2 (D) 7.4
- 77. The normal concentration of bicarbonate in blood is**  
(A) 21 meq/L (B) 24 meq/L  
(C) 26 meq/L (D) 30 meq/L
- 78. At the pH of blood 7.4, the ratio between the carbonic acid and bicarbonate fractions is**  
(A) 1 : 10 (B) 1 : 20  
(C) 1 : 30 (D) 1 : 40
- 79. A 0.22 M solution of lactic acid ( $pK_a$  3.9) was found to contain 0.20 M in the dissociated form and 0.02 M undissociated form, the pH of the solution is**  
(A) 2.9 (B) 3.3  
(C) 4.9 (D) 5.4
- 80. Important buffer system of extracellular fluid is**  
(A) Bicarbonate/carbonic acid  
(B) Disodium hydrogen phosphate/sodium dihydrogen phosphate  
(C) Plasma proteins  
(D) Organic Phosphate
- 81. The pH of body fluids is stabilized by buffer systems. The compound which will be the most effective buffer at physiologic pH is**  
(A)  $Na_2HPO_4$   $pK_a = 12.32$   
(B)  $Na_2HPO_4$   $pK_a = 7.21$   
(C)  $NH_4OH$   $pK_a = 7.24$   
(D) Citric acid  $pK_a = 3.09$

- 82. The percentage of CO<sub>2</sub> carrying capacity of whole blood by hemoglobin and oxyhemoglobin is**  
 (A) 20 (B) 40  
 (C) 60 (D) 80
- 83. The normal serum CO<sub>2</sub> content is**  
 (A) 18–20 meq/L (B) 24–29 meq/L  
 (C) 30–34 meq/L (D) 35–38 meq/L
- 84. The carbondioxide carrying power of the blood residing within the red cells is**  
 (A) 50% (B) 60%  
 (C) 85% (D) 100%
- 85. Within the red blood cells the buffering capacity contributed by the phosphates is**  
 (A) 5% (B) 10%  
 (C) 20% (D) 25%
- 86. The normal ratio between the alkaline phosphate and acid phosphate in plasma is**  
 (A) 2 : 1 (B) 1 : 4  
 (C) 20 : 1 (D) 4 : 1
- 87. The oxygen dissociation curve for hemoglobin is shifted to the right by**  
 (A) Decreased O<sub>2</sub> tension  
 (B) Decreased CO<sub>2</sub> tension  
 (C) Increased CO<sub>2</sub> tension  
 (D) Increased pH
- 88. Bohr effect is**  
 (A) Shifting of oxyhemoglobin dissociation curve to the right  
 (B) Shifting of oxyhemoglobin dissociation curve to the left  
 (C) Ability of hemoglobin to combine with O<sub>2</sub>  
 (D) Exchange of chloride with carbonate
- 89. Chloride shift is**  
 (A) H ions leaving the RBC in exchange of Cl<sup>-</sup>  
 (B) Cl<sup>-</sup> leaving the RBC in exchange of bicarbonate  
 (C) Bicarbonate ion returns to plasma and exchanged with chloride which shifts into the cell  
 (D) Carbonic acid to the plasma
- 90. Of the total body water, intracellular compartment contains about**  
 (A) 50% (B) 60%  
 (C) 70% (D) 80%
- 91. Osmotically active substances in plasma are**  
 (A) Sodium (B) Chloride  
 (C) Proteins (D) All of these
- 92. Osmotic pressure of plasma is**  
 (A) 80–100 milliosmole/litre  
 (B) 180–200 milliosmole/litre  
 (C) 280–300 milliosmole/litre  
 (D) 380–400 milliosmole/litre
- 93. Contribution of albumin to colloid osmotic pressure of plasma is about**  
 (A) 10% (B) 50%  
 (C) 80% (D) 90%
- 94. The highest concentration of proteins is present in**  
 (A) Plasma (B) Interstitial fluid  
 (C) Interstitial fluid (D) Transcellular fluid
- 95. Oncotic pressure of plasma is due to**  
 (A) Proteins (B) Chloride  
 (C) Sodium (D) All of these
- 96. Oncotic pressure of plasma is about**  
 (A) 10 mm of Hg (B) 15 mm of Hg  
 (C) 25 mm of Hg (D) 50 mm of Hg
- 97. Oedema can occur when**  
 (A) Plasma Na and Cl are decreased  
 (B) Plasma Na and Cl are increased  
 (C) Plasma proteins are decreased  
 (D) Plasma proteins are increased
- 98. Colloid osmotic pressure of intracellular fluid is**  
 (A) Equal to that of plasma  
 (B) More than that of plasma  
 (C) More than that of plasma  
 (D) Nearly zero

- 99. The water produced during metabolic reactions in an adult is about**  
(A) 100 ml/day (B) 300 ml/day  
(C) 500 ml/day (D) 700 ml/day
- 100. The daily water loss through gastrointestinal tract in an adult is about**  
(A) Less than 100 ml/day  
(B) 200 ml/day  
(C) 300 ml/day  
(D) 400 ml/day
- 101. Recurrent vomiting leads to loss of**  
(A) Potassium (B) Chloride  
(C) Bicarbonate (D) All of these
- 102. Obligatory reabsorption of water**  
(A) Is about 50% of the total tubular reabsorption of water  
(B) Is increased by antidiuretic hormone  
(C) Occurs in distal convoluted tubules  
(D) Is secondary to reabsorption of solutes
- 103. Antidiuretic hormone**  
(A) Is secreted by hypothalamus  
(B) Secretion is increased when osmolality of plasma decreases  
(C) Increases obligatory reabsorption of water  
(D) Acts on distal convoluted tubules and collecting ducts
- 104. Urinary water loss is increased in**  
(A) Diabetes mellitus  
(B) Diabetes insipidus  
(C) Chronic glomerulonephritis  
(D) All of these
- 105. Diabetes insipidus results from**  
(A) Decreased insulin secretion  
(B) Decreased ADH secretion  
(C) Decreased aldosterone secretion  
(D) Unresponsiveness of osmoreceptors
- 106. Thiazide diuretics inhibit**  
(A) Carbonic anhydrase  
(B) Aldosterone secretion  
(C) ADH secretion  
(D) Sodium reabsorption in distal tubules
- 107. Furosemide inhibits reabsorption of sodium and chloride in**  
(A) Proximal convoluted tubules  
(B) Loop of Henle  
(C) Distal convoluted tubules  
(D) Collecting ducts
- 108. A diuretic which is an aldosterone antagonist is**  
(A) Spironolactone (B) Ethacrynic acid  
(C) Acetazolamide (D) Chlorothiazide
- 109. In a solution having a pH of 7.4, the hydrogen ion concentration is**  
(A) 7.4 nmol/L (B) 40 nmol/L  
(C) 56 nmol/L (D) 80 nmol/L
- 110. At pH 7.4, the ratio of bicarbonate : dissolved CO<sub>2</sub> is**  
(A) 1 : 1 (B) 10 : 1  
(C) 20 : 1 (D) 40 : 1
- 111. Quantitatively, the most significant buffer system in plasma is**  
(A) Phosphate buffer system  
(B) Carbonic acid-bicarbonate buffer system  
(C) Lactic acid-lactate buffer system  
(D) Protein buffer system
- 112. In a solution containing phosphate buffer, the pH will be 7.4, if the ratio of monohydrogen phosphate : dihydrogen phosphate is**  
(A) 4 : 1 (B) 5 : 1  
(C) 10 : 1 (D) 20 : 1
- 113. pK<sub>a</sub> of dihydrogen phosphate is**  
(A) 5.8 (B) 6.1  
(C) 6.8 (D) 7.1
- 114. Buffering action of haemoglobin is mainly due to its**  
(A) Glutamine residues  
(B) Arginine residues  
(C) Histidine residues  
(D) Lysine residues

**115. Respiratory acidosis results from**

- (A) Retention of carbon dioxide
- (B) Excessive elimination of carbon dioxide
- (C) Retention of bicarbonate
- (D) Excessive elimination of bicarbonate

**116. Respiratory acidosis can occur in all of the following except**

- (A) Pulmonary oedema
- (B) Hysterical hyperventilation
- (C) Pneumothorax
- (D) Emphysema

**117. The initial event in respiratory acidosis is**

- (A) Decrease in pH
- (B) Increase in  $p\text{CO}_2$
- (C) Increase in plasma bicarbonate
- (D) Decrease in plasma bicarbonate

**118. Respiratory alkalosis can occur in**

- (A) Bronchial asthma
- (B) Collapse of lungs
- (C) Hysterical hyperventilation
- (D) Bronchial obstruction

**119. The primary event in respiratory alkalosis is**

- (A) Rise in pH
- (B) Decrease in  $p\text{CO}_2$
- (C) Increase in plasma bicarbonate
- (D) Decrease in plasma chloride

**120. Anion gap is the difference in the plasma concentrations of**

- (A) (Chloride) – (Bicarbonate)
- (B) (Sodium) – (Chloride)
- (C) (Sodium + Potassium) – (Chloride + Bicarbonate)
- (D) (Sum of cations) – (Sum of anions)

**121. Normal anion gap in plasma is about**

- (A) 5 meq/L
- (B) 15 meq/L
- (C) 25 meq/L
- (D) 40 meq/L

**122. Anion gap is normal in**

- (A) Hyperchloraemic metabolic acidosis
- (B) Diabetic ketoacidosis
- (C) Lactic acidosis
- (D) Uraemic acidosis

**123. Anion gap is increased in**

- (A) Renal tubular acidosis
- (B) Metabolic acidosis resulting from diarrhoea
- (C) Metabolic acidosis resulting from intestinal obstruction
- (D) Diabetic ketoacidosis

**124. Anion gap in plasma is because**

- (A) Of differential distribution of ions across cell membranes
- (B) Cations outnumber anions in plasma
- (C) Anions outnumber cations in plasma
- (D) Of unmeasured anions in plasma

**125. Salicylate poisoning can cause**

- (A) Respiratory acidosis
- (B) Metabolic acidosis with normal anion gap
- (C) Metabolic acidosis with increased anion gap
- (D) Metabolic alkalosis

**126. Anion gap of plasma can be due to the presence of all the following except**

- (A) Bicarbonate
- (B) Lactate
- (C) Pyruvate
- (D) Citrate

**127. All the following features are found in blood chemistry in uncompensated lactic acidosis except**

- (A) pH is decreased
- (B) Bicarbonate is decreased
- (C)  $p\text{CO}_2$  is normal
- (D) Anion gap is normal

**128. All the following statements about renal tubular acidosis are correct except**

- (A) Renal tubules may be unable to reabsorb bicarbonate
- (B) Renal tubules may be unable to secrete hydrogen ions
- (C) Plasma chloride is elevated
- (D) Anion gap is decreased

**129. All the following changes in blood chemistry can occur in severe diarrhoea except**

- (A) Decreased pH
- (B) Decreased bicarbonate
- (C) Increased  $p\text{CO}_2$
- (D) Increased chloride

- 130. During compensation of respiratory alkalosis, all the following changes occur except**
- (A) Decreased secretion of hydrogen ions by renal tubules
  - (B) Increased excretion of sodium in urine
  - (C) Increased excretion of bicarbonate in urine
  - (D) Increased excretion of ammonia in urine
- 131. Blood chemistry shows the following changes in compensated respiratory acidosis:**
- (A) Increased  $p\text{CO}_2$
  - (B) Increased bicarbonate
  - (C) Decreased chloride
  - (D) All of these
- 132. Metabolic alkalosis can occur in**
- (A) Severe diarrhoea
  - (B) Renal failure
  - (C) Recurrent vomiting
  - (D) Excessive use of carbonic anhydrase inhibitors
- 133. Which of the following features are present in blood chemistry in uncompensated metabolic alkalosis except?**
- (A) Increased pH
  - (B) Increased bicarbonate
  - (C) Normal chloride
  - (D) Normal  $p\text{CO}_2$
- 134. One joule is the energy required to**
- (A) Raise the temperature of 1 gm of water by  $1^\circ\text{C}$
  - (B) Raise the temperature of 1 kg of water by  $1^\circ\text{C}$
  - (C) Move a mass of 1 gm by 1 cm distance by a force of 1 Newton
  - (D) Move a mass of 1 kg by 1 m distance by a force of 1 Newton
- 135. Organic compound of small molecular size is**
- (A) Urea
  - (B) Uric acid
  - (C) Creatinine
  - (D) Phosphates
- 136. Organic substance of large molecular size is**
- (A) Starch
  - (B) Insulin
  - (C) Lipids
  - (D) Proteins
- 137. Body water is regulated by the hormone:**
- (A) Oxytocin
  - (B) ACTH
  - (C) FSH
  - (D) Epinephrine
- 138. Calcium is required for the activation of the enzyme:**
- (A) Isocitrate dehydrogenase
  - (B) Fumarase
  - (C) Succinate thiokinase
  - (D) ATPase
- 139. Cobalt is a constituent of**
- (A) Folic acid
  - (B) Vitamin  $\text{B}_{12}$
  - (C) Niacin
  - (D) Biotin
- 140. Calcium absorption is inferred by**
- (A) Fatty acids
  - (B) Amino acids
  - (C) Vitamin D
  - (D) Vitamin  $\text{B}_{12}$
- 141. The average of pH of urine is**
- (A) 5.6
  - (B) 6.0
  - (C) 6.4
  - (D) 7.0

**ANSWERS**

1. D	2. A	3. D	4. C	5. C	6. C
7. C	8. D	9. B	10. C	11. B	12. C
13. D	14. D	15. A	16. B	17. A	18. A
19. D	20. A	21. B	22. C	23. A	24. D
25. A	26. B	27. C	28. B	29. B	30. A
31. B	32. D	33. A	34. B	35. C	36. A
37. B	38. A	39. C	40. A	41. B	42. D
43. B	44. B	45. D	46. A	47. C	48. B
49. C	50. A	51. A	52. B	53. C	54. A
55. D	56. A	57. A	58. B	59. B	60. D
61. D	62. D	63. D	64. C	65. A	66. A
67. A	68. A	69. B	70. B	71. C	72. D
73. A	74. B	75. C	76. D	77. C	78. B
79. C	80. A	81. B	82. C	83. B	84. C
85. D	86. D	87. C	88. A	89. C	90. C
91. D	92. C	93. C	94. C	95. A	96. C
97. C	98. B	99. B	100. A	101. B	102. D
103. D	104. D	105. B	106. D	107. B	108. A
109. B	110. C	111. B	112. A	113. C	114. C
115. A	116. B	117. B	118. C	119. B	120. C
121. B	122. A	123. B	124. B	125. C	126. A
127. D	128. D	129. C	130. D	131. D	132. C
133. D	134. D	135. A	136. D	137. A	138. D
139. B	140. A	141. B			