Cell and marker enzymes MCQ's Ch.-1

1. Transition temperature of lipid bilayers of cell membrane is increased by:
   a) Cholesterol
   b) Saturated fatty acids
   c) Hydrocarbons
   d) Unsaturated fatty acids
2. Cell shape and motility are provided by :
   a) Microfilaments
   b) Microtubules
   c) Golgi apparatus
   d) Mitochondria
3. All are true about nucleolus, EXCEPT :
   a) It does not contain DNA
   b) It contains RNA
   c) Not bound by limiting membrane
   d) It is the site of formation of r-RNA
4. True about lipid bilayer of cell membrane:
   a) Asymmetrical arrangement of cell membrane component
   b) Unilateral diffusion of ions
   c) Symmetrical arrangement of cell membrane components
   d) Does not contain amphipathic lipids
5. The lipid bilayer of cell membrane exists as :
   a) Solid
   b) Semisolid
   c) Gel
   d) Fibres
6. Proteins targeted for destruction in eukaryotes are covalently linked to:
   a) Clathrin.
   b) Pepsin
   c) Laminin.
   d) Ubiquitin.
7. The ligand-receptor complex dissociates in the endosome because:
   a) Of its large size
   b) The vesicle loses its clathrin coat
   c) Of the acidic pH of the vesicle
   d) Of the basic pH of the vesicle
8. The agranular endoplasmic reticulum synthesizes :
   a) Proteins
   b) Lipids
   c) Vitamins
   d) Carbohydrates
9. The major integral membrane glycoprotein in human erythrocytes is :
   a) Glycophorin
   b) Concanavalin
   c) Lectin
   d) Heparin
10. Following are pairs of organelle and marker molecules. Match the correct order

ORGANELLE	MARKER MOLECULE
1) GOLGI APPARATUS	A) GIUTAMATE DEHYDROGENASE
2) RIBOSOME	B) RIBOZYME
3) END. RETICULUM	C) LDH
4) LYSOSOME	D) CATALASE
5) PLASMA MEMBRANE	E) GLUCOSE – 6 – PO_4 ASE
6) PERIOXISOME	F) ACID PO_4 ASE
7) CYTOSOL	G) NA – K – ATPASE
8) MITOCHONDRIA	H) GALACTOSYL TRANSFERASE

Identify the correct pairs

11. Fluidity of membranes is increased by :
    a) Unsaturated fatty acids
    b) Phospholipids
    c) Cholesterol
    d) Saturated fatty acids

12. Transition temperature of lipid bilayers of cell membrane is increased by :
    a) Cholesterol
    b) Saturated fatty acids
    c) Hydrocarbons
    d) Unsaturated fatty acids

13. In cell membrane, following are true, EXCEPT:
    a) Lipids arranged in a monolayer
    b) Phosphatidyl choline in outer leaflet
    c) Phosphatidyl serine in inner leaflet
    d) Cholesterol regulates fluidity
14. What happens to the lipid bilayer on adding unsaturated fatty acids to it:
    a) Fluidity decreases
    b) Fluidity increases
    c) Non predictable effect on fluidity
    d) No effect
15. The most important molecule regulating the fluidity of membranes is :
    a) Phospholipids
    b) Cholesterol
    c) Integral proteins
    d) Peripheral proteins
16. Marker for Mitochondria is:
    a) Na – K ATPase
    b) LDH
    c) Glutamic dehydrogenase
    d) Catalase
17. All of the following proteins are synthesized in cytosolic ribosomes, EXCEPT:
    a) Mitochondrial
    b) Nuclear
    c) Peroxisomal
    d) Secretory
18. Lysosomal enzymes belong to the class:
    a) Oxidases
    b) Hydroxylases
    c) Hydrolases
    d) Peroxidases
19. All the following components make up the cytoskeleton of most eukaryotic cells, EXCEPT:
    a) Actin Filaments
    b) Chromatin
    c) Micro-filaments
    d) Intermediate filaments
20. Cilia are made of:
    a) Actin filaments
    b) Microfilaments
    c) Microtubules
    d) Intermediate filaments
21. During subcellular fractionation by differential centrifugation the fraction that separates out first is :
    a) Nuclear fraction
    b) Mitochondrial fraction
    c) Microsomal fraction
    d) Cytosol
22. The membrane with a protein to lipid ratio less than one is :
    a) Mitochondrial outer membrane
    b) Mitochondrial inner membrane
    c) Myelin
    d) Human erythrocyte plasma membrane

Chapter – 1 Answer Key:-

1. b)
2. b)
3. a)
4. a)
5. c)
6. d)
7. c)
8. b)
9. a)
10. 1) = H; 2) = B; 3) = E; 4) = F; 5) = G; 6) = D; 7) = C; 8) = A
11. a)
12. b)
13. a)
14. b)
15. b)
16. c)
17. d)
18. c)
19. b)
20. c)
21. a)
22. c)

<u>Free radicals antioxidants and xenebiotics MCQ</u> Ch.2

1. All of the following are polar EXCEPT:
    a. Amines
    b. Alcohols
    c. Ether
    d. Thiol
    e. Acetone
2. All of the following are amphipathic EXCEPT:
    a. Free fatty acid
    b. Cholesteryl ester
    c. Cholesterol
    d. Phospholipids
3. pKa is:
    a. dissociation constant
    b. – log [Ka]
    c. – log [H^+]
    d. pH at which weak acid is half dissociated
4. The surfactant in alveoli is:
    a. Lecithin
    b. Cephalin
    c. Plasmalogen
    d. Cardiolipin

5. Hay's sulfur test is based on which property of bile salts?
   a. Emulsifying property
   b. Non polar property
   c. Surfactant property
   d. Conjugation property
6. If pH is more the dissociation of weak acid is:
   a. Less
   b. More
   c. Same
   d. No relationship
7. The mathematical relationship of pH with dissociation of weak acids is:
   a. Handersen Hasselbalch Equation
   b. Michelis Menten Equation
   c. Lineweaver Burke Equation
   d. Hill Equation
8. All of the following are Antioxidants EXCEPT:
   a. Retinal
   b. Beta carotene
   c. Tocopherol
   d. Urate
   e. Ascorbate
9. Free radicals cause membrane lipid peroxidation by:
   a. Damaging membrane cholesterol
   b. Damaging double bonds of fatty acids
   c. Damaging membrane proteins
   d. Damaging glycocalyx
10. Redox potential is:
    a. Tendency to reduce
    b. Tendency to get oxidized
    c. Tendency to lose electron
    d. Tendency to gain electron
11. Which of the following is NOT known to have an antioxidant effect?
    a. B carotene
    b. L-Ascorbic acid
    c. Alpha-Tocopherol
    d. Phylloquinone
12. First line of antioxidant defence system is:
    a. Glutathione Peroxidase
    b. Tocopherol
    c. SOD
    d. Catalase
13. Xenobiotic metabolism involves:
    a. Cytochrome a
    b. Cytochrome b
    c. Cytochrome c
    d. Cytochrome P_{450}
14. Cytochrome P_{450} monooxygenase systems are found in:
    a. Microsomes
    b. Mitochondria
    c. Both microsomes & mitochondria
    d. Both mitochondria and cytosol
15. In phase I reaction Xenobiotics are converted:
    a. From active form to inactive form
    b. From inactive form to active form
    c. Both 1 & 2 are possible
    d. None of the above
16. Which of the following is a phase I reaction in xenobiotic metabolism:
    a. Hydroxylation
    b. Glucuronidation
    c. Sulfation
    d. Methylation

Ansker Key:-

1.	**C**
2.	**B**
3.	**B**
4.	**A**
5.	**C**
6.	**A**
7.	**A**
8.	**A**
9.	**B**
10.	**D**
11.	**D**
12.	**B**
13.	**D**
14.	**C**
15.	**C**
16.	**A**

Carbohydrate Chemistry & metabolism MCQ's Ch.-3

1. Following items should be taken by dieters EXCEPT:
    a. Dietary fibers
    b. Corn Flakes
    c. Vegetables
    d. Brown rice
2. Which of the following food items has lowest glycemic index
    a. Corn Flakes
    b. Apple juice
    c. Ice creams
    d. Chocolates
3. Which is not a ketose
    a. Ribulose
    b. Xylulose
    c. Lactulose
    d. Sedoheptulose
4. Which of the following have the same chemical formula
    a. Glyceraldehyde and dihydroxyacetone
    b. Erythrose & Erythrulose
    c. Lactose and lactulose
    d. Xylose and xylulose
    e. Ribose and deoxyribose
5. Which of the following carbohydrates would be most abundant in vegetarian diet?
    a. Amylose
    b. Amylopectin
    c. Cellulose
    d. Glycogen
6. Which of the following would be the richest source of carbohydrates in the diet of strict vegetarians?
    a. Amylose
    b. Amylopectin
    c. Cellulose
    d. Glycogen
7. After eating ice-cream an adult female patient experiences abdominal distention, nausea, cramping and pain followed by a watery diarrhea. This set of symptoms is observed each time a dairy product is consumed. Which of the following is NOT TRUE of this clinical condition?
    a. It is a case of Steatorrhea
    b. It is due to Beta galactosidase deficiency
    c. Deficiency of Fat soluble vitamins is NOT associated with this condition
    d. It is due to Gluten hypersensitivity
8. Trehalase acts on which bond?
    a. α 1 – 4
    b. α 1 – 6
    c. α 1 – 1
    d. β 1 – 4
    e. β 1 – 6
9. All of the following are glucosans EXCEPT
    a. Starch
    b. Cellulose
    c. Inulin
    d. Glycogen
10. The separation of dextro and levo forms from a racemic mixture is called:
    a. Racemization
    b. Ulttrafiltration
    c. Resolution
    d. Fractionation
11. Which of the following food items has highest glycemic index
    a. Corn Flakes
    b. Sugar cane juice
    c. Ice creams
    d. Chocolates
12. All of the following enzyme deficiencies EXCEPT one may cause false positive Benedict's test.
    a. Galactokinase
    b. Aldolase B
    c. Xylulose Reductase
    d. Epimerase
    e. Lactase
13. All are true about Xylose EXCEPT:
    a. It is an example of L type of sugar.
    b. It is an aldose
    c. Used to diagnose Carbohydrate mal absorption due to mucosal disease.
    d. It is a pentose
14. All the following are true about inulin EXCEPT:
    a. It is a component of dietary fibres:
    b. It is a homopolysacharide
    c. It is a pentosan.
    d. It is used for measuring GFR
15. Which of the following pair of enzyme and its alternate name is wrongly paired
    a. Lactase: Beta Galactosidase
    b. Isomaltase: alpha 1, 4 glucosidase
    c. Limit dextrinase: alpha 1, 6 glucosidase
    d. Sucrase: invertase
16. All of the following reactions take place inside mitochondria except
    a. acid oxidation
    b. Oxidative EMP pathway
    c. Kreb cycle
    d. Fatty phosphorylation
17. von Gierke's disease is due to deficiency of enzyme
    a. Glucose-6-phosphatase
    b. Glucose-1-phosphatase
    c. Branching enzyme
    d. Myophosphorylase
18. Which of the following is a non-reducing sugar
    a. Maltose
    b. Sucrose
    c. Lactose
    d. Glucose
19. Which does not occur in glycolysis
    a. Isomerization
    b. Hydration
    c. Phosphoryl transfer
    d. All of the above
20. The oxidation of 1 mole of glucose by anerobic glycolysis yields a net of
    a. 2 moles of Lactate and 2 moles of ATP

b. 2 moles of pyruvate and 6 moles of ATP
c. 2 moles of lactate and 6 moles of ATP
d. 2 moles of pyruvate & 8 moles of ATP

21. Oxaloacetate + Acetyl CoA + H_2O ⟶ Citrate + CoA. This is an example of
    a. Hydration
    b. Deacylation
    c. Dehydrogenation
    d. Condensation
22. Which of the following pathways is considered as amphibolic in nature
    a. Glycolysis
    b. Lipolysis
    c. Glycogenesis
    d. Citric acid cycle
23. Which of the following enzymes in glycolytic pathway is inhibited by fluoride
    a. phosphoglycerate kinase
    b. Pyruvate kinase
    c. Aldolase
    d. Enolase.
24. In conversion of Lactic acid to glucose three reactions of glycolytic pathway are circumvented which of the following enzymes does not participate
    a. Pyruvate carboxylase
    b. pyruvate kinase
    c. Phosphoenolpyruvate carboxykinase
    d. Fructose 1-6 bisphosphatase
25. Transketolase activity is affected in
    a. Biotin deficiency
    b. pyridoxine deficiency
    c. PABA deficiency
    d. Thiamine deficiency
26. Gluconeogenesis occurs in
    a. Liver and Kidney
    b. Muscle
    c. Heart and liver
    d. Liver only
27. Glycogenolysis in muscle does not raise blood sugar due to lack of
    a. Lactate dehydrogenase
    b. pyruvate kinase
    c. G-6-phosphatase
    a. Arginosuccinase
28. Allosteric inhibition with ATP affects
    a. Phosphofructokinase
    b. PEP carboxykinase
    c. pyruvate kinase
    d. Glucose-6-P dehydrogenase
29. A patient's blood is drawn for glucose estimation in a red capped primary tube (vacutainer). If the test is performed after 2 hours expected level of blood glucose will be shorter by approximately:
    a. 5 mg %
    b. 10 mg %
    c. 15 mg %
    d. 20 mg %
30. The rate-limiting enzyme in glycolysis regulated by covalent modification is
    a. Phosphofructokinase 2
    b. Phosphofructokinase 1
    c. Hexokinase
    d. 2,3 DPG dehydrogenase
    e. Glucokinase
31. All of the following statements are true about 2,3 BPG EXCEPT:
    a. It is a byproduct of glycolysis
    b. Stabilizes relaxed form of hemoglobin.
    c. Binds to Lysine, Histidine and Valine form both β - chains
    d. Shifts oxygen dissociation curve to right
32. Energy required for gluconeogenesis is supplied by all EXCEPT:
    a. NADH
    b. NADPH
    c. ATP
    d. GTP
33. All are glucogenic EXCEPT::
    a. Succinyl CoA
    b. Propionyl CoA
    c. Acetyl CoA
    d. Methyl Malonyl CoA
34. Liver is constantly supplied with glucogenic molecules. Which of the following statements is INCORRECT about source of glucogenic substrates in liver?
    a. Muscle supplies lactate and alanine
    b. RBC supplies Lactate
    c. Adipose tissue supplies glycerol
    d. Intestine supplies Glutamine
35. Which of the following is NOT a characteristic of gluconeogenesis
    a. It requires energy in the form of ATP or GTP
    b. It is important in maintaining blood glucose during the normal overnight fast.
    c. It uses carbon skeletons provided by Leucine
    d. It involves the enzyme fructose 1, 6 bispohosphatase
36. All the TCA cycle enzymes are also found in cytosol EXCEPT
    a. Isocitrate dehydrogenase
    b. Succinate Thiokinase
    c. Alpha Keto Glutarate Dehydrogenase
    d. Malate Dehydrogenase
37. All the TCA cycle enzymes produce NADH EXCEPT:
    a. α – keto Glutarate Dehydrogenase
    b. Isocitrate Dehydrogenase
    c. Succinate Dehydrogenase
    d. Malate Dehydrogenase
38. Acetyl CoA produces how many ATPs
    a. 6
    b. 8
    c. 10
    d. 15
39. Which of the following statements regarding TCA cycle is FALSE?
    a. 10 ATPs are produced per mole of Glucose
    b. All dehydrogenases produce NADH except Succinate dehydrogenase

c. All enzymes are mobile except Succinate dehydrogenase
d. All enzymes are found in Cytosol also except succinate dehydrogenase and α – keto glutarate dehydrogenase

40. α – keto Glutarate dehydrogenase contains all EXCEPT:
    a. Biotin
    b. NAD
    c. FAD
    d. CoA
41. The primer for glycogenesis is:
    a. Amino group of Lysine residues of glycogenin
    b. Amide group of Aspargine residues of glycogenin
    c. Hydroxyl group of Tyrosine residues of glycogenin
    d. Sulfhydryl group of cysteine residues of glycogenin
42. The donor of glucose moieties for glycogenesis is:
    a. Glucose itself
    b. Glucose – 6 – Phosphate
    c. Glucose – 1 – Phosphate
    d. UDP Glucose
43. The most important inhibitor of hepatic phosphorylase (a) is:
    a. Insulin
    b. Glucose
    c. ATP
    d. 5' AMP
44. The most important stimulator of Myophosphorylase (b) is:
    a. 5' AMP
    b. Glucagon
    c. Epinephrine
    d. Calcium
45. Various inborn errors of glycogen metabolism result in accumulation of abnormal type or abnormal amount (excess) of glycogen in muscle and liver. Which of the following glycogen storage disorders DOES NOT affect Liver?
    a. Von Gierke's disease
    b. Cori's disease Type a
    c. Anderson's disease
    d. Tauri's Disease
    e. Type X
46. All of the following diseases have fasting hypoglycemia EXCEPT:
    a. Type I
    b. Type III b
    c. Type VI
    d. Type VII
    e. Type VIII
47. Debranching enzyme is:
    a. α – 1,4 Glucosidase
    b. α – 1,6 Glucosidase
    c. α – 1,4 → α – 1,4 glucan transferase
    d. α – 1,4 → α – 1,6 glucan transferase
48. Various inborn errors of glycogen metabolism result in accumulation of abnormal type or abnormal amount (excess) of glycogen in muscle and liver. Which of the following glycogen storage disorders DOES NOT affect muscle?
    a. Cori's disease
    b. Anderson's disease
    c. McArdle's disease
    d. Her's disease
    e. Tauri's Disease
49. Which of the following statements is CORRECT?
    a. Muscle has 5 % of glycogen which constitutes 3/4th of body glycogen
    b. Muscle has 0.7 % Glycogen which constitutes 3/4th of body glycogen
    c. Liver has 5 % glycogen which constitutes 3/4th of body glycogen
    d. Liver has 0.7 % glycogen which constitutes 3/4th of body glycogen
50. Which of the following statements is NOT TRUE about glycogen metabolism?
    a. Glycogen Synthase forms α 1,4 glycosidic bond
    b. Glycogen Synthase forms α 1,6 glycosidic bond
    c. Glycogen Phosphorylase hydrolyses α 1,4 glycosidic bond
    d. Debranching enzyme hydrolyses α 1,6 glycosidic bond
51. HMP shunt DOES NOT occur in:
    a. RBC
    b. Muscle
    c. Mammary Glands
    d. Adrenal Cortex
52. HMP shunt is not important in:
    a. Gluconeogenesis
    b. Triglyceride synthesis
    c. Cholesterol synthesis
    d. Steroidogenesis
53. HMP Shunt is required to produce free radicals in:
    a. Erythrocytes
    b. Monocytes
    c. Lynphocytes
    d. Thrombocytes
54. HMP Shunt is important in detoxification of free radicals in:
    a. Erythrocytes
    b. Monocytes
    c. Lynphocytes
    d. Thrombocytes
55. Which Vitamin could have been synthesized if we had L – Gulonolactone Oxidase
    a. Tocopherol
    b. Ascorbate
    c. Beta carotene
    d. Pantothenate
56. Deficiency of which enzyme can lead to false positive benedict's test?
    a. Cytochrome P450 Reductase
    b. Glutathine Reductase
    c. Aldose Reductase
    d. Xylulose Reductase

57. Which enzyme leads to premature cataract in galactocemia?
    a. Cytochrome P450 Reductase
    b. Glutathine Reductase
    c. Aldose Reductase
    d. Xylulose Reductase
58. Aldose reductase is useful for production of fructose from glucose in seminal vesicles but is disadvantageous in:
    a. Essential fructosuria
    b. Diabetes
    c. Hereditary fructose intolerance
    d. Phospho Fructo kinase deficiency
59. Which of the following test is diagnostic of Riboflavin deficiency?
    a. RBC transaminase activity
    b. RBC glutathione reductase activity
    c. RBC transketolase activity
    d. FIGLU test
60. Which of the following test is diagnostic of Thiamine deficiency?
    a. RBC transaminase activity
    b. RBC glutathione reductase activity
    c. RBC transketolase activity
    d. FIGLU test
61. Excess of Fructose is stored as:
    a. Glycogen
    b. Glucose
    c. Fructose
    d. Triglyceride
    e. Nucleic acids
62. Excessive fructose consumption causes all EXCEPT:
    a. Hypertriglyceridemia
    b. Hypercholesterolemia
    c. Increased HDL
    d. Hyperuricemia
63. Fructose enters glycolysis at the level of:
    a. Fructose 1 phosphate
    b. Fructose 6 phosphate
    c. Fructose 1,6 bisphosphate
    d. Glyceraldehyde 3 phosphate
64. Which of the following in born enzyme deficiency results in hypoglycemia?
    a. Fructokinase deficieny
    b. Aldolase B ddeficiency
    c. Uridyl transferase deficiency
    d. Galactokinase deficiency
65. The most common cause of galactocemia is deficiency of:
    a. Galactokinase
    b. Uridyl Transferse
    c. Epimerase
    d. Hexokinase
66. Hepatotoxicity, Hypophosphatemia, hypoglycemia and positive benedict's test is found in:
    a. Galactokinase deficiency
    b. Fructokinase deficiency
    c. Aldolase B deficiency
    d. Xylulose reductase deficiency
67. Jaundice and hepatomegaly are features of
    a. Galactokinase deficiency
    b. Uridyl Transferase deficiency
    c. Fructokinase deficiency
    d. Aldolase B deficiency
    e. Lactase deficiency
68. A newborn infant is brought to the pediatrician with c/o failure to thrive. The pediatrician notices icterus, hepatomegaly and cataract. Which of the following statements is FALSE?
    a. Probable deficiency is that of Galactokinase
    b. Probable deficiency is that of Galactose 1 phosphate uridyl transferase.
    c. Benedict's test would be positive in such patient.
    d. Uristix will not show a positive test
69. A newborn is admitted with c/o refusal of feed. On examination he is found to have jaundice and hepatomegaly. His eyes show signs of cataract. His urine gives a positive Benedict's test in spite of normal blood glucose concentration and dipstick test in urine is normal. Which of the following enzymes may be deficient?
    a. Galactokinase
    b. Uridyl transferase
    c. Epimerase
    d. Galactosidase
70. A child is admitted in a state of coma. There is a history of intake of sugarcane juice. Urinary Benedict's test is positive. However blood glucose level in glucometer shows hypoglycemia. Which of the following is a FALSE statement regarding this condition?
    a. Glucometer is faulty
    b. Dipstick test is likely to be negative in urine
    c. Ingestion of fruits will always precipitate this condition
    d. There is associated hepatotoxicity and hypophosphatemia
71. How many phosphate anhydride bonds are formed when glucose is completely oxidized and glycerophosphate shuttle is used for transporting NADH inside mitochondria
    a. 32
    b. 30
    c. 7
    d. 5

Carbohydrate Chemistry & metabolism Ans.Key Ch.3

1. **b**
2. **b**
3. **c**
4. **a b d**
5. **c**
6. **b**
7. **a**
8. **c**
9. **c**
10. **c**
11. **a**
12. **e**
13. **a**
14. **c**
15. **b**
16. **a**
17. **a**
18. **b**
19. **b**
20. **a**
21. **d**
22. **d**
23. **d**
24. **b**
25. **d**
26. **a**
27. **c**
28. **a**
29. **d**
30. **a**
31. **b**
32. **b**
33. **c**
34. **d**
35. **c**
36. **c**
37. **c**
38. **c**
39. **a**
40. **a**
41. **c**
42. **d**
43. **b**
44. **a**
45. **d**
46. **d**
47. **b**
48. **d**
49. **b**
50. **b**
51. **b**
52. **a**
53. **b**
54. **a**
55. **b**
56. **d**
57. **c**
58. **b**
59. **b**
60. **c**
61. **d**
62. **c**
63. **d**
64. **b**
65. **b**
66. **b**
67. **b d**
68. **a**
69. **b**
70. **a**

Lipids Chemistry & metabolism MCQ's Ch. – 4

1. The lecithin: Sphingomyelin ratio in the amniotic fluid can be used to assess
   a. Fetal growth
   b. Fetal karyotype
   c. Fetal lung maturity
   d. Multiple gestational pregnancies
   e. Presence of neural tube defects
2. Excessive consumption of animal fat can cause dyslipidemia because they contain:
   a. Saturated fatty acids
   b. Trans fatty acids
   c. MUFA
   d. PUFA
3. Phospholipids have all of the following functions EXCEPT
   a. Surfactant
   b. Signal transduction
   c. Lipid Transport
   d. Cell surface antigens
4. Gangliosides serve all of the following functions EXCEPT:
   a. Form glycocalyx
   b. Cell adhesion molecules
   c. Receptor functions
   d. Antigenic function
   e. Lipid transport
5. A sphingolipid that contains phosphate is:
   a. Sulphatide
   b. Sphingomyelin
   c. Glucocerebroside
   d. GM1
6. Which of the following is NOT a ω 3 fatty acid?
   a. Linolenic acid
   b. Timnodonic Acid
   c. Cervonic
   d. Eicostetraenoic acid
7. Omega 3 fatty acids prevent all EXCEPT:
   a. Atherosclerosis
   b. Retinitis pigmentosa
   c. Attention deficit hyperactivity disorder
   d. Alzheimer's disease
8. 1st messenger for IP3 is:`
   a. DAG
   b. PI
   c. ADH
   d. Ca
   e. PLC
9. Which of the following produces 2nd messengers in signal transduction cascade
   a. Protein Kinase C
   b. Protein Kinase A
   c. Phospholipase A2
   d. Phospholipase C
10. Lipid which mainly accumulates In fatty liver is
    a. HDL
    b. Triglycerides
    c. Cholesterol
    d. FFA
11. Highest phospholipids is present in
    a. chylomicron
    b. VLDL
    c. HDL
    d. LDL
12. Gaucher is due to detect in enzyme
    a. Ceramidase
    b. Galactosidase
    c. Glucocerebrosidase
    d. Hexosaminidase
13. In which tissue Glycerol is converted to glucose in
    a. Liver
    b. Muscle
    c. Heart
    d. Brain
14. In which of the following condition Ketoacidosis is seen without glyosuria
    a. DM
    b. Prolonged starvation
    c. Aspirin poisoning
    d. Renal tubular acidosis
15. Number of ATP formed by one turn of β-oxidation
    a. 3
    b. 5
    c. 7
    d. 12
16. Number of ATP formed from one mole of stearic acid in β oxidation
    a. 7
    b. 129
    c. 56
    d. 146
17. Precursor for cholesterol synthesis is
    a. Acetic acid
    b. Acetyl CoA
    c. Oxaloacetic acid
    d. Pyruvate
18. Phospholipid that does not contains glycerol
    a. Phosphatidylcholine
    b. Phosphatidyllethanolamine
    c. Phosphatidylserine
    d. Sphingomyelin
19. Lipoprotein fraction with highest cholesterol content
    a. α-lipoprotein
    b. β-lipoprotein
    c. Chylomicron
    d. Pre β-lipoprotein
20. Molecule which is not an intermediate in cholesterol biosynthesis
    a. Acetoacetyl CoA
    b. HMG CoA
    c. Mevalonate
    d. Citrate
21. Lipid not an example of a phospholipid
    a. Cerebroside
    b. Sphingomyelin
    c. Lecithin
    d. Cephalin
22. Example of is non- essential fatty acid
    a. Linoleic acid
    b. Linolenic acid
    c. Arachidonic acid

d. Oleic acid

23. Which is not a ketone body
    a. Acetone
    b. Oxaloacetate
    c. Acetoacetic acid
    d. β-hydroxybutyric acid
24. Rich source of PUFA in diet is
    a. Milk
    b. Egg
    c. Butter
    d. Vegetable oils
25. High density lipoprotein transport
    a. Triglyceride from liver
    b. Triglyceride from small bowel
    c. Cholesterol to tissue
    d. Cholesterol to liver
26. Odd chain fatty acid on β- oxidation produces
    a. Succinyl CoA
    b. Propionyl CoA
    c. Acetyl CoA
    d. Melanyl CoA
27. Bile acids are synthesized from
    a. Fatty acid
    b. Amino acids
    c. Bilirubin
    d. Cholesterol
28. The anti- atherosclerotic lipoprotein is
    a. HDL
    b. VLDL
    c. LDL
    d. ID
29. Synthesis of triglyceride is increased by
    a. Growth Hormone
    b. Insulin
    c. Acetyl Cortisol
    d. Glucagon
30. which of the following lipoprotein complex is associated with LCAT activity
    a. VLDL
    b. Chylomicron
    c. LDL
    d. HDL
31. Highest amount of prostaglandins are seen in
    a. Seminal fluid
    b. CSF
    c. Blood
    d. Urine
32. Cerebrosides is present in which of the following
    a. Phylol
    b. Glycerol
    c. Galactitol
    d. Sphingosine
33. Tissue responsible for formation of Ketone body.
    a. Liver
    b. Kidney
    c. Spleen
    d. Blood
34. Which of the following statements about fatty acid synthesis is INCORRECT
    a. Acetyl CoA is the precursor
    b. Acetyl CoA forms Malonyl CoA and transported out of mitochondrion
    c. Source of acetyl CoA for fatty acid synthesis is glucose
    d. Acetyl CoA condenses with Oxaloacetate to form citrate, which is transported to cytosol, where it is cleaved to reform acetyl CoA and oxaloacetate again
35. How many turns of beta oxidation are required for complete oxidation of Arachidic acid?
    a. 10
    b. 9
    c. 12
    d. 8
36. Acetyl CoA released by Complete β – oxidation of Stearate produces how many ATP
    a. 80
    b. 90
    c. 96
    d. 108
37. Which one of the following statements about utilization of Ketone Bodies as a fuel by the body is INCORRECT:
    a. They do not require carriers in the blood
    b. They are made in liver where the amount of acetyl CoA exceeds the oxidative capacity of the liver
    c. Acetone is not utilized by the body as a fuel
    d. Ketone bodies are utilized by conversion of acetoacetate to acetoacetyl CoA
    e. When plasma Ketone bodies level is elevated, the liver efficiently oxidizes them for energy purpose
38. Which statement about propionyl CoA is INCORRECT?
    a. Propionyl CoA is metabolized via a reaction that involves Vitamin B 12 and Biotin
    b. Propionyl CoA is converted to Acetyl CoA
    c. Propionyl CoA is a product of odd chain fatty acids
    d. It is the only potion of fatty acids which is glucogenic
39. Enzymes Required for Synthesis of Long Chain Fatty Acids are located in:
    a. Cytosol
    b. Nucleus
    c. E.R.
    d. Ribosomes
40. How many NADH are formed by complete oxidation of stearic acid (C 18)
    a. 8
    b. 9
    c. 17
    d. 27
    e. 35
41. Complete β – oxidation of a fatty acid with 26 carbons produces how many ATPs?
    a. 176
    b. 178
    c. 214
    d. 216

42. Cholesterol is important for following functions EXCEPT
    a. Membrane formation
    b. Emulsification
    c. Energy generation
    d. Endocrine functions
    e. Mineralization
43. All are synthesized from cholesterol EXCEPT:
    a. Cortisol
    b. Cholecalciferol
    c. Estradiol
    d. Menadiol
    e. Estriol
44. Which of the following statements is INCORRECT regarding HMG CoA reductase
    a. It is the rate limiting enzyme of cholesterol biosynthesis
    b. It is the committed step in the cholesterol biosynthesis
    c. It is induced by insulin
    d. It is repressed by glucagon
45. All are true statements regarding Lithocholate EXCEPT:
    a. It is a secondary bile acid
    b. It is synthesized in intestine
    c. It helps to absorb cobalamine
    d. It undergoes enterohepatic recirculation
46. Which of the following reactions is NOT affected by biotin deficiency?
    a. Pyruvate to oxaloacetate
    b. Acetyl CoA to malonyl CoA
    c. Propionyl CoA to succinyl CoA
    d. Tyrosine to DOPA
47. biotin is involved in :
    a. Gluconeogenesis
    b. Cholesterol synthesis
    c. Fatty acid synthesis
    d. a) + c)
    e. b) + c)
48. Shuttle required for transport of Acetyl CoA from mitocondria to cytosol is:
    a. Malate oxaloacetate aspartate shuttle
    b. Glycerophosphate shuttle
    c. Citrate malate shuttle
    d. Citrate Aspartate shuttle
49. Which of the following reactions is NOT affected by biotin deficiency?
    a. Pyruvate to oxaloacetate
    b. Acetyl CoA to malonyl CoA
    c. Propionyl CoA to succinyl CoA
    d. Tyrosine to DOPA
50. During starvation, acetyl CoA obtained form Beta oxidation is least used in the synthesis of
    a. HMG CoA
    b. Citrate
    c. Acetoacetate
    d. Beta Hydroxy Butyrate
51. Insulin increases the activity of following enzymes except:
    a. Glucokinase
    b. Pyruvate Carboxylase
    c. Glycogen Synthase
    d. Acetyl CoA carboxylase
52. Which of the following enzymes are in phophorylated form?
    a. Acetyl CoA carboxylase (a)
    b. HMG CoA reductase (b)
    c. Phosphofructokinase 2 (a)
    d. Glycogen Phosphorylase (b)
    e. Glycogen Synthase (a)
53. Which of the following is NOT decreased in diabetes mellitus?
    a. Glucokinase
    b. Acetyl CoA carboxylase
    c. Pyruvate carboxylase
    d. Phosphofructokinase
54. The lipoprotein responsible for the majority of the cholesterol transport to the liver from extrahepatic tissues is:
    a. Chylomicrons
    b. VLDL
    c. LDL
    d. HDL
    e. Albumin
55. Heparin DOES NOT clear lipemia in:
    a. Type I hyperlipidemia
    b. Type II hyperlipidemia
    c. Type III hyperlipidemia
    d. Type IV hyperlipidemia
56. Free radicals are implicated in atherosclerosis. The pathogenic mechanism is:
    a. Increased LDL cholesterol
    b. Decreased HDL cholesterol
    c. Formation of oxidized LDL
    d. Increased lipoprotein (a) levels
57. Dietary triglycerides are delivered to adipose tissue by
    a. Free fatty acids
    b. Mixed micelles
    c. Free Triacylglycerol
    d. 2- monoacylglycerol
    e. Chylomicrons
58. Which of the following statements regarding plasma lipoproteins is INCORRECT
    a. Chylomicrons and VLDL contain Apo B 100
    b. HDL has LCAT activity
    c. VLDL are synthesized in Liver and produce LDL by the action of LPL
    d. LDL delivers cholesterol to all tissues
59. Which of the following is an activator of LPL
    a. Apo B100
    b. Apo A I
    c. Apo E
    d. Apo C II
60. Raised serum levels of lipo-protein (a) is a predictor of
    a. Cirrhosis of liver
    b. Rheumatic arthritis
    c. Atherosclerosis
    d. Cervical cancer
61. Tangier's Disease occurs due to defect in
    a. Lipoprotein Lipase

b. ATP binding Cassette Transporter 1
c. LDL receptor
d. Overproduction of VLDL

62. In familial hypercholesterolemia, there is increased chances of atherosclerosis due to:
    a. Excessive deposition of cholesterol to peripheral tissues
    b. Down regulation of LDL receptors
    c. Deficiency of LDL receptors
    d. Up regulation of LDL receptor
63. All of the following factors are important in the functioning of HDL in preventing atherosclerosis EXCEPT:
    a. LCAT
    b. ABCA 1
    c. LRP
    d. SRB 1
    e. CETP
64. Enzyme 'lipoprotein lipase (LPL)' is responsible for hydrolysis of triglycerides present in VLDL and chylomicrons. Presence of which Apoprotein is necessary for this activity of LPL?
    a. Apo A I
    b. Apo B 100
    c. Apo B 48
    d. Apo C II
    e. Apo E
65. Apo B 48 is
    a. Isoenzyme of Apo B 100
    b. Truncated form of Apo B 100
    c. Formed from a large precursor i.e. Apo B 100
    d. Conformational isomer of Apo B 100
66. Which of the following is independent risk factor for CAD?
    a. High LDL
    b. Low HDL
    c. High Triglyceride
    d. High Lp (a)
67. Cholesterol present in LDL:
    a. Represents primarily cholesterol that is being removed from peripheral cells.
    b. Binds to a receptor and diffuses across the cell membrane.
    c. On accumulation in the cell inhibits replenishment of LDL receptors.
    d. When enters a cell, suppresses activity of acyl–CoA : cholesterol acyl transferase (ACAT)

Lipids Chemistry & metabolism Answer Key Ch. – 4

1. **c**
2. **b**
3. **d**
4. **e**
5. **b**
6. **a**
7. **a**
8. **c**
9. **d**
10. **b**
11. **c**
12. **c**
13. **a**
14. **b**
15. **b**
16. **d**
17. **b**
18. **d**
19. **b**
20. **d**
21. **a**
22. **d**
23. **b**
24. **d**
25. **d**
26. **b**
27. **d**
28. **a**
29. **b**
30. **d**
31. **a**
32. **d**
33. **a**
34. **b**
35. **b**
36. **b**
37. **e**
38. **b**
39. **a c**
40. **e**
41. **b**
42. **c**
43. **d**
44. **d**
45. **c**
46. **d**
47. **d**
48. **c**
49. **d**
50. **b**
51. **a**
52. **b**
53. **c**
54. **d**
55. **a**
56. **c**
57. **e**
58. **a**
59. **d**
60. **c**
61. **b**
62. **b**
63. **c**
64. **d**
65. **b**
66. **d**
67. **c**

Amino Acid and Proteins: Chemistry & Metabolism MCQ Chapter- 5

1. pI of Histidine is:
   a. $\frac{pK1 + pK2}{2}$
   b. $\frac{pK2 + pK3}{2}$
   c. $\frac{pK1 + pK3}{2}$
   d. $\frac{pK3 + pK4}{2}$
2. Which of the following amino acid exists as zwitterion at pH 7?

a. Glutamic acid
b. Arginine
c. Valine
d. Serine
e. Histidine

3. The amino acid residue having a secondary amino group is:
   a. Lysine.
   b. Histidine.
   c. Tyrosine.
   d. Proline
4. The amino acid residues of proteins involved in post translational modifications
   a. Arginine
   b. Histidine
   c. Lysine
   d. Leucine
5. Amino acid has least buffering capacity at:
   a. pK 1
   b. pK 2
   c. pK 3
   d. pI
6. Vitamin K is required for:
   a. Carboxylation
   b. Hydroxylation
   c. Phosphorylation
   d. Acetylation
7. Features of scurvy are due to defect of which enzyme?
   a. Lysyl hydroxylase
   b. Lysyl oxidase
   c. Procollagen peptidase
   d. Glycine Hydroxylase
8. Which vitamins are NOT required for post translational modifications?
   a. Ascorbate
   b. Menaquinine
   c. Phylloquinone
   d. Pyridoxine
9. 11 – cis retinal is attached to opsin on:
   a. Arginine residues
   b. Tyrosine residues
   c. lysine residues
   d. Glutamate residues

10. Which of the following R group is NOT correctly matched with its amino acid?
    a. Histidine : Imidazole
    b. Tryptophan : Indole
    c. Arginine : ε – amino group
    d. Methionine : Thioether
    e. Cysteine : Sulfhydryl
11. Following is the list of various amino acids
    I. Aspartate
    II. Glutamate
    III. Glutamine
    IV. Arginine
    V. Histidine
    VI. Lysine
    VII. Phenyl Alanine
    VIII. Tyrosine
    IX. Tryptophan
    X. Serine
    XI. Threonine
    a. I undergoes gamma carboxylation in activation of clotting factors
    b. IV & VI form cross linkages in collagen
    c. V & VI are responsible for responsible for buffering action of proteins
    d. VI & VII undergo hydroxylation
    e. X & XI are responsible for covalent modification of enzymes
12. In each turn of urea cycle 2 amino acids are metabolized. One of the amino acid provides the ammonia through transamination and Glutamate Dehyhdrogenase. The other amino acid is:
    a. Deaminated to provide ammonia
    b. Transaminated to alanine
    c. Transaminated to aspartate
    d. Transaminated to glutamate
13. Ammonia is transported from muscle to liver as:
    a. Glutamine
    b. Aspargine
    c. Alanine
    d. Glutamate
    e. Aspartate
14. All are ketogenic EXCEPT:
    a. Leucine
    b. Isoleucine
    c. Threonine
    d. Phenylalanine
    e. Cysteine
15. Which of the following amino acids get rid of their amino group by combination of transaminase and glutamate dehydrogenase
    a. Proline
    b. Lysine
    c. Histidine
    d. Threonine
16. Amino acids form normal protein turnover in muscles, transfer their amino group to
    a. Glutamate
    b. Glutamine
    c. Alanine
    d. Aspartate
17. The cause of ammonia toxicity are all EXCEPT
    a. Decreased NADH
    b. Decreased TCA cycle intermediates
    c. Decreased ATP
    d. Local brain acidosis
    e. Increased synthesis of GABA
18. Which neurotransmitter is excessively synthesized in brain in ammonia toxicity?
    a. GABA
    b. Glutamate
    c. Glycine
    d. Serotonine
    e. Norepinephrine
19. Which of the following statements regarding urea cycle is INCORRECT?
    a. N acetyl glutamate is the allosteric activator

b. All the reactions of urea cycle take place in mitochondria
c. Defect in Ornithine citrulline Antiport results in hyperornithinemia Hyperammonemia
d. ATP is required in the reaction where Arginosuccinate is synthesized
e. Arginosuccinase step relates urea cycle with TCA cycle

20. Which of the following statements regarding transamination is INCORRECT?
    a. It is the Transfer of amino group from an amino acid to a keto acid
    b. It requires pyridoxal phosphate
    c. It is the only reaction by which all amino acids get rid of their amino groups
    d. It is a freely reversible reaction
    e. Transaminase is specific for a pair of amino and keto acid and non specific for the other
21. All of the following amino acids are glucogenic EXCEPT:
    a. Isoleucine
    b. Leucine
    c. Tyrosine
    d. Tryptophan
    e. Threonine
22. Amino acid that can be synthesized from α – keto Glutarate are all EXCEPT:
    a. Glutamate
    b. Glutamine
    c. Proline
    d. Serine
23. Amino acids synthesize proteins, which function as enzymes. Which amino acid forms coenzyme in addition?
    a. Phenylalanine
    b. Tyrosine
    c. Tryptophan
    d. Histidine
24. Phenylalanine is the precursor of all the following except
    a. Tyrosine
    b. Epinephrine
    c. Thyroxine
    d. Melatonin
25. A patient presents to the physician's office with c/o multiple joint pains. On examination physician notes generalized pigmentation and urine turns dark on exposure to air. The compound responsible generalized pigmentation and urine turning dark on standing is:
    a. Tyrosine
    b. Homogentisate
    c. Benzoquinone acetate
    d. Phenyl pyruvate
26. Melatonin is synthesized from
    a. Dopamine
    b. Tryptophan
    c. Tyrosine
    d. Melanin
27. Following are true about homocysteinuria EXCEPT:
    a. Can be caused by deficiency of cystathione β Synthase
    b. Can be a feature of B 12 deficiency
    c. Associated with increased risk of atherosclerosis
    d. Defect in cysteine metabolism
28. Which of the following statements regarding Phenylketonuria is INCORRECT?
    a. The deficiency of phenylalanine Hydroxylase makes Tyrosine essential for us
    b. Phenylalanine is converted to phenyl lactate which is responsible for mousy odour in the hair, breath & skin
    c. Phenylalanine is converted to phenyl pyruvate, which is detected by Guthrie test
    d. Tandem mass spectrometry can be used for screening
29. Which of the following in – born error of metabolism pertains to an aromatic amino acid
    a. Xanthuernic aciduria
    b. Urocanic aciduria
    c. Propionic academia
    d. Methyl malonic Aciduria
30. Folate trap is because if the deficiency of
    a. Hydroxo cobalamine
    b. Adenosyl cobalamine
    c. Methyl coblamine
    d. Transcobalamine
31. Vitamin B_{12} and folic acid supplementation in megaloblastic anemia required for activation of
    a. Thymidylate Synthase
    b. Ribonucleotide redutase
    c. CTP synthase
    d. Adenosine Deaminase
32. All of following are dietary causes of pellagra EXCEPT:
    a. Maize
    b. Shorghum
    c. Khesari
    d. Pyridoxine deficiency
    e. Niacin deficiency
33. Vitamin B_{12} and folic acid supplementation in megaloblastic anemia required for activation of
    a. Thymidylate Synthase
    b. Ribonucleotide redutase
    c. CTP synthase
    d. Adenosine Deaminase
34. Pyridoxine deficiency can lead to all EXCEPT
    a. Decreased RBC transaminase activity
    b. Pellagra
    c. Propionic acidemia
    d. Xanthurenic aciduria
35. All of the following are examples of Prion disease, EXCEPT:
    a. Cruetzfeldt Jacob Disease (CJD)
    b. Alzheimer's disease
    c. Scrapie,

d. Gerstmann-Straussler Scheinker syndrome

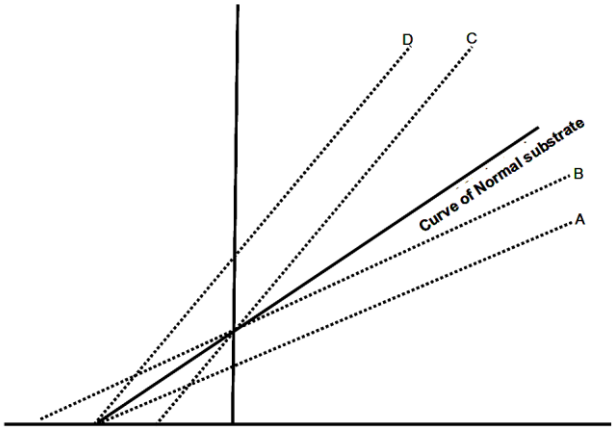
36. All are true about denaturation of proteins EXCEPT:
    a. All bonds are disrupted except peptide and disulfide
    b. All structures are disrupted except primary structure
    c. Accompanied by precipitation but function is preserved
    d. On removal of denaturing force, renaturation normally does not occur
37. The bonds responsible for super-secondary motifs are
    a. Amide
    b. Hydrogen
    c. Electrovalent
    d. Covalent
    e. Disulfide
38. Which is NOT TRUE of secondary structure of proteins
    a. Alpha helix is most common secondary structure
    b. It is a conformational relationship among amino acids nearby in primary structural sense
    c. It forms regular repetitive structure
    d. Bonds responsible are all except peptide bond
39. Hydrophilic amino acids are likely be found on the surface of a protein molecule due to:
    a. Vander walls forces
    b. Hydrophobic interactions
    c. Ionic bonds
    d. Disulfide bridges
40. Diseases due to misfolded proteins are all except:
    a. Creutzfeldt–Jacob disease
    b. Kuru
    c. Gerstmann–Straussler–Scheinker Syndrome (GSS)
    d. Huntigton's Disease
    e. Alzheimer' Disease
41. Structure of prions is:
    a. α – Helix
    b. β – Pleated sheet
    c. Random coil
    d. Triple Helix
42. PrP gene is situated on
    a. Chromosome 6
    b. Chromosome 11
    c. Chromosome 20
    d. Chromosome X
43. Hydrogen bond between Serine and Threonine forms
    a. Primary structure
    b. Secondary structures
    c. Tertiary structures
    d. Quaternary Structures
44. Amphipathic Helices are present at all locations EXCEPT:
    a. Lipoprotein surfaces
    b. Protein surfaces
    c. Membrane – cytosol interface
    d. Protein interior

Amino Acid and Proteins: Chemistry & Metabolism
Answer Key Chapter- 5

1. **b**
2. **e**
3. **d**
4. **c**
5. **d**
6. **a**
7. **a**
8. **d**
9. **c**
10. **c**
11. **e**
12. **c**
13. **c**
14. **e**
15. **c**
16. **c**
17. **d**
18. **a**
19. **b**
20. **c**
21. **b**
22. **d**
23. **c**
24. **d**
25. **c**
26. **b**
27. **d**
28. **c**
29. **b**
30. **c**
31. **a**
32. **c**
33. **a**
34. **c**
35. **b**
36. **c**
37. **b**
38. **d**
39. **b**
40. **d**
41. **b**
42. **c**
43. **c**
44. **d**

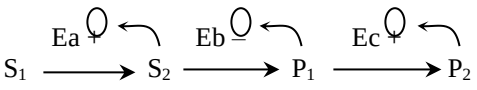
Enzymes MCQ's Chapter-6

1. Which of the following enzymes DOES NOT follow Michaelis–Menten kinetics
   a. Glucokinase
   b. Hexokinase
   c. Acetyl CoA carboxylase
   d. Tyrosyl tRNA synthetase
2. One international unit of enzyme converts:
   a. One Mole of substrate to product in one second
   b. One mMole of substrate to product in one second
   c. One µMole of substrate to product in one second
   d. One mMole of substrate to product in one minute
   e. One µMole of substrate to product in one minute
3. Which is the curve given by competitive inhibitor?



4. Which of the following is NOT a protein?
   a. Glucan transferase
   b. Amino transferase
   c. Peptidyl transferase
   d. Terminal transferase
5. Isoenzymes differ in all of the following aspects EXCEPT:
   a. Genes coding for them
   b. Electrophoretic mobility
   c. Km and/or V_{max}
   d. Reaction specificity
6. Which of the following are examples of competitive inhibitors?
   a. Methyl alcohol on alcohol dehydrogenase
   b. Malonate on succinate dehyhdrogenase
   c. Aspirin on cyclooxygenase
   d. Atorvastatin on HMG CoA Reductase
7. X – intercept in double reciprocal plot is:
   a. 1/Km
   b. – 1/Km
   c. 1/Vmax
   d. – 1/Vmax
8. Y – intercept in double reciprocal plot is:
   a. 1/Km
   b. – 1/Km
   c. 1/Vmax
   d. – 1/Vmax
9. All are co-substrates EXCEPT:
   a. NAD
   b. NADP
   c. CoASH
   d. Biotin
10. Aldolase acts through:
    a. Catalysis by proximity
    b. Catalysis by strain
    c. Covalent catalysis
    d. Acid – Base catalysis
11. The role of Alkaline phosphatase in serum is to act on :
    a. Monoesters of phosphoric acid
    b. Diesters of phosphoric acid
    c. Disodium phenol phosphate
    d. None of the above
12. All the following correctly describe the active site of an enzyme, EXCEPT:
    a. It is small relative to the entire enzyme
    b. Many amino acyl residues form the active site
    c. It is two-dimensional in structure
    d. It is usually a crevice or cleft
13. In which of the following conditions the level of creatinine kinase-1 increase?
    a. Myocardial Ischemia.
    b. Brain Ischemia
    c. Kidney damage.
    d. Electrical cardioversion.
14. All of the following enzymes are active within a cell, EXCEPT :
    a. Trypsin
    b. Fumarase
    c. Hexokinase
    d. Alcohol dehydrogenase
15. Serine proteases are all, EXCEPT :
    a. Elastase
    b. Chymotrypsin
    c. Trypsin
    d. Pepsin
16. The predominant isozyme of LDH in cardiac muscle is :
    a. LD-1
    b. LD-2
    c. LD-3
    d. LD-5
17. Enzymes that move a molecular group from one molecule to another are known as :
    a. Ligases
    b. Oxido –reductases
    c. Transferases
    d. Dipeptidases
18. The type of enzyme inhibition in which succinate dehydrogenase reaction is inhibited by malonate is:
    a. Noncompetitive
    b. Uncompetitive
    c. Competitive
    d. Allosteric

19. The substrate concentration used for determining the activity of an enzyme having Km = Xμm/L will be :
    a. 2 Xμm/L
    b. 4 Xμm/L
    c. 8 Xμm/L
    d. 10 Xμm/L
20. In which of the following inhibition, the affinity between enzyme and substrate increases?
    a. Competitive
    b. Non competitive
    c. Uncompetitive
    d. Inhibition cannot increase affinity between E & S
21. Allopurinol is a competitive inhibitor of :
    a. Xanthine oxidase
    b. Adenosine deaminase
    c. Uric acid excretion
    d. Uric acid breakdown
22. Chymotrypsinogen is :
    a. Carboxypeptide
    b. Zymogen
    c. Hormone
    d. Active enzyme
23. Enzymes Ea, Eb and Ec are under allosteric control of S2 and P1 and P2 respectively. If Ec is defective what would occur :



    a. Accumulation of S_1
    b. Accumulation of P_1
    c. Accumulation of S_2
    d. Decrease of S_2
24. Km value of an enzyme is defined as :
    a. Substrate concentration at Vmax/2
    b. Substrate concentration of twice Vmax
    c. Substrate concentration of thrice Vmax
    d. Substrate concentration of one third Vmax
25. Enzyme inhibition with Km increased but Vmax same is :
    a. Competitive
    b. Non competitive
    c. Irreversible
    d. Uncompetitive

Enzymes Answer Key Chapter-6

1. d

2. e

3. c

4. c

5. d

6. c

7. b

8. c

9. d

10. b

11. d

12. c

13. b

14. a

15. d

16. a

17. c

18. c

19. d

20. c

21. a

22. b

23. c

24. a

25. a

Vitamins, minerals, AB balance & heme MCQ's Chapter 7, 8, 9, 10

1. Vitamin acting as coenzyme for transamination is
    a. B1
    b. B2
    c. B6
    d. B12
    e. B9.
2. Which is Anti infective Vitamin.
    a. Vit B6
    b. vit A.
    c. Vit D.
    d. vit c.
3. Most active form of Vitamin D is
    a. 25 hydro cholecalciferol
    b. 25 hydroxy ergocalciferol
    c. 24.25 dihydroxy cholecalciferol
    d. 1. 25 dihydroxy cholecalciferol.
4. Which Vitamin active form is coenzyme A

a. pyridoxine.
b. Pantothenic acid
c. Thiamin
d. Nicotinic acid.

5. Deficiency of which vitamin causes methy malonic aciduria
   a. Vitamin B12
   b. Folic acid
   c. Thiamin
   d. Nicotinic acid
6. Amount of tryptophan needed to produce 1 mg of niacin.
   a. 20 mg.
   b. 40mg
   c. 50mg
   d. 60mg
7. Metal in Vitamin B12 is
   a. Copper
   b. Cobalt
   c. Chromium
   d. Zinc
8. property of Vitamin E by virtue of which it prevent rancidity
   a. Antioxidant
   b. Oxidant.
   c. Sulphuration.
   d. Hydrogenation
9. All of the following compounds prevent iron absorption EXCEPT.
   a. phosphates
   b. oxalates
   c. Ascrobic acid
   d. Phytates.
10. Biotin is essential for which reactions
    a. Decarboxylation.
    b. Carboxylation
    c. Homocysteine.
    d. Choline
11. Vitamin K is essential for
    a. Preventing bile stasis
    b. Electron transport.
    c. Preventing thrombosis
    d. Biosynthesis of prothrombin & proconvertin
    e. Maintaining retinal integrity.
12. Vitamin which acts as reducing agent is
    a. Vitamin C
    b. Vitamin B12
    c. Vitamin K
    d. Both Vitamin C and K
13. Vitamin which acts as coenzyme for NADH dehydrogenase
    a. Niacin
    b. Riboflavin
    c. Biotin
    d. Pyridoxine.
14. Which the following is a trace element.
    a. Mg
    b. Fe
    c. Phosphorus
    d. Potassium
15. Whole wheat flour is a good source of.
    a. Vitamin D
    b. Vitamin C
    c. Retinal
    d. Thiamine
16. Patients with severe renal disease is unable to use normal dietary source of
    a. Vitamin A
    b. Vitamin B
    c. Vitamin C
    d. Vitamin D
17. Deficiency of which vitamin causes Wernicke's encephalopathy
    a. Thymine
    b. Cyanocobalamine.
    c. Pantothenic acid
    d. Thiamin
18. Only maize eating people are likely to develop niacin deficiency due to
    a. A low niacin
    b. Low tryptophan
    c. High leucine
    d. High isoleucine.
19. All are correct about ascorbic acid EXCEPT
    a. Dehydro ascorbate is a nontoxic metabolite of vitamin C.
    b. It is cofactor required for the hydroxylation of proline and lysine
    c. It is an antioxidant
    d. Diet high in ascorbic acid reduced the risk of certain types of cancer
20. All of the following about vitamin D are FALSE EXCEPT
    a. Chronic renal failure require administration of 1,25 dihydroxycholecalciferol
    b. 25 hydroxycholecalciferol is the active form of vitamin
    c. Vitamin D opposes the effect of parathyroid hormone
    d. A deficiency of vitamin D results in an increased secretion of calcitonin
21. Pellagra is due to deficiency of vitamin
    a. Pyridoxine
    b. Nicotinic acid
    c. Pantothenic acid
    d. Biotin.
22. The xanthurenic index which is used to measured pyridoxine deficiency is involved in metabolism of
    a. Tryptophan
    b. Pyridoxine
    c. Histidine
    d. Niacin
23. Which form of Vitamin A acts as steroid hormone
    a. All trans retinal
    b. 11 Cis retinal
    c. Retinoic acid
    d. Both retinol and retinoic acid
    e. Retinol

24. Urinary excretion of which compound can be indicator of vitamin B12
    a. Methyl cobalamin
    b. Adenosyl cobalamin
    c. Malic acid
    d. Methyl malonic acid
25. In To prevent rickets in a case of chronic renal disorders which of the following substance should be administered ?
    a. cholecalciferol
    b. ergocalciferol
    c. 25.O.H Calciferol
    d. 125. di OH cholecaciferol
    e. high dietary Ca
26. Haemochromatosis is cahracterised by the liver infiltrated with
    a. Cu
    b. Iron
    c. Selenium
    d. Chromium
    e. Lipids
27. Metal Zn is constituent of which of the following enzyme.
    a. Succinate dehyrogenase
    b. Carbonic anhydrase
    c. Mitochoncrial superoxide dismutase
    d. Aldolase
    e. Amylase
28. Vitamin involved in formation of tyrosine
    a. Pyridoxal Phosphate
    b. Biotin
    c. Thiamine pyrophosphate
    d. Ascorbic acid
    e. Methylcobalamin
29. Binding of proteins to DNA is regulated by :
    a. Copper
    b. Zinc
    c. Selenium
    d. Magnesium
30. In the colorimetric estimation for Hb the reagent used is :
    a. Ringers solution
    b. Isotonic saline
    c. Nayem's reagent
    d. Drabkins reagent
31. Porphyrin in Heme is :
    a. Protoporphyrin I
    b. Protoporphyrin III
    c. Uroporphyrin
    d. Coperoporphyrin
32. There are more than 300 variants of human hemoglobin gene. Among these only a few are fatal. Hence, the most important factor to be conserved in a protein for its function is the:
    a. Amino acid sequence
    b. Ligand binding residues
    c. Structure
    d. Environment
33. Which one of the following statements about Hemoglobin S (HbS) is not true?
    a. Hemoglobin HbS differs from hemoglobin HbA by the substitution of Val for Glu in position 6 of the beta chain.
    b. One altered peptide of Hb S migrates faster towards the cathode (-) than the corresponding peptide of HbA.
    c. Hemoglobin HbS differs from hemoglobin HbA by the substitution of Glu for Val in position 6 of the beta chain
    d. Lowering the concentration of deoxygenated HbS can prevent sickling.
34. Tocopherol acts as antioxidant synergistically with which mineral:
    a. Iron
    b. Selenium
    c. Copper
    d. Molybdenum
35. Biotin is useful in :
    a. MSUD
    b. Multiple carboxylase deficiency
    c. Multiple sulfatase deficiency
    d. α - galactosidase deficiency
36. Biological role of metallothioneins is to sequester harmful metal ions. These bind :
    a. Cd^{++}, Cu^{++} & Zn^{++}
    b. Al^{+++}, Hg^{+++} & NH_4^+
    c. Pt^{++}, As^{+++} & $PO4^{-}$
    d. Fe^{+++}, Na^+ & K^+
37. A small Ca^{2+} binding protein that modifies the activity of many enzymes and other proteins in response to changes of Ca^{2+} concentration, is know as:
    a. Cycline.
    b. Calmodulin.
    c. Collagen.
    d. Kinesin.
38. Enzyme inhibited by lead is :
    a. ALA synthetase
    b. ALA dehydratase
    c. Protoporphyrin oxidase
    d. Coproporphyrinogen oxidase
39. All of the following enzymes are regulated by calcium or calmodulin, EXCEPT:
    a. Adenylate cyclase
    b. Glycogen synthase
    c. Guanyl cyclase
    d. Hexokinase
40. Zinc containing enzyme in the body is :
    a. Carbonic anhydrase
    b. Mitochondrial superoxide dismutase
    c. Pyruvate Kinase
    d. Glutathione peroxidase
41. Hephaestin, a membrane transporter of Iron is a :
    a. Ferroxidase
    b. Ferroreductase
    c. Ferrochelatase
    d. DMT (Dionic metal transporter)
42. Mineral with antioxidant property is :
    a. Iron
    b. Molybdenum
    c. Cobalt
    d. Selenium

43. Which of the following elements is known to influence the body's ability to handle oxidative stress?
    a. Calcium
    b. Iron
    c. Potassium
    d. Selenium
44. Most abundant lipid – soluble antioxidant is:
    a. Vitamin E
    b. Vitamin K
    c. Vitamin A
    d. Vitamin C
45. All of the following contain porphyrin, EXCEPT:
    a. Hemoglobin
    b. Myoglobin
    c. Cytochrome
    d. Transferrin
46. A porphyrin with asymmetric distribution of varous side chains is classified as :
    a. Type I
    b. Type II
    c. Type III
    d. Type IV
47. All of the following are present in hemoglobin EXCEPT:
    a. Pyrrole rings
    b. Vinyl sidechains
    c. Histidine
    d. Ferric ion
48. The polypeptide chains in normal adult hemoglobin HbA are :
    a. $\alpha_2\beta_2$
    b. $\alpha_2\delta_2$
    c. $\alpha_2\gamma_2$
    d. $\alpha_2\varepsilon_2$
49. Hemoglobin exhibits co-operative binding kinetics for oxygen. Hence the oxygen dissociation curve is :
    a. Straight line
    b. Parabola
    c. Hyperbola
    d. Sigmoidal
50. 2, 3 – BPG binds to the hemoglobin molecule by forming bonds with all EXCEPT:
    a. Valine
    b. Lysine
    c. Histidine
    d. Arginine
51. The rate limiting reaction for synthesis of heme occurs in:
    a. Mitochondria
    b. Cytosol
    c. E.R
    d. Lysosomes
52. All the porphyrias are autosomal dominant, EXCEPT :
    a. Acute intermittent porphyria
    b. Congenital erythropoetic porphyria
    c. Porphyria cutanea tarda
    d. Protoporphyria
53. Amount of bilirubin formed from 1 gm of Hemoglobin is:
    a. 15 mg
    b. 25 mg
    c. 35 mg
    d. 45 mg
54. All of the following cause rise in unconjugated bilirubin EXCEPT :
    a. Gilbert's syndrome
    b. Crigler Najjar syndrome type I
    c. Crigler Najjar syndrome type II
    d. Dubin Johnson syndrome
54. Handerson Hasselbach's equation states that:
    (1) $pH = pk + \log \frac{\Delta G^{\circ\prime}}{= -}$
    (2) $pH = pk - \log \frac{DN}{}$
    (3) $pH = pk + \log \frac{tRN}{\Delta}$
    (4) $pk = pH + \log \frac{rRN}{A}$
56. The average normal ratio of concentrations of bicarbonate and dissolved carbondioxide in plasma is:
    a. 1 : 20
    b. 20 : 1
    c. 4 :1
    d. 1 : 4
57. The amino acid that acts as the most important buffer is:
    a. Tryptophan
    b. Arginine
    c. Histidine
    d. Tyrosine
58. In correcting acidosis, the kidneys can excrete urine with a pH as low as:
    a. 6.5
    b. 5.5
    c. 4.5
    d. 3.5
59. Kidneys regulate acid base balance by synthesis of which of these compounds:
    a. Urea
    b. Uric acid
    c. Creatinine
    d. Ammonia
60. The normal value of anion gap is:
    a. 4 m mol / L
    b. 6 m mol/ L
    c. 12 m mol/L
    d. 25 m mol/ L
61. The compensatory mechanism in a patient of diabetic ketoacidosis would be:
    a. Decreased expiration of PCO_2
    b. Decreased formation of NH_3
    c. Increased pH of urine
    d. Increased reabsorption of filtered HCO_3^-
62. Most of the total body water is present:
    a. In the vascular compartment
    b. In the extracellular compartment

c. In the intracellular compartment
d. In the red cells

63. The most abundant intracellular cation is:
    a. Na^+
    b. Ca^+
    c. K +
    d. Mg++
64. The total osmolality of each of the three body compartments viz interstitium, plasma, intracellular compartment is:
    a. 100 mOsm/L
    b. 200 mOsm/L
    c. 300 mOsm/L
    d. 400 mOsm/L
65. Most of the sodium of the glomerular filtrate is absorbed in the:
    a. Proximal convoluted tubules
    b. Loop of Henle
    c. Distal convoluted tubules
    d. Collecting ducts
66. Which of the following is action of aldosterone on distal convoluted tubules:
    a. Sodium reabsorption and potassium secretion
    b. Potassium reabsorption and sodium secretion
    c. Reabsorption of both sodium & potassium
    d. Secretion of both sodium and potassium
67. For every 100 mg% rise in glucose above 100 mg%, the sodium level drops by:
    a. 0.6 mmol/L
    b. 1.6 mmol/L
    c. 2.6 mmol/L
    d. mmol/L
68. Hyperkalemia can result in:
    a. Acidosis
    b. Alkalosis
    c. No change in pH
    d. No such change can be predicted
69. Direct bilirubin refers to:
    a. Conjugated bilirubin
    b. Unconjugated bilirubin
    c. Insoluble portion of bilirubin
    d. Bilirubin bound to albumin
70. Following exogenous dyes are used for assessment of liver function, EXCEPT:
    a. BSP (Bromosulfopthalein)
    b. ICG (Indocyanine Green)
    c. PAH (Para Amino Hippuric acid)
    d. Rose Bengal
71. Standard clearance of substance is obtained by multiplying its absolute clearance by [A =body surface area (sq.met) of the patient]:
    a. 1.73
    b. 1.73/A
    c. A/1.73
    d. 1073x A
72. The reference molecule for measurement of GFR is:
    a. Urea
    b. Inulin
    c. Creatinine
    d. Uric acid
73. The serum levels of all of the following increase in CRF, EXCEPT:
    a. Ca^{++}
    b. PO_4^{3-}
    c. Urea
    d. Uric acid
74. Hemoglobinuria is prevented by:
    a. Haptoglobin
    b. Transferrin
    c. Hemopexin
    d. Ferritin

Vitamins, minerals, AB balance & heme Answer Key Chapter 7, 8, 9, 10

1. c
2. b
3. d
4. b
5. a
6. a
7. b
8. a
9. c
10. b
11. d
12. a
13. a
14. b
15. d
16. d
17. d
18. b
19. d
20. a
21. b
22. a
23. d
24. d
25. d
26. b
27. b
28. d
29. b
30. d
31. b
32. b
33. c
34. b
35. b
36. a
37. b
38. b
39. d
40. a
41. a
42. d
43. d
44. a
45. d
46. c

47. d
48. a
49. d
50. d
51. a
52. b
53. c
54. d
55. a
56. b
57. c
58. c
59. d
60. c
61. d
62. c
63. c
64. c
65. a
66. a
67. b
68. a
69. a
70. c
71. b
72. b
73. a
74. a

Bioenergetics MCQ Chapter-11

1. Which of the following is **NOT** a component of the electron transport chain of oxidative phosphorylation?
   a. Flavin mononucleotide (FMN)
   b. Cytochrome *b*
   c. Cytochrome c_1
   d. Iron-sulphur protein
   e. Cytochrome P-450
2. Catabolism and biosynthesis are coupled through:
   a. The TCA cycle
   b. ATP utilizing reactions
   c. Anaerobic respiration
   d. Glycolysis
   e. None of the above
3. Which of the following reactions has highest $\Delta G^{O/}$?
   a. ATP $\rightarrow$ ADP + Pi
   b. ATP $\rightarrow$ AMP + PPi
   c. ADP $\rightarrow$ AMP + Pi
   d. PPi $\rightarrow$ Pi + Pi
   e. Creatine phosphate $\rightarrow$ creatine + Pi
4. Under standard conditions (that is, where all reactants and products are present at 1 mol/L concentrations
   a. The free energy changes, ΔG is equal to 0
   b. The standard free energy change, ΔG^0 is equal to 0.
   c. The free energy change, ΔG is equal to the standard free energy change, $\Delta G^{0.}$
   d. The free energy change, ΔG is equal to the standard free energy change, $\Delta G^{0/}$
5. Which of the following statement is a characteristic of anabolic reactions?
   a. They serve to generate energy
   b. They often produce NADH or $FADH_2$
   c. They are divergent processes in which a few precursors from a wide variety of polymeric products
   d. They often involve hydrolysis of macromolecules
   e. Glycolysis is an example of a catabolic pathway.
6. Oligomycin inhibits:
   a. ATP Synthase complex
   b. Abolishes proton gradient
   c. Adenine nucleotide ttransporter
   d. Inhibits complex II
7. Which of the following statements about cyt aa3 are false:
   a. It is the only cytochrome which contains copper instead of iron
   b. It is the only cytochrome which can bind to molecular oxygen
   c. It carries out only irreversible reaction in respiratory chain
   d. It is inhibited by cyanide
8. All are substrate level phosphorylation reaction **EXCEPT**
   a. Glyceraldehyde 3 phosphate dehydrogenase
   b. Phosphoglycerate kinase
   c. Pyruvate kinase
   d. Succinate thiokinase
9. Thermogenin:
   a. Inhibits electron transport and ATP syntheses
   b. Allows electron transport to proceed without ATP synthesis
   c. Inhibits electrons transport without impairment of ATP synthesis
   d. Specifically inhibits cytochrome b
   e. Acts as a competitive inhibitors of NAD+ requiring reactions in the mitochondria
10. Inhibitors of complex IV of the Electron Transport Chain include all **EXCEPT**
    a. Carbon Monoxide
    b. Cyanide
    c. Hydrogen sulphide
    d. Atractyloside
11. Regarding oxidative phosphorylation all are true **EXCEPT**:
    a. Oxidation generates a chemiosmotic gradient across inner mitochondrial membrane
    b. Protons enter the mitochondrial matrix through F1 of ATP synthase complex
    c. 4 protons are equivalent to one ATP
    d. Inhibited by oligomycin
12. Cytochromes are found in all **EXCEPT**:
    a. Mitochondria
    b. Endoplasmic reticulum
    c. Cytosol
    d. Phagosome
13. Cytochromes are inhibited by all **EXCEPT**:
    a. Barbiturates
    b. Carbon monoxide
    c. Cyanide
    d. BAL
14. A reaction can proceed spontaneously if ΔG is:
    a. Positive
    b. Negative
    c. Zero
    d. None of the above
15. The free energy generated upon hydrolysis of phosphate bond in creatine phosphate is :
    a. More than 30.6 Kcal/mol
    b. More than 7.3 Kcal/mol
    c. Less than 30.6 KJ/mol
    d. Less than 7.3 Kcal/mol
16. Which of the following is an oxidase type of enzyme:
    a. Cytochrome b
    b. Cytochrome c_1
    c. Cytochrome C
    d. Cytochrome aa_3
17. All of the following are enzymatic antioxidants EXCEPT:
    a. Catalase
    b. Peroxidase

c. Xanthine oxidase
d. Superoxide dismutase

18. Microsomal & Mitochondrial cytochrome P_{450} can be classified as :
    a. Dioxygenoses
    b. Dehydrogenases
    c. Hydroperoxidases
    d. Monooxygenases
19. Which of the following redox couples has the highest redox potentials :
    a. $NAD^+/NADH$
    b. Cytochrome C_1 Fe^{3+}/Fe^{2+}
    c. Ubiquinone /Ubiquinol
    d. O_2/H_2O
20. The action of 2,4 dinitrophenol on the respiratory chain is :
    a. Inhibition of flow of electrons through the chain
    b. Inhibition of oxidative phosphorylation
    c. Dissociation of oxidation from phosphorylation
    d. Inhibition of ATP synthase
21. The mitochondrial respiratory complex which does not act as a proton pump is:
    a. Complex I
    b. Complex II
    c. Complex III
    d. Complex IV

Bioenergetics Answer Key Chapter-11

1. e
2. a
3. e
4. c
5. c
6. a
7. a
8. a
9. a
10. d
11. d
12. c
13. a
14. b
15. b
16. d
17. c
18. d
19. d
20. c
21. b

Nucleic Acid: Chemistry & metabolism MCQ's Ch. 12

1. Nucleotides have all the following functions **EXCEPT**:
    a. Energy transduction
    b. Coenzyme
    c. Signal transduction
    d. Antioxidant
2. ADA deficiency leads to deficiency of all **EXCEPT**:
    a. dATP
    b. dGTP
    c. dCTP
    d. dTTP
3. Which nucleotides associated with Neuraminic Acid?
    a. Adenosine monophophate
    b. Guanosine diphosphate
    c. Thymidine monophosphate
    d. Cytosine monophosphate
    e. Uridine diphosphate
4. Which of following statements is **FALSE** regarding nucleoside

a. There is β N glycosidic bond between pentose sugar and nitrogenous base
b. N 1 of pyrimidines and N 9 of purines form the bond with C1 of pentose
c. Atoms of bases are designated by prime
d. C3 or C5 can be phosphorylated

5. "Tophus" is chemically
   a. Disodium Urate
   b. Uric acid
   c. Monosodium Urate
   d. Calcium pyrophosphate
6. A young child who presents with megaloblastic anemia is found to have increased orotate in the urine due to a deficiency phosphoribosyl transferase. This enzyme deficiency decreased the synthesis of which substance?
   a. Glycogen
   b. Purine
   c. Pyrimidine
   d. Sphingomyelin
   e. Tyrosine
7. The molar percentage of G in human DNA is 30%.The molar percentage of A is:
   a. 10%
   b. 20%
   c. 30%
   d. 40%
   e. 50%
8. At the physiological pH the nucleic acids are negatively charged due to:
   a. Phosphodiester back bone
   b. Nitrogenous bases
   c. OH groups of Pentose sugars
   d. Histones
9. A patient complains of severe pain in Right great toe and knees. He has a history of receiving chemotherapy. He has high serum and urinary uric acid level while serum urea creatinine levels are normal. His synovial fluid is likely to have all the features **EXCEPT:**
   a. Negatively birefringent crystals
   b. Needle shaped crystals
   c. Crystals are chemically Uric Acid
   d. Urinary stones are likely to be of uric acid
10. A 3 year old male child is brought to pediatrician with c/o bedwetting and mental retardation. His urine consists of sand like crystals. On examination the child has poor built, anemia, self mutilation, delayed milestones and mental retardation. His baseline investigations reveal increased serum and urinary uric acid. Which of the following statements regarding this disease are **INCORRECT:**
    a. It is X linked recessive condition
    b. Purine salvage pathway is affected
    c. Urinary crystals are mono sodium urate
    d. Deficiency of HGPRTase
11. A gene is:
    a. Intron
    b. Exon
    c. Cistron
    d. Transposon
12. Chargaff's rule states
    a. Adenine is equal to guanine & cytosine is equal to thymine
    b. Adenine is equal to cytosine & guanine is equal to thymine
    c. Adenine is equal to Thymine & cytosine is equal to guanine
    d. Purines are equal to pyrimidines
13. Which is **NOT TRUE** regarding histones:
    a. Rich in basic amino acids Histidine
    b. function in the packaging of DNA in chromosomes
    c. H 1 is associated with linker DNA
    d. (H2A/ H2B)2 & (H3)2/ (H4)2 form core histone octamer
14. How much of human genome is coding?
    a. 1.5 %
    b. 5 %
    c. 30 %
    d. 70 %
15. Which of the following histones is **NOT** a core Histone?
    a. H1
    b. H2A
    c. H2B
    d. H3
    e. H4
16. Which histone is associated with the linker DNA?
    a. H1
    b. H2
    c. H3
    d. H4
17. How much of human genome is intron?
    a. 1.5 %
    b. 28.5 %
    c. 70%
    d. More than 90 %
18. Which is **NOT TRUE** regarding mitochondrial DNA?
    a. It is double stranded and helically coiled
    b. There are about 100 copies per mitochondrion during embryogenesis
    c. All of it is maternally acquired
    d. It codes for all mitochondrial proteins
19. How many genes are present in human genome?
    a. 30000
    b. 25000
    c. 23000
    d. 20000
20. Core histones are subject all covalent modifications **EXCEPT:**
    a. Acetylation
    b. Methylation
    c. Prenylation
    d. ADP – Ribosylation
    e. Ubiquitinization

Nucleic Acid: Chemistry & metabolism Ans. Key
Ch. 12

1. d
2. a
3. d
4. c
5. c
6. c
7. b
8. a
9. c
10. c
11. c
12. c
13. a
14. a
15. a
16. a
17. d
18. d
19. c
20. c

Genetics, Biotechnology, Separation techniques
Chapter 13, 14, 15

1. All enzymes are required for replication **EXCEPT**:
   a. Primase
   b. DNA gyrase
   c. DNA polymerase II
   d. DNA ligase
   e. Helicase
2. DNA polymerase require all **EXCEPT**:
   a. d NTPs
   b. Free OH group
   c. Ligase
   d. Template
3. During which phase of the cell cycle DNA replication takes place
   a. G1 phase
   b. S phase
   c. G2 phase
   d. M phase
4. DNA replication has all the following features **EXCEPT:**
   a. It is semiconservative
   b. It is bidirectional
   c. It is semidiscontinuous
   d. It occurs in 5' to 3' direction in one strand then 3' to 5' direction in other strand
5. DNA polymerase III has following features **EXCEPT**
   a. Requires RNA primers for initiation
   b. Use deoxyribonucleotides as precursors
   c. Has 5' to 3' polymerase activity
   d. Has 5' to 3' exonuclease activity
6. Which of the following enzymes uses ribonucleotides?
   a. Primase
   b. DNA ligase
   c. DNA gyrase
   d. Reverse transcriptase
7. During which phase of the cell cycle DNA is most tightly coiled?
   a. G1 phase
   b. S phase
   c. G2 phase
   d. M
8. True statement (s) about telomerase is
   a. Maintains telomeres
   b. Has reverse transcriptase activity
   c. Prevents DNA shortening in all cells
   d. Mechanism for cancerous growth
9. Which of the following enzymes can polymerize deoxyribonucleotides into DNA?
   a. Primase
   b. DNA ligase
   c. DNA gyrase
   d. Reverse transcriptase
10. Which of the following is **NOT TRUE** about DNA ligase?
    a. It utilizes dNTPs
    b. It seals the nicks at the end of DNA replication
    c. It is a useful tool in genetic engineering
    d. It forms the bond between 3' OH and 5' phosphate
11. Telomerase has all the following features **EXCEPT:**
    a. Requires RNA as template
    b. Extends 5' ends of DNA
    c. Use deoxyribonucleotides as precursors
    d. Has 5' to 3' polymerase activity
12. RNA Polymerase differs from DNA Polymerase in following aspects **EXCEPT**:
    a. It does not require 3' OH group to initiate RNA synthesis
    b. It does not have 3' – 5'exonuclease activity
    c. It does not require Helicase
    d. It does not require topoisomerase
13. Which of the following RNA is the product of a palindrome?
    a. CGTATACG.
    b. GCAUAUGC
    c. CGUACGUA
    d. AGUACGAU
    e. UCAUCAUCA
14. The sequence of a bacterial gene is
    5' – TATAAT----------ATCCGT – 3'
    3' – ATATTA----------TAGGCA – 5'
    The sequence of Primary messenger RNA transcript would be:
    a. 5' – AUCCGU – 3'
    b. 5' – UAGGCA – 3'
    c. 5' – UGCCUA – 3'
    d. 5' – ACGGAU – 3'
15. RNA polymerase is similar to DNA polymerase in:
    a. Requires RNA primers for initiation
    b. Has 5' to 3' polymerase activity
    c. Has proof reading activity
    d. Utilizes deoxyribonucleotides
16. Which RNA has abnormal bases
    a. tRNA
    b. mRNA
    c. rRNA
    d. sn RNA
17. Which of the following is **NOT** a post transcriptional modification of RNA?
    a. Splicing
    b. 5' Capping
    c. 3' polyadenylation
    d. Glycosylation
18. Which of the enzyme polymerizes ribonucleotides?
    a. Reverse transcriptase
    b. Telomerase
    c. Primase
    d. Restriction endonuclease
19. All are produced by RNA polymerase III EXCEPT:
    a. sn RNA
    b. t RNA
    c. r RNA
    d. m RNA
20. RNA synthesis is done by:

a. Sigma factor
b. Core enzyme
c. Holoenzyme
d. None of these

21. The enzyme responsible for initiating eukaryotic transcription is:
    a. HAT
    b. HDAC
    c. Pol δ
    d. σ factor
22. Not an example of DNA repair mechanism?
    a. Mismatch
    b. Cross linkage
    c. Base-Excision
    d. Nucletide – excision
23. Southern blot technique is to
    a. Detect specific sequences in a DNA fragment
    b. Detect RNA
    c. Detect Proteins
    d. DNA sequencing
24. Restriction enzymes are best described by which one of the following statements
    a. they ligate termini of recombinatnt DNA molecules
    b. They confer selective advantage on invading bacteriophages
    c. Enzymes that recognise and methylate specific DNA sequences.
    d. Make sequence specific cuts in both strands of duplex DNA
    e. They cleave 5' terminal nucleotides from duplex DNA
25. Degeneracy of genetic code reflects
    a. A given base triplet can code for more than one amino and
    b. there is no punctuation in the code sequences
    c. The third base in a codon is not important in coding
    d. An amino acid coded by more than one codon
26. Factor responsible for initiation of transcription in prokaryotes is
    a. alpha (α)
    b. Beta (β)
    c. Transcription factor II D
    d. Sigma (σ)
27. Toxins inhibits eukaryotic protein synthesis through the depurination of a single adenine residue in 28S ribosomal RNA
    a. Diphtheria toxin
    b. Ricin
    c. α-sacrin
    d. colicin E3
    e. Cyclohexamide
28. End product of adenine and guanine breakdown in humans is
    a. Xanthine
    b. Uric acid
    c. Urea
    d. β-Alanine
29. The first pyrimidine ring by denovo pyrimidine biosynthesis is
    a. Orotate
    b. Uracil
    c. Cytosine
    d. Thymine
30. DNA double helix is bound by
    a. Covalent bond
    b. Hydrogen bond
    c. Disulfide linkage
    d. Vander wal forces
31. In RFLP DNA strands separation is done using
    a. Gel-electrphosesis
    b. Ultra centrifugation
    c. High pergormame liquid chromatography
    d. Ion exchange chromatography
32. Protein translation occurs at
    a. mitochondria
    b. centrosome
    c. nucleus
    d. ribosome
33. RNA having maximum abnormal purine bases
    a. tRNA
    b. mRNA
    c. yRNA
    d. 165 RNA
34. Segment of mRNA removed during protein synthesis
    a. intron
    b. Codon
    c. Exon
    d. Citron
35. Attachment site of DNA dependent RNA polymerase is on
    a. Operator
    b. Promoter
    c. Structural gene
    d. Regulatory gene
    e. Repressor
36. Restriction endonuclease releases
    a. Double stranded DNA
    b. Single stranded DNA
    c. Single stranded RNA
    d. Polypeptide
37. Mutation converting an amino acid codon to a stop codon is a
    a. Nonsense mutation
    b. Transversion
    c. Silent mutation
    d. Frame shift mutation
38. Which of following is most likely to lead to a frame shift mutation
    a. Ultraviolet light
    b. Intercalation
    c. Spontaneous degeneration
    d. Alkylation
39. Nitrogen base generally absent present in RNA?
    a. Adenine
    b. Thymine
    c. Uracil
    d. Guanine

40. Which of the following nitrogen base combination is not possible?
    a. G-C
    b. A-T
    c. A-U
    d. A-G
41. Chain terminator codons are all except:
    a. UGG
    b. UGA
    c. UAG
    d. UAA
42. Which of the following enzymes is NOT a protein
    a. Primase
    b. Ribonucleotide reductase
    c. Peptidyl Transferase
    d. RNA polymerase
43. Genetic code has following properties EXCEPT:
    a. Overlapping
    b. Degenerate
    c. Universal
    d. Unambiguous
44. Ochre codon is:
    a. Initiator codon
    b. Terminator codon
    c. Alters protein structure
    d. None
45. Cause of silent mutation is
    a. Degeneracy of genetic code
    b. Wobble hypothesis
    c. RNA editing
    d. DNA repair
46. In spite of mutation the protein is functioning normally. Following can be possible causes EXCEPT:
    a. Mutation may be silent
    b. Mutation may be missense but synonymous
    c. Mutation has not affected the protein conformation
    d. Mutation may be silent but Non Synonymous
47. Opal codon is:
    a. UGA
    b. UAG
    c. UAA
    d. AGA
    e. AGG
48. Following mutations do not result in clinical disease EXCEPT:
    a. Mutation in junk DNA
    b. Mutation in intron
    c. Functional mutation
    d. Silent mutation
49. Initiation codon in prokaryotes can be:
    a. AUG (Methionine)
    b. AUA (methionine)
    c. AUA (Isoleucine)
    d. Both a or b
50. In eukaryotes methionyl tRNA and initiation factors form ternary complex with
    a. 50 S ribosome
    b. 60 S ribosome
    c. 30 S ribosome
    d. 40 S ribosome
51. The sequence which helps initiation complex to locate eukaryotic translation initiation codon is:
    a. Whichever AUG comes first
    b. Shine dalgarno sequence
    c. Kozac sequence
    d. Promoter sequence
52. Which of the following is Sanger's reagent
    a. 1 Fluoro – 2,4 – dinitrobenzene
    b. Phenyl Isothiocynate
    c. Dansyl chloride
    d. Dabsyl chloride
53. Which of the following is Edman's reagent
    a. 1 Fluoro – 2,4 – dinitrobenzene
    b. Phenyl Isothiocynate
    c. Dansyl chloride
    d. Dabsyl chloride
54. CBB is used as a stain for:
    a. DNA and RNA
    b. Proteins
    c. Carbohydrate
    d. Lipids
55. All the following techniques separate proteins purely on the basis of size EXCEPT:
    a. Exclusion chromatography
    b. Gel filtration
    c. SDS PAGE
    d. IEF
56. The technique separating proteins purely on the basis of charge:
    a. Exclusion chromatography
    b. Ion exchange chromatography
    c. Gel filtration
    d. SDS PAGE
    e. IEF
57. The technique to separate proteins purely on the basis of pI:
    a. Exclusion chromatography
    b. Gel filtration
    c. SDS PAGE
    d. IEF
58. In SDS – PAGE the electrophoretic gel consists of
    a. Polyacrylamide
    b. Polyacrylamide pretreated with SDS
    c. Polyacrylamide with Agarose
    d. Agarose pretreated with SDS
59. Molecular sieving is:
    a. A type of cell sorting technique
    b. A type of technique to isolate proteins from cell extract
    c. A type of electrophoresis
    d. A type of chromatography
60. The chromatography column in gel filtration consists of
    a. Cellulose
    b. Acrylamide
    c. Saphedex
    d. Silica
61. Size exclusion chromatography separates the proteins on the basis of:

a. Molecular size
b. Molecular weight
c. Stokes radius
d. Charge density

62. What is the first step in the synthesis of human insulin by genetic engineering?
    a. cDNA identification in somatic cell
    b. Genomic DNA identification in pancreatic cell
    c. cDNA identification in pancreatic cell
    d. Genomic DNA identification in somatic cell
63. RFLP analysis can be used for all EXCEPT:
    a. Diagnosis of point mutations
    b. Genomic mapping
    c. DNA fingerprinting
    d. Genome sequencing
64. FISH is used for all EXCEPT:
    a. Genomic mapping
    b. Genetic fingerprinting
    c. Diagnosis of Down's Syndrome
    d. Diagnosis of CML
65. DNA Fingerprinting is Based On
    a. Presence of variable number of tandem repeats
    b. Presence of variable number of introns
    c. Presence of fixed number of tandem repeats
    d. Presence of variable number of exons
66. Acridine orange is used as a stain for:
    a. DNA and RNA
    b. Proteins
    c. Carbohydrate
    d. Lipids
67. The best vector for gene therapy of ADA deficiency is
    a. Plasmid
    b. Cosmid
    c. Viral DNA
    d. Viral RNA
68. Which of the following is NOT a genetic fingerprinting method
    a. STR analysis
    b. Karyotyping
    c. PCR analysis
    d. RFLP analysis
69. Which of the following is NOT a genetic engineering tool
    a. Reverse transcriptase
    b. DNA Gyrase
    c. Restriction endonuclease
    d. DNA Ligase
    e. Terminal transferase
70. To obtain single stranded cDNA from mRNA the enzyme involved is
    a. DNA polymerase
    b. Reverse transcriptase
    c. Ligase
    d. Polymerase II
71. To obtain double stranded DNA from cDNA the enzyme involved is
    a. DNA polymerase
    b. Reverse transcriptase
    c. Ligase
    d. Polymerase II
72. All the following are true about plasmids EXCEPT
    a. It contains extra-chromosomal DNA
    b. It is separate from the host DNA
    c. It is present only in the gram positive organisms
    d. It is responsible for transfer of bacterial resistance
73. Of the following statements regarding restriction endonuclease which is FALSE?
    a. They always yield overhanging single-stranded ends
    b. They spare methylated DNA sequences
    c. They act on palindromic sequences triplet repeat
    d. They act only on duplex DNA
74. PCR requires all EXCEPT:
    a. Deoxyribonucleotides
    b. Taq Polymerase
    c. RNA primers for 5' ends of DNA to be amplified
    d. Thermocycler
75. All are conditions, to be met for Human Gene Therapy EXCEPT
    a. It may be used in case of a multigene disorder
    b. Both mutant and normal gene must be cloned and sequenced
    c. In the absence of technique for eliminating the existing mutant gene, the functional gene must function well
    d. The risks must be outweighed by the seriousness of the disease
76. A human protein has a sequence of 2000 amino acids. For cloning a cDNA fragment which can produce this protein the best vector to be utilized is
    a. Plasmids
    b. Phage λ
    c. Cosmids
    d. Bacterial artificial Chromosomes
    e. Yeast Artificial Chromosomes
77. Same amino acid is coded d/t following :
    a. Degeneracy
    b. Frame-shift mutation
    c. Transcription
    d. Mutation
78. Fluorescence means
    a. Spontaneous illumination in dark
    b. Release of longer wavelength light on absorbing light of shorter wavelength
    c. Release of shorter wavelength light on absorbing light of longer wavelength
    d. Release of equal wavelength light at constant rate
79. DNA estimation can be done by
    a. Spirometer
    b. Spectrophotometer
    c. pH meter
    d. Sphygmometer

80. If a 4 nucleotide sequence code for an amino acid instead of 3, then theoretically how many unique amino acids could be coded by such a system?
    a) 16
    b) 64
    c) 128
    d) 256
81. Same amino acid is coded by multiple codons d/t following :
    a) Degeneracy
    b) Frame-shift mutation
    c) Transcription
    d) Mutation
82. Poly(A) tail on translation will give rise to:
    a) Polyglycine
    b) Polylysine
    c) Polyalanine
    d) Polyproline
83. CAP in LAC operon is
    a. Positive regulator
    b. Negative regulator
    c. Attenuation
    d. Constitutive expression
84. Starting material for production of insulin from bacteria is:
    a. Genomic DNA from beta pancreatic cells of human
    b. Genomic DNA from lymphocytes of human
    c. mRNA from beta pancreatic cells of human
    d. mRNA from lymphocytes of human
85. For PCR which of the following is not required:
    a. Taq polymerase
    b. d-NTP
    c. dideoxynucleotides
    d. Magnesium
86. Which of the following is not required for protein synthesis in eukaryotes :
    a. RNA Polymerase
    b. Ribosomes
    c. Peptidyl transferase
    d. Amino acyl tRNA synthetase
87. Substance separated in partition chromatography are due to difference in :
    a. Solubility
    b. Charge
    c. Molecular size
    d. Adsorptive property

88. Between absorbance and concentration the relationship is :
    a. Direct and linear
    b. Direct & logarithmic
    c. Inverse and linear
    d. Inverse & logarithmic
89. Apo B48 & Apo B100 is synthesized from the same mRNS; the difference between them is due to:
    a. RNA splicing
    b. Allelic exclusion
    c. Deamination of cytidine to uridine
    d. Upstream repression
90. Among the following all are hydrophilic hormones that act on cytosolic receptors except one which is a lipophilic hormone that acts on nuclear receptor:
    a. Thyroxine
    b. Epinehrine
    c. GH
    d. ACTH
91. Gene duplication plays an important role in the evolution of
    a. m Rna
    b. r Rna
    c. t Rna
    d. hn Rna
92. Movement of protein from nucleus to cytoplasm can be seen by
    a. FISH
    b. FRAP
    c. Confocal microscopy
    d. Electron microscopy
93. Histone acetylation cause?
    a. Increased Heterochromation formation
    b. Increased Euchromatin formation
    c. Methylation of cystine
    d. DNA replication
94. Triplex DNA is due to
    a. Hoogsteen pairing
    b. Palindrome sequences
    c. Large no. of guanosine repeats
    d. Polypyramidine tracts
95. After digestion by restriction endonucleases DNA strands can be joined again by
    a. DNA polymerase
    b. DNA ligase
    c. DNA topoisomerase
    d. DNA gyrase
96. True about Sickle cell disease are all, Except :
    a. Single nucleotide change results in change of Glutamine to Valine
    b. Sticky patch is generated as a result of replacement of a non polar residue
    c. Hbs confers resistance against malaria in heterozygotes
    d. RFLP results from a single base change.
97. A four-year-old child is diagnosed with Duchenne muscular dystrophy, an X-linked recessive disorder. Genetic analysis shows that the patient's gene for the muscle protein dystrophin contains a mutation in its promoter region. What would be the most likely effect of this mutation?
    a. Tailing of dystrophin mRNA will be defective.
    b. Capping of dystrophin mRNA will be defective
    c. Termination of dystrophin transcription will be deficient.
    d. Initiation of dystrophin transcription will be deficient.
98. Methods of introducing gene in target cells are all except:

a. Electroporation
b. Transfection
c. Site directed recombination
d. FISH

99. Intron is not found in which DNA?
    a. Nuclear DNA
    b. Mitochondrial DNA
    c. B DNA
    d. Z DNA
100. Which statement is incorrect:
    a. Chemiluminescene: excited electron in higher orbit comes to lower orbit by emitting energy in form of photon
    b. Bioluminescence is a form of chemiluminescence
    c. Phosphorescence: is energy emitted following absorption of EM radiation.
    d. Electrochemiluminescence: is energy emitted by photon

<u>Genetics, Biotechnology, Separation techniques</u>
Chapter 13, 14, 15 Answer key

1. c
2. c
3. b
4. d
5. d
6. a
7. d
8. b
9. d
10. a
11. b
12. d
13. b
14. a
15. b
16. a
17. d
18. c
19. d
20. b
21. a
22. b
23. a
24. d
25. d
26. d
27. b
28. b
29. a
30. b
31. a
32. d
33. a
34. a

35. b
36. a
37. a
38. b
39. b
40. d
41. a
42. c
43. a
44. b
45. a
46. d
47. b
48. c
49. a
50. d
51. c
52. a
53. b
54. b
55. d
56. b
57. d
58. a
59. d
60. c
61. c
62. c
63. d
64. b
65. a

66. a
67. d
68. b
69. b
70. b
71. a
72. c
73. a
74. c
75. a
76. b
77. a
78. b
79. b
80. d
81. a
82. b
83. a
84. c
85. c
86. c
87. a
88. a
89. c
90.
91. a
92. b
93. b
94. a
95. b
96. b

97. d

98. d

99. b

100. d