JEMAS(PG)-2024 **QB No: 4102100001**

Subject: M.Sc in Medical Biochemistry(M.Sc MB)

Duration: 90 minutes **No of MCQ: 100** **Full Marks: 100**

INSTRUCTIONS

1. All questions are of objective type having four answer options for each.
2. **Category-1**: Carries **1** mark each and only one option is correct. In case of incorrect answer or any combination of more than one answer, ¼ mark will be deducted.
3. Questions must be answered on OMR sheet by darkening the appropriate bubble marked A, B, C, or D.
4. Use only **Black/Blue ink ball point pen** to mark the answer by filling up of the respective bubbles completely.
5. Write Question Booklet number and your roll number carefully in the specified locations of the **OMR** sheet. Also fill appropriate bubbles.
6. Write your name (in block letter), name of the examination center and put your signature (as is appeared in Admit Card) in appropriate boxes in the **OMR sheet**.
7. The OMR sheet is liable to become invalid if there is any mistake in filling the correct bubbles for Question Booklet number/roll number or if there is any discrepancy in the name/ signature of the candidate, name of the examination center. The OMR sheet may also become invalid due to folding or putting stray marks on it or any damage to it. The consequence of such invalidation due to incorrect marking or careless handling by the candidate will be sole responsibility of candidate.
8. Candidates are not allowed to carry any written or printed material, calculator, pen, log-table, wristwatch, any communication device like mobile phones, bluetooth devices etc. inside the examination hall. Any candidate found with such prohibited items will be **reported against** and his/her candidature will be summarily cancelled.
9. Rough work must be done on the Question Booklet itself. Additional blank pages are given in the Question Booklet for rough work.
10. Hand over the OMR sheet to the invigilator before leaving the Examination Hall.
11. Candidates are allowed to take the Question Booklet after examination is over.

Signature of the Candidate: _____

(As in Admit Card)

Signature of the Invigilator: _____

ROUGH WORK ONLY

M.Sc. Medical Biochemistry

1. For a spontaneous process, the entropy of the universe increases:
   (A) Combination of 2nd & 1st Law of Thermodynamics.
   (B) 3rd Law of Thermodynamics.
   (C) 2nd Law of Thermodynamics.
   (D) 1st Law of Thermodynamics.

2. Glucose & galactose are epimers at:
   (A) C-1 carbon.
   (B) C-2 carbon.
   (C) C-3 carbon.
   (D) C-4 carbon.

3. Ergocalciferol is:
   (A) Vitamin D2.
   (B) Vitamin D1.
   (C) Vitamin B2.
   (D) Vitamin B1.

4. Radioactive iodine I-131is given in:
   (A) Breast cancer.
   (B) Thyroid cancer.
   (C) Lung cancer.
   (D) Liver cancer.

5. Taq polymerase is:
   (A) Thermolabile DNA polymerase III.
   (B) Thermolabile DNA polymerase I.
   (C) Thermostable DNA polymerase III.
   (D) Thermostable DNA polymerase I.

6. Carnitine is a:
   (A) Acetic acid derivative.
   (B) Butyric acid derivative.
   (C) Propionic acid derivative.
   (D) Caproic acid derivative.

7. Lecithin is chemically:
   (A) Phosphatidyl ethanolamine.
   (B) Phosphatidyl glycerol.
   (C) Phosphatidyl serine.
   (D) Phosphatidyl choline.

8. Cyanide on cytochrome oxidase is example of:
   (A) Non-competitive inhibition.
   (B) Un-competitive inhibition.
   (C) Competitive inhibition.
   (D) Suicidal inhibition.

9. Sodium fluoride inhibits:
   (A) Enolase.
   (B) Aldolase.
   (C) Phospho triose isomerise.
   (D) Phospho hexose isomerise.

10. In sickle cell disease after mutation glutamic acid is replaced by:
   (A) Alanine.
   (B) Valine.
   (C) Glycine.
   (D) Aspartic acid.

11. Which of the following is stop codon for human?
   (A) UUG.
   (B) UUA.
   (C) UGA.
   (D) UUU.

12. Promoter region in DNA used during:
   (A) Prokaryotic replication.
   (B) Eukaryotic replication.
   (C) Reverse transcription.
   (D) Transcription.

13. Type-II topoisomerase:
   (A) Prevents supercoiling by acting on both the strands simultaneously.
   (B) Prevents supercoiling by acting on single strand.
   (C) Starts proofreading activity when needed.
   (D) Re-joins any cut after completion of replication.

14. Denaturation means:
   (A) Breaking of A=T hydrogen bonds.
   (B) Breaking of G=C hydrogen bonds.
   (C) Breaking of both hydrogen bonds.
   (D) Breaking of phosphor-diester bonds.

15. RNA can be separated by:
   (A) Southern Blotting.
   (B) Western Blotting.
   (C) South-western Blotting.
   (D) Northern Blotting.

16. C3-convertase is:
   (A) C3bBb.
   (B) C4bBb.
   (C) C5bBb.
   (D) C2bBb.

17. Succinate dehydrogenase served as the marker enzyme for:
   (A) Cell membrane.
   (B) Nucleus.
   (C) Golgi complex.
   (D) Mitochondria.

18. Regarding Calcium reabsorption from kidney:
    (A) Calcium is not at all reabsorbed from kidney.
    (B) Maximum calcium is reabsorbed in PCT of kidney.
    (C) Maximum calcium is reabsorbed in DCT of kidney.
    (D) Minimum calcium is reabsorbed in PCT of kidney.

19. Macrophage is derived from:
    (A) Eosinophil.
    (B) Basophil.
    (C) Monocyte.
    (D) Lymphocyte.

20. Which carbohydrate is not present in different blood group antigens?
    (A) Glucose.
    (B) Fructose.
    (C) Galactose.
    (D) Fucose.

21. GLUT-4 transporter is present in:
    (A) Both skeletal muscle and cardiac muscle.
    (B) Both liver and adipose tissue.
    (C) Both skeletal muscle and adipose tissue.
    (D) Both skeletal muscle and liver.

22. Regarding glycogenin which statement is true:
    (A) Glycogenin is a Protein.
    (B) Glycogenin is a Carbohydrate.
    (C) Glycogenin is a lipid.
    (D) Glycogenin is also known as glycogen primer.

23. 2, 3 BPG shunt occurs in:
    (A) Myocytes.
    (B) Neurocytes.
    (C) Erythrocytes.
    (D) Hepatocytes.

24. Apo-B 48 is present in:
    (A) VLDL.
    (B) Chylomicron.
    (C) LDL.
    (D) HDL.

25. Beta-oxidation of fatty acids occurs in:
    (A) Nucleus.
    (B) Golgi complex.
    (C) Mitochondria.
    (D) Cytoplasm.

26. Alkaptonuria is related to:
    (A) Defective tyrosine metabolism.
    (B) Defective proline metabolism.
    (C) Defective serine metabolism.
    (D) Defective glycine metabolism.

27. Glutathione is a
    (A) Dipeptide
    (B) Tripeptide
    (C) Tetrapeptide
    (D) Pentapeptide

28. Serotonin is obtained from:
    (A) Proline.
    (B) Alanine.
    (C) Tryptophan.
    (D) Tyrosine.

29. Urea cycle occurs in:
    (A) Both cytoplasm and Endoplasmic reticulum.
    (B) Both nucleus and mitochondria.
    (C) Both cytoplasm and nucleus.
    (D) Both cytoplasm and mitochondria.

30. Maple syrup urine disease is related to:
    (A) Defective branched chain amino acid metabolism.
    (B) Defective aromatic amino acid metabolism.
    (C) Defective sulfurcontaining amino acid metabolism.
    (D) Defective glycine metabolism.

31. 46.Parathyroid hormone is secreted in blood, in response to:
    (A) Hypercalcemia.
    (B) Hypocalcemia.
    (C) Hypernatremia.
    (D) Hypokalemia.

32. Marker of Bone resorption:
    (E) Lipase.
    (F) Amylase.
    (G) Alkaline Phosphatase.
    (H) Acid phosphatise.

33. Carbamoyl phosphate synthetase-II enzyme is needed for:
    (A) Denovo Purine synthesis.
    (B) Denovo Pyrimidine synthesis.
    (C) Urea production in human body.
    (D) Creatinine biosynthesis.

34. In the genetic code dictionary, how many codons are used to code for all the 20 amino acids?
    (A) 20.
    (B) 64.
    (C) 61.
    (D) 60.

35. In a competitive inhibition:
    (A) Km and Vmax increased.
    (B) Km and Vmax decreased.
    (C) Km remains same.
    (D) Vmax remains same.

36. Which of the following amino acid has single codon?
    (A) Isoleucine.
    (B) Tryptophan.
    (C) Valine.
    (D) Arginine.

37. Galactosyltransferase is a marker enzyme of :
    (A) Cell membrane.
    (B) Mitochondria.
    (C) Lysosomes.
    (D) Golgi complex.

38. Which is a live attenuated vaccine:
    (A) Rabies.
    (B) BCG.
    (C) Hepatitis B.
    (D) Cholera.

39. A segment of DNA has 110 adenine and 110 cytosine bases. The total number of nucleotides present in the segment is:
    (A) 110.
    (B) 220.
    (C) 440.
    (D) 55.

40. Hydroxylation occurs in which of the following amino acids in collagen:
    (A) Glycine.
    (B) Proline.
    (C) Tyrosine.
    (D) Theonine.

41. Mutagenicity of a compound is checked by:
    (A) Hay's test.
    (B) FISH test.
    (C) Guthrie test.
    (D) Ame's test.

42. The chief product of catabolism of purines in human beings is:
    (A) Urea.
    (B) Uric acid.
    (C) Hypoxanthine.
    (D) Ammonia.

43. Deficiency of folic acid leads to:
    (A) Night blindness.
    (B) Rickets.
    (C) Macrocytic anaemia.
    (D) Microcytic anaemia.

44. The equivalent weight of oxalic acid ($C_2H_20_4.2H_20$) is:
    (A) 126.
    (B) 63.
    (C) 55.
    (D) 85.

45. What volume of 0.3 N HNO_3 is required to neutralize 50 mL of a 0.15 N solution of $Ba(OH)_2$?
    (A) 50mL.
    (B) 75mL.
    (C) 25mL.
    (D) 100mL.

46. Percentiles divides a series into:
    (A) Ten equal parts.
    (B) Twenty equal parts.
    (C) Fifty equal parts.
    (D) Hundred equal parts.

47. If the ratio of mean and median of a distribution is 2:3, then the ratio of mode and mean is
    (A) 2:3.
    (B) 2:5.
    (C) 5:2.
    (D) 3:2.

48. Insulin activates:
    (A) Lipolysis.
    (B) Ketogenesis.
    (C) Gluconeogenesis.
    (D) Glycolysis.

49. The major fat in adipose tissue is:
    (A) Triacylglycerol.
    (B) Cholesterol.
    (C) Sphingolipids.
    (D) Phospholipids.

50. The polysaccharide used in assessing the glomerular filtration rate (GFR) is:
    (A) Glycogen
    (B) Agar
    (C) Inulin
    (D) Hyaluronic acid

51. Hyaluronic acid is found in:
    (A) Joints.
    (B) Brain.
    (C) Abdomen.
    (D) Mouth.

52. 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.

53. 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.

54. An amino acid that does not form an α-helix is:
    (A) Valine.
    (B) Proline.
    (C) Tyrosine.
    (D) Tryptophan.

55. 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.

56. Which of the following is a nonapeptide?
    (A) Anserine.
    (B) Oxytocin.
    (C) Glutathione.
    (D) Kallidin.

57. Carbonic anhydrase is an example of ?
    (A) Lipoprotein.
    (B) Phosphoprotein.
    (C) Metalloprotein.
    (D) Chromoprotein.

58. The lipoprotein associated with activation of LCAT is:
    (A) HDL.
    (B) LDL.
    (C) VLDL.
    (D) IDL.

59. A 'suicide enzyme' is:
    (A) Cycloxygenase.
    (B) Lipooxygenase.
    (C) Phospholipase A1.
    (D) Phospholipase A2.

60. Trypsinogen is converted to active trypsin by:
    (A) Enterokinase.
    (B) Bile salts.
    (C) HCl.
    (D) Mg++.

61. Small amount of urinary oxalates is contributed by the amino acid:
    (A) Glycine.
    (B) Tyrosine.
    (C) Alanine.
    (D) Serine.

62. Phenylketonuria 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.

63. Light chains of immunoglobulins are of following types:
    (A) Alpha and kappa.
    (B) Alpha and gamma.
    (C) Lambda and delta.
    (D) Kappa and lambda.

64. On exposure to any antigen, the first antibody to be formed is of the following class:
    (A) IgA
    (B) IgG
    (C) IgM
    (D) IgE

65. Consumption of raw eggs can cause deficiency of:
(A) Calcium.
(B) Lipoic acid.
(C) Biotin.
(D) Vitamin A.

66. Histidine is converted into histamine by:
(A) Carboxylation.
(B) Decarboxylation.
(C) Methylation.
(D) Hydroxylation.

67. Dietary fats after absorption appear in the circulation as:
(A) HDL.
(B) VLDL.
(C) LDL.
(D) Chylomicron.

68. Absence of phenylalanine hydroxylase causes:
(A) Neonatal tyrosinemia.
(B) Phenylketonuria.
(C) Primary hyperoxaluria.
(D) Albinism.

69. Ochronosis is an important finding of:
(A) Tyrosinemia.
(B) Tyrosinosis.
(C) Alkaptonuria.
(D) Richner Hanhart syndrome.

70. 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.

71. Cholesterol is transported from liver to extrahepatic tissues by:
(A) Chylomicrons.
(B) VLDL.
(C) HDL.
(D) LDL.

72. The structure of tRNA appears like a:
(A) Helix.
(B) Hair pin.
(C) Clover leaf.
(D) Coi.

73. Substitution of a thymine base by adenine in DNA is known as.
    (A) Transposition.
    (B) Transition.
    (C) Transversion.
    (D) Frameshift mutation.

74. Which of the following best describes the structure of the cell membrane?
    (A) A single layer of phospholipids
    (B) A double layer of phospholipids with proteins embedded
    (C) A rigid layer of cellulose
    (D) A single layer of proteins

75. Which of the following processes involves the cell membrane engulfing external materials to bring them into the cell?
    (A) Exocytosis
    (B) Osmosis
    (C) Facilitated diffusion
    (D) Endocytosis

76. Which of the following is the general formula for carbohydrates?
    (A) CH_2O.
    (B) $Cn(H_2O)_n$.
    (C) $(CH)_{2n}O_n$.
    (D) CH_4.

77. Which of the following is a type of lipid that is crucial for cell membrane structure?
    (A) Steroids.
    (B) Phospholipids.
    (C) Glycogen.
    (D) Insulin.

78. Which of the following is NOT a function of proteins?
    (A) Energy storage.
    (B) Catalyzing metabolic reactions.
    (C) Structural support.
    (D) Transmitting genetic information.

79. The specific sequence of amino acids in a protein is known as the:
    (A) Primary structure.
    (B) Secondary structure.
    (C) Tertiary structure.
    (D) Quaternary structure.

80. Unsaturated fats differ from saturated fats in that they contain:
    (A) No double bonds between carbon atoms.
    (B) One or more double bonds between carbon atoms.
    (C) Additional phosphate groups.
    (D) More hydrogen per fatty acid.

81. Primarily a quick source of energy?
    (A) Proteins.
    (B) Nucleic acids.
    (C) Carbohydrates.
    (D) Lipids..

82. Which molecule enters the citric acid cycle as a key component?
    (A) Glucose.
    (B) Pyruvate.
    (C) Acetyl-CoA.
    (D) Glycerol.

83. The final electron acceptor in the mitochondrial electron transport chain is:
    (A) Oxygen.
    (B) Carbon dioxide.
    (C) ATP.
    (D) NAD+.

84. The process of synthesizing glucose from non-carbohydrate sources is called:
    (A) Glycogenesis.
    (B) Glycolysis.
    (C) Gluconeogenesis.
    (D) Lipogenesis.

85. Ketone bodies are produced in the:
    (A) Liver.
    (B) Kidneys.
    (C) Heart.
    (D) Brain.

86. The process of forming proteins based on information in mRNA is called:
    (A) Transcription.
    (B) Translation.
    (C) Replication.
    (D) Mutation.

87. Oxidative phosphorylation is inhibited by a lack of:
    (A) Glucose.
    (B) Fatty acids.
    (C) Oxygen.
    (D) Amino acids.

88. Fatty acid synthesis occurs in the:
    (A) Cytoplasm.
    (B) Mitochondria.
    (C) Endoplasmic reticulum.
    (D) Golgi apparatus.

89. Which mechanism is NOT involved in the regulation of gene expression in eukaryotic cells?
    (A) DNA methylation.
    (B) RNA splicing.
    (C) Operon activation.
    (D) Chromatin remodeling.

90. What is the primary function of the CRISPR-Cas9 system in genome editing?
    (A) To replicate DNA sequences.
    (B) To cut DNA at specific sites.
    (C) To enhance gene expression.
    (D) To methylate DNA.

91. Primary function of telomeres in eukaryotic cells?
    (A) Catalyzing protein synthesis.
    (B) Protecting the ends of chromosomes.
    (C) Promoting gene duplication.
    (D) Enhancing RNA interference.

92. The key advantage of next-generation sequencing technologies is:
    (A) Reduced need for sample preparation.
    (B) Ability to sequence single DNA molecules.
    (C) Longer read lengths compared to traditional Sanger sequencing.
    (D) High-throughput sequencing capabilities.

93. An example of an epigenetic change is?
    (A) DNA mutation.
    (B) Histone modification.
    (C) RNA splicing.
    (D) Nucleotide excision repair.

94. Transgenic organisms are those that:
    (A) Have undergone a spontaneous mutation.
    (B) Are cloned from another organism.
    (C) Have had a foreign gene inserted into their DNA.
    (D) Express only recessive traits.

95. The main purpose of PCR is to:
    (A) Break down DNA into its constituent nucleotides.
    (B) Amplify specific DNA sequences.
    (C) Sequence entire genomes.
    (D) Identify protein-DNA interactions.

96. Signal transduction pathways typically involve:
    (A) The direct transfer of DNA between two cells.
    (B) The movement of proteins into the nucleus.
    (C) A series of molecular changes that convert a signal on a target cell's surface to a specific response inside the cell.
    (D) The elimination of foreign DNA from a cell.

97. Gene therapy is a technique designed to:
    (A) Replace or repair defective genes.
    (B) Enhance the expression of all genes.
    (C) Remove all mutations from the genome.
    (D) Increase genetic diversity within populations.

98. Which mineral is essential for bone health and muscle function?
    (A) Iron.
    (B) Zinc.
    (C) Calcium.
    (D) Magnesium.

99. The coenzyme is involved in transferring electrons from complex I and complex II to the electron transport chain is:
    (A) Coenzyme A (CoA)
    (B) NAD+.
    (C) FAD.
    (D) ATP.

100. Name the Vitamin that acts as an antioxidant, helping to protect cells from damage caused by free radicals.
    (A) Vitamin B12.
    (B) Vitamin E.
    (C) Vitamin K.
    (D) Vitamin A.