Question Booklet Series: **A** *Question Booklet Serial No.* 304050

Ph. D. Entrance Test – 2015

Subject: Bio-Chemistry

Paper – I

Important: *Please consult your Admit Card/Roll No. slip before filling your Roll Number on the Test Booklet and Answer Sheet.*

Roll No. ***In Figure*** ***In Words***

O.M.R. Answer Sheet Serial No.

Signature of Candidate: _____ *Signature of Invigilator:* _____

Time: 60 Minutes **Number of Questions: 50** **Maximum Marks: 50**

DO NOT OPEN THE SEAL ON THE BOOKLET UNTIL ASKED TO DO SO.

INSTRUCTIONS:

1. Write your Roll No. on the Questions Booklet and also on the OMR Answer Sheet in the space provided and nowhere else.
2. Enter the Question Booklet Serial No. on the OMR Answer Sheet. Darken the corresponding bubbles with **Black Ball Point/Black Gel Pen.**
3. Do not make any identification mark on the Answer Sheet or Question Booklet.
4. Please check that this Question Booklet contains 50 Questions. In case of any discrepancy, inform the Assistant Superintendent within 10 minutes of the start of Test.
5. Each question has four alternative answer (A,B,C,D) of which only one is correct. For each question, darken only one bubble (A or B or C or D), whichever you think is the correct answer, on the Answer Sheet with **Black Ball Point/Black Gel Pen. There shall be no negative marking for wrong answers.**
6. If you do not want to answer a question, leave all the bubbles corresponding to that question blank in the Answer Booklet. No marks will be deducted in such cases.
7. Darken the bubbles in the OMR Answer Sheet according to the Serial No. of the question given in the Question Booklet.
8. If you want to change an already marked answer, erase the shade in the darkened bubble completely.
9. For rough work only the blank sheet at the end of the Question Booklet be used.
10. The Answer Sheet is designed for computer evaluation. Therefore, if you do not follow the instructions given on the Answer Sheet, it may make evaluation by the computer difficult. **Any resultant loss to the candidate on the above account, i.e. not following the instructions completely, shall be of the candidate only.**
11. After the test, hand over the Question Booklet and the Answer Sheet to the Assistant Superintendent on duty.
12. In no case the Answer Sheet, the Question Booklet, or its part or any material copied/noted from this Booklet is to be taken out of the examination hall. Any candidate found doing so would be expelled from the examination.
13. A candidate who creates disturbance of any kind or changes his/her seat or is found in possession of any paper possibly of any assistant or found giving or receiving assistant or found using any other unfair means during the examination will be expelled from the examination by the Centre Superintendent/Observer whose decision shall be final.
14. **Communication equipment such as mobile phones, pager, wireless set, scanner, camera or any electronic/digital gadget etc., is not permitted inside the examination hall. Use of calculators is not allowed.**
15. The candidates will not be allowed to leave the Examination Hall/Room before the expiry of the allotted time.

1. Which of the following reagents would be useful in determining the N-terminal amino acid of a polypeptide?
(A). Ninhydrin reagent
(B). Phenylisothiocyanate
(C). Carboxypeptidase
(D). Cyanogen Bromide

2. Which of the following antibiotic resembles the 3'end of charged t-RNA molecule?
(A). Puromycin
(B). Streptomycin
(C). Tetracyclin
(D). Kanamycin

3. A mixture of glycine, aspartic acid, phenylalanine and arginine are separated by cation exchange chromatography on Dowex-50. Buffers of increasing pH are used to elute amino acids from the column. Which amino acid is eluted first?
(A). Arginine
(B). Glycine
(C). Aspartic acid
(D). Phenylalanine

4. Which of the following statements about the competitive inhibition of an enzyme-catalyzed reaction is correct?
(A). A competitive inhibitor and substrate can bind simultaneously to the enzyme.
(B). The V_{max} and K_m (Michaelis constant) for a reaction are unchanged in the presence of a competitive inhibitor.
(C). The V_{max} for a reaction remains unchanged in the presence of a competitive inhibitor.
(D). The K_m for a reaction remains unchanged in the presence of a competitive inhibitor

5. If the fatty acid is esterfied with an alcohol of high molecular weight instead of glycerol, the resulting compound is
(A) Lipositol
(B) Plasmalogen
(C) Wax
(D) Cephalin

6. Bile acids are derived from:
(A). Fatty acids
(B). Amino acids
(C). Cholesterol
(D). Bilirubin

7. Prostaglandins are
(A). C20 unsaturated fatty acids
(B). C27 saturated alcohols
(C). C20 saturated fatty acids
(D). C27 unsaturated alcohols

8. The most important amino acid is glutathione is
(A). Glycine
b) Glutamic acid
(C). methionine
(D). Cysteine

9. Which one of the following best describes the number of ATPs produced by the oxidation of palmitic acid to CO2 and H2O?
(A). 100 ATP
(B). 130 ATP
(C). 40 ATP
(D). 70 ATP

10. In which of the following tissues is glucose transport into the cell enhanced by insulin?
(A). Brain
(B). Red blood cells
(C). Lens
(D). Adipose tissue

11. A polypetide 10 amino acids long is split into various smaller fragments, and the amino acid sequences of some of the fragments are determined. The identified fragments include: ala-gly-ser-gln, lys-trp-arg-pro, gln-his-lys, asp-ala-gly. What is the primary sequence of the polypeptide ?
(A). ala-gly-ser-gln-lys-trp-arg-pro-gln-his
(B). asp-ala-gly-ser-gln-his-lys-trp-arg-pro
(C). ala-gly-ser-gln-his-lys-trp-arg-pro-asp
(D). lys-trp-arg-pro-gln-his-lys-asp-ala-gly

12. Which of the following statements about haemoglobin is correct
(A). 2,3-Bisphosphoglycerate (BPG) increases the affinity of haemoglobin for oxygen.
(B). Deoxygenated haemoglobin has a higher binding affinity for protons than has oxyhaemoglobin.
(C). Haemoglobin has a higher affinity for oxygen than does myoglobin.
(D). One molecule of haemoglobin binds sixteen molecules of oxygen - four per subunit.

13. Which of the following statements about collagen is correct?
(A). Collagen contains a high proportion of hydroxylated proline residues.
(B). Collagen is a globular, intracellular protein.
(C). Post-translational modification of collagen involves vitamin A.
(D). The structure of collagen consists of a superhelix of three α helices twisted together.

14. If there is a deletion mutation in the operator for the *lac* operon, the expression of *lac* structural genes would be:

(A). Permanently repressed
(B). Constitutively expressed
(C). Not expressed
(D). Resistant to catabolite repression

15. Synthesis of prostaglandins is inhibited by
(A). Aspirin
(B). Arsenic
(C). Fluoride
(D). Cyanide

16. The BRCA1 gene is associated with
(A). Eye development
(B). Sickle-cell anemia
(C). Breast cancer
(D). Retinoblastoma

17. All of the following are core histones, except:
(A).H1
(B).H2A, H2B
(C). H3
(D). H4

18. Anion gap is increased in
(A). Renal tubular acidosis
(B). Diabetic ketoacidosis
(C). Metabolic acidosis resulting from intestinal obstruction
(D). Metabolic acidosis resulting from diarrhoea

19. Shine-Dalgarno sequence is part of:
(A). r-RNA
(B). m-RNA
(C). t-RNA
(D). RNAi

20. Diphtheria toxin inhibits
(A). Prokaryotic EF-1
(B). Prokaryotic EF-2
(C). Eukaryotic EF-1
(D). Eukaryotic EF-2

21. How would the cell cycle be affected if you removed the phosphorylation sites in the Rb protein?
(A). The cell cycle would not be affected because pRb is not phosphorylated normally.
(B). The cell cycle would be blocked in G1.
(C). The cell cycle would be blocked in G2.
(D). The cell cycle would be shorter.

22. Acyl carrier protein contains the vitamin:
(A). Biotin
(B). Lipoic acid
(C). Pantothenic acid
(D) Folic acid

23. DNA topoisomerase I of *E. coli* catalyses
(A). Relaxation of negatively supercoiled DNA
(B). Relaxation of positively supercoiled DNA
(C). Conversion of negatively supercoiled DNA into positively supercoiled DNA
(D). Conversion of double helix into supercoiled DNA

24. The 'rho' (ρ) factor is involved
(A) To increase the rate of RNA synthesis
(B) In binding catabolite repressor to the promoter region
(C) In proper termination of transcription
(D) To allow proper initiation of transcription

25. A PCR reaction that continues for 30 cycles will produce approximately how many PCR products from a single template DNA molecule?
(A). 64
(B). 128
(C). 128,000
(D). Approximately 1 billion

26. Saponification number indicates
(A). Unsaturation in fat
(B). Average M.W of fatty acid
(C). Acetyl number
(D). Acid number

27. Calcitriol synthesis involves
(A) Both liver and kidney
(B) Intestine
(C) Adipose tissue
(D) Muscle

28. Cystic fibrosis results from defective ion channels for
(A) Na+
(B) Cl-
(C) Ca++
(D) H+

29. Which of the following antibiotic resembles the 3'end of charged t-RNA molecule?
(A). Streptomycin
(B). Tetracyclin
(C). Kanamycin
(D). Puromycin

30. Aspartate transcarbamoylase is inhibited by
(A). CTP
(B). PRPP
(C). ATP
(D). TMP

31. Glycine gives _____ atoms of purine.
(A). C2, C3
(B). C4, C5 and N7
(C). C4, C5 and N9
(D). C4, C6 and N7

32. In extreme antigen excess, immune complexes between IgG and a tetravalent antigen have the composition:
(A). Ag3Ab2
(B). Ag4Ab3
(C). Ag1Ab4
(D). Ag2Ab1

33. During liver disease the LDH isozyme raised in serum is:
(A).M4
(B). M3H
(C). M2H2
(D). MH3

34. Which vitamin deficiency manifests itself as impaired wound healing, gastrointestinal bleeding and sore and bleeding oral tissues?
(A). Vitamin A
(B). Folate
(C). Vitamin C
(D). Vitamin D

35. The ____ surrounds the cell like a belt, preventing the passage of substances between the cells.
(A) Tight junctions
(B) Gap Junctions
(C) Desmosome
(D) Hemidesmosome

36. McArdle's disease is due to the deficiency of
(A) Glucose-6-phosphatase
(B) Phosphofructokinase
(C). Liver phosphorylase
(D). Muscle phosphorylase

37. A Fab fragment:
(A) Is produced by pepsin treatment.
(B) Binds antigen
(C) Is produced by separation of heavy and light chains.
(D) Lacks light chains.

38. The functional activity of neutrophils can be assessed by:
(A) A fluorescent antibody test for myeloperoxidase.
(B) The nitroblue tetrazolium test.
(C) A plaque test for antibody
(D) Limiting dilution analysis.

39. At the neuromuscular junction:
(A) the muscle membrane possesses muscarinic receptors.
(B) the motor nerve endings secrete norepinephrine.
(C) curare leads to prolongation of neuromuscular transmission.
(D) the motor nerve endings secrete acetylcholine.

40. In the small intestine, cholera toxin acts by:
(A). ADP-ribosylation of the G regulatory protein
(B). Inhibition of adenyl cyclase
(C). Activation of GTPase
(D). Active absorption of NaCl

41. Microarray analysis has allowed scientists to view what phenomenon?
(A). The expression of specific genes in a cell
(B). The number of genes in a cell
(C). The cDNA of a cell
(D). The genome sequence in a cell

42. The highest phospholipids content is found in
(A) Chylomicrons
(B) VLDL
(C) LDL
(D) HDL

43. A C-terminal peptide sequence of four amino acids, Lys-Asp-Glu-Leu (KDEL) directs proteins to which of the following organelles?
(A). Endoplasmic reticulum
(B). Mitochondria.
(C). Nucleus.
(D). Peroxisomes.

44. Where do proteins inserted into the inner mitochondrial membrane originate?
(A). In the cytosol inserted using outer and inner membrane translocases (TOMs and TIMs) and in the matrix inserted using TIMs.
(B). In the cytosol, inserted using outer membrane translocases (TOMs) and inner membrane translocases (TIMs).
(C). In the matrix inserted using inner membrane translocases (TIMs).
(D). Pre-existing mitochondria

45. What type of protein is Ras?
(A). A tyrosine kinase
(B). A serine-threonine kinase
(C). A small monomeric GTPase switch protein
(D). A G protein switch

46. Which of the following proteins is a death receptor which triggers the extrinsic pathway of apoptosis?
(A). caspase-8
(B). FADD
(C). Fas
(D). Fas ligand

47. What enzyme. or combination of enzymes, protects cells against superoxide generated in oxidation reactions?
(A). Superoxide dismutase
(B). Catalase
(C). Superoxide dismutase plus catalase
(D). Glutathione peroxidise

48. Which of the following reactions is required for proofreading (i.e. correcting replication errors) during DNA replication by DNA polymerase III?

(A). 3' - 5' exonuclease activity
(B). 5' - 3' exonuclease activity
(C). 3' - 5' endonuclease activity
(D). 5' - 3' endonuclease activity

49. Which of the following statements about the mechanism of the light-dependent reactions of photosynthesis is correct?
(A). Electrons from photosystem I reduce NADPH.
(B). Electrons from photosystem I reduce pheophytin.
(C). Electrons from NADPH revert photosystem II back to the ground state.
(D). Ferredoxin-NADP reductase reduces NADP+ to NADPH.

50. Which reaction in photosynthesis is carried out by 'Rubisco' or ribulose 1- 5 bisphosphate carboxylase?
(A). Conversion of 3 phosphoglycerate into glyceraldehyde 3 phosphate.
(B). Utilisation of CO2 to produce 3 phosphoglycerate.
(C). Conversion of glyceraldehyde 3 phosphate into ribulose 5 phosphate.
(D). Carboxylation of phosphoenol pyruvate to oxaloacetate.

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