CET (PG)-2015

Sr. No. : 212111

Question Booklet Series : A

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

Roll No. *In Figures* | | | | | | | *In Words* _____

O.M.R. Answer Sheet Serial No. | | | | | | |

Signature of the Candidate : _____

Subject : M.Sc. (Hons. School)–Bio-Chemistry

Time : 90 minutes **Number of Questions : 75** **Maximum Marks : 75**

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

INSTRUCTIONS

1. Write your Roll No. on the Question Booklet and also on the OMR Answer Sheet in the space provided and nowhere else.
2. Enter the Subject and Series Code of Question Booklet 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. To open the Question Booklet remove the paper seal gently when asked to do so.
5. Please check that this Question Booklet contains **75** questions. In case of any discrepancy, inform the Assistant Superintendent within 10 minutes of the start of test.
6. Each question has four alternative answers (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.**
7. If you do not want to answer a question, leave all the bubbles corresponding to that question blank in the Answer Sheet. No marks will be deducted in such cases.
8. Darken the bubbles in the OMR Answer Sheet according to the Serial No. of the questions given in the Question Booklet.
9. Negative marking will be adopted for evaluation i.e., 1/4th of the marks of the question will be deducted for each wrong answer. A wrong answer means incorrect answer or wrong filling of bubble.
10. For calculations, use of simple log tables is permitted. Borrowing of log tables and any other material is not allowed.
11. For rough work only the sheets marked "Rough Work" at the end of the Question Booklet be used.
12. 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.**
13. After the test, hand over the Question Booklet and the Answer Sheet to the Assistant Superintendent on duty.
14. 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.
15. A candidate who creates disturbance of any kind or changes his/her seat or is found in possession of any paper possibly of any assistance or found giving or receiving assistance 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.
16. **Telecommunication equipment such as pager, cellular phone, wireless, scanner, etc., is not permitted inside the examination hall. Use of calculator is not allowed.**

SEAL

1. **What is the isoelectric point for phenylalanine given the pKa for the COOH group is 1.83 and the NH3+ group is 9.13 ?**
   (A) 2.43
   (B) 4.83
   (C) 5.48
   (D) 9.13

2. **A buffer solution contains 0.36 M sodium acetate (CH_3COONa) and 0.45M acetic acid (CH_3COOH), pKa = 4.8. What is the pH of this buffer solution ?**
   (A) 4.7
   (B) 5.2
   (C) 3.8
   (D) 6.1

3. **Which of these substances diffuse directly through the lipid bilayer of the cell membrane ?**
   (A) Glucose and amino acids
   (B) CO_2 and O_2
   (C) Na+ and Cl-
   (D) Fatty acids

4. **Proline disrupts α-helical structure in proteins because it is :**
   (A) Acidic amino acid
   (B) Aromatic amino acid
   (C) Basic Amino acid
   (D) Imino acid

5. **In vertebrate genes, transcription regulatory that contain CpG islands are inactivated by the following CpG modification :**
   (A) Methylation
   (B) Acetylation
   (C) Phosphorylation
   (D) Ubiquitylation

6. **A polypeptide 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

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

8. **Which of the following is a non-organ-specific (systemic) autoimmune disease:**
   (A) Myasthenia gravis
   (B) Systemic lupus erythematosus (SLE)
   (C) Hashimoto's thyroiditis
   (D) Insulin-dependent diabetes mellitus

9. **Prothrombin time is prolonged by administering :**
   (A) Vitamin K
   (B) Dicoumarol
   (C) Calcium
   (D) Prothrombin

10. **When glucose interferes with the inductive effects of lactose on the lactose operon, this is called :**
   (A) Co-repression
   (B) Attenuation
   (C) Anti-termination
   (D) Diauxie

11. **Selenium is a constituent of the enzyme :**
   (A) Glutathione peroxidase
   (B) Homogentisate oxidase
   (C) Tyrosine hydroxylase
   (D) Phenylalanine hydroxylase

12. **What would the generally expected effect on the PCR reaction be of adjustments that increase the temperature of the annealing phase and the length of the elongation phase ?**
   (A) Precision and yield will be reduced
   (B) Precision will be reduced, but yield will be increased
   (C) Precision will be increased, but yield will be reduced
   (D) Precision and yield will be increased

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

14. **Isomers differing as a result of variations in configuration of the —OH and —H on carbon atoms 2, 3 and 4 of glucose are known as :**
   (A) Epimers
   (B) Anomers
   (C) Optical isomers
   (D) Stereoisomers

15. **Dehydrogenases involved in HMP shunt are specific for :**
   (A) FMN
   (B) NAD+
   (C) FAD
   (D) NADP+

16. **The test that distinguishes between monosaccharides and dissaccharide is :**
   (A) Bial's test
   (B) Seliwanoff's test
   (C) Barfoed's test
   (D) Hydrolysis test

17. **Which of the following is NOT a component of histone octamer ?**
   (A) H2A
   (B) H1
   (C) H2B
   (D) H3

18. **Animals fed high cholesterol diet exhibit decreased cholesterol synthesis by liver because of the inhibition of the following enzymes?**
(A) HMG-CoA synthetase
(B) HMG-CoA lyase
(C) HMG-CoA reductase
(D) Mevalonate kinase

19. **Saponification number indicates :**
(A) Unsaturation in fat
(B) Average molecular weight of fatty acid
(C) Acetyl number
(D) Acid number

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

21. **A peptide bond :**
(A) is ionized at physiological pH
(B) is stable to heating in strong acids
(C) has a partial double bond character
(D) occurs most commonly in cis configuration

22. **In the Sanger method of DNA sequencing, what causes the termination of chain elongation ?**
(A) The incorporation of a regular DNA nucleotide
(B) The incorporation of a dideoxynucleotide
(C) Denaturation of the double-stranded test fragments
(D) When the DNA polymerase encounters a stop codon

23. **Rotenone inhibits the respiratory chain at :**
(A) FMN → coenzyme Q
(B) NAD→ FMN
(C) Coenzyme Q→ cyt b
(D) Cyt b→ Cyt c1

24. **The reaction catalyzed by phosphofructokinase is :**
(A) Inhibited by high concentration of ATP and citrate
(B) Uses fructose-1-P as substrate
(C) Is near equilibrium in most cells
(D) Is inhibited by AMP

25. **The formation of uric acid from purines is catalyzed by :**
(A) Adenylate deaminase
(B) Uricase
(C) Xanthine oxidase
(D) Allantoinase

26. **The following hormone is a peptide of less than 10 amino acids :**
(A) Insulin
(B) Growth Hormone
(C) Oxytocin
(D) Parathyroid hormone

27. **Ternary complex is not formed in :**
(A) Random Bi B
(B) Ordered Bi Bi
(C) Theorel-Chance Bi Bi
(D) Ping Pong Bi Bi

28. **An amino acid with 6 codons is :**
(A) Proline
(B) Alanine
(C) Serine
(D) Glycine

29. **During liver disease the LDH isozyme raised in serum is :**
(A) M_4
(B) M_3H
(C) M_2H_2
(D) MH_3

30. **Sphingomyelin accumulates in**
(A) Tay-Sachcs disease
(B) Gaucher's disease
(C) Fabry's disease
(D) Niemann-Pick's disease

31. **Recombination of V, D and J Ig gene segments :**
(A) Only occurs in mature B-cells
(B) Involves heptamer-spacer-heptamer flanking sequences
(C) Is effected by recombinase enzymes
(D) Does not occur until the mRNA stage

32. **Which one of the following mast cell products is not preformed and therefore has to be newly synthesized ?**
(A) Histamine
(B) Prostaglandin D2
(C) Eosinophil chemotactic factor (ECF)
(D) Neutral protease

33. **ADP-ribosylation by cholera toxin locks :**
(A) Gs in active form
(B) Gs in inactive form
(C) Gi in active form
(D) Gi in inactive form

34. **Effect of release of IP3 during signal transduction pathway is :**
(A) Closure of Ca^{2+} channel in ER
(B) Increase in intracellular Ca^{2+} level
(C) Increase in extracellular Ca^{2+} level
(D) Inactivation of calmodulin proteins

35. **Most common types of introns spliced in mammals are :**
(A) GU-AG
(B) UA-UC
(C) UG-UA
(D) UG-GA

36. **siRNA :**
(A) forms complex in the spliceosome
(B) recruits histone acetyl transferases to the nucleus
(C) forms a complex with RISC proteins to inhibit translation or cause degradation of complementary mRNA
(D) is not transmitted to daughter cells after cell division

37. **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

38. **What type of glycosidic bond is present in lactose ?**
(A) $\alpha(1\rightarrow2)$
(B) $\beta(1\rightarrow2)$
(C) $\alpha(1\rightarrow4)$
(D) $\beta(1\rightarrow4)$

39. **Which of the following components is NOT a component of 30S initiation complex ?**
(A) GTP
(B) Initiation factor-2 (IF-2)
(C) N-formylmethionyl-tRNA
(D) ATP

40. **Chymotrypsin is specific for peptide bonds containing :**
(A) Uncharged amino acid residues
(B) Acidic amino acids
(C) Basic amino acid
(D) Small amino acid residues

41. **A cosmid is a :**
(A) Large bacterial plasmid
(B) Viral plasmid
(C) Hybrid of plasmid and phage
(D) Yeast plasmid

42. **If the protein below were digested with trypsin, how many fragments would you expect to find? (Trypsin cleaves on the C-terminal side of Lysine and Arginine, unless the next amino acid is proline) :**

AVMFRLSGCKPV

TCLKWCQRECMI

(A) 2
(B) 3
(C) 4
(D) 5

43. **Fatty acids with odd number of carbon atoms yield acetyl-CoA and a molecule of :**
(A) Succinyl-CoA
(B) Propionyl-CoA
(C) Malonyl-CoA
(D) Acetoacetyl-CoA

44. **Enzyme glucokinase is a :**
(A) Transferase
(B) Isomerase
(C) Oxidoreductase
(D) Hydrolase

45. **Pyruvate dehydrogenase complex and α-ketoglutarate dehydrogenase complex require the following for their oxidative decarboxylation :**
(A) COASH and Lipoic acid
(B) NAD+ and FAD
(C) COASH and TPP
(D) COASH, TPP,NAD+,FAD, Lipoate

46. **The final product of the Calvin cycle is :**
(A) RuPB
(B) PGA
(C) ATP
(D) G3P

47. **The principal intracellular cation is :**
(A) Na^+
(B) Ca^{2+}
(C) Cl^-
(D) K^+

48. **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

49. **How much stock solution is required to make 100 ml of 25 mM solution of NaCl from a 1M stock :**
(A) 2.5 ml
(B) 0.25 ml
(C) 25 ml
(D) 50 ml

50. **For the ion product of water; which one of the following is correct ?**
(A) Is independent of temperature
(B) Has a numerical value of 1×10^{-14} at 25°C
(C) Is the equilibrium constant for the reaction H_2O H+ + OH–
(D) Is an approximation that fails to take into account the presence of the hydronium ion (H_3O^+)

51. **Enzyme glucokinase is a :**
(A) Transferase
(B) Isomerase
(C) Oxidoreductase
(D) Hydrolase

52. **The electron transport chain is located predominantly in :**
(A) Outer part of the mitochondria
(B) Intermembrane space of the mitochondria
(C) Inner membrane of the mitochondria
(D) Matrix of mitochondria

53. **An uncouple of oxidative phosphorylation such as dinitrophenol :**
(A) Inhibits respiration and ATP synthesis
(B) Allows electron transport to proceed without ATP synthesis
(C) Inhibits respiration without impairment of ATP synthesis
(D) Specifically inhibits cytochrome b

54. **The most abundant carbohydrate found in nature is**
(A) Starch
(B) Glycogen
(C) Cellulose
(D) Chitin

55. **If the enthalpy change for a reaction is zero, ΔG° is equal to :**
(A) ΔH°
(B) / nKeq
(C) $T\Delta S^\circ$
(D) $-T\Delta S^\circ$

56. **The reaction succinyl CoA to succinate requires :**
(A) CDP
(B) ADP
(C) GDP
(D) $NADP^+$

57. **Sulphur containing amino acid is :**
(A) Methionine
(B) Leucine
(C) Valine
(D) Asparagine

58. **The enzymes of □-oxidation are found in :**
(A) Mitochondria
(B) Cytosol
(C) Golgi apparatus
(D) Nucleus

59. **All the following compounds are members of the electron transport chain except :**
(A) Ubiquinone
(B) Carnitine
(C) NAD
(D) FAD

60. **The approximate number of nucleotides in tRNA molecule is :**
(A) 25
(B) 50
(C) 75
(D) 100

61. **The most important buffer systems in body fluids include the following :**
(A) Biocarbonate
(B) Protein
(C) Hemoglobin
(D) Phosphate

62. **Which blotting technique is used for detection of DNA after electrophoresis and transfer onto a nitrocellulose sheet ?**
(A) Northern blotting
(B) Southern blotting
(C) Eastern blotting
(D) Western blotting

63. **The proteins get separated on the basis of their molecular weight by :**
(A) Ion-exchange chromatography
(B) Gel chromatography
(C) Affinity chromatography
(D) Adsorption chromatography

64. **Palindromic sequences in DNA serve as :**
(A) Signals for attachment of RNA primer
(B) Signals for termination of RNA synthesis
(C) Sites for restriction endonuclease
(D) Primers for DNA replication

65. **In nucleic acids, the free hydroxyl group is attached to the_____ carbon of the sugar.**
(A) 5'
(B) 4'
(C) 3'
(D) 2'

66. **During which stage of cell cycle does DNA synthesis occur?**
(A) G_1
(B) G_2
(C) G_0
(D) S

67. **According to Chargaff's rule, the following proportion exists in DNA :**
(A) C=G
(B) C>T
(C) C>G
(D) C=T

68. **In eukaryotes, there are_____ codons that specify amino acids.**
(A) 20
(B) 61
(C) 60
(D) 64

69. **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

70. **Which of the following signalling molecules binds to a receptor situated in the cytosol, rather than the outer membrane of the cell ?**
(A) Progesterone
(B) Adrenaline (Epinephrine)
(C) Epidermal growth factor
(D) Interferon

71. **Which of the following statements about Michaelis-Menten kinetics is correct ?**
(A) K_m, the Michaelis constant, is defined as the concentration of substrate required for the reaction to reach maximum velocity
(B) K_m, the Michaelis constant, is defined as the dissociation constant of the enzyme-substrate complex
(C) K_m, the Michaelis constant, is expressed in terms of the reaction velocity
(D) K_m, the Michaelis constant, is a measure of the affinity the enzyme has for its substrate

72. **Which of the following statements about microtubules is correct ?**
(A) β tubulin has latent ATPase activity, which regulates microtubule stability
(B) Microtubules are hollow tubes consisting of 13 protofilaments
(C) Microtubules are polymers of β tubulin homodimers
(D) Microtubules are stable structures in the cell

73. **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

74. **Which of the following statements about food storage in the body is correct ?**
(A) More glycogen is stored per unit mass in the muscles than in the liver
(B) Glycogen storage in the liver is unlimited
(C) Fat is a more efficient form of fuel storage than glycogen
(D) Proteins in muscle cells are a normal storage form of fuel

75. **A sexual-like process in some bacteria that results in exchange of genetic material between two cells that are temporarily joined, best defines :**
(A) Conjugation
(B) Transduction
(C) Lysogeny
(D) Transformation