Booklet Series

**B**

No. of Printed Pages : 16

**Serial Number of the Test Booklet**

613046

# PAPER CODE

# PAPER/II-06/BIOCHEMISTRY

**B**

**Roll No. :** _____

**Name of the Candidate :** _____

***Test Duration : 03 Hours*** ***Total Questions : 100*** ***Total Maximum Marks : 200***

## INSTRUCTIONS TO CANDIDATES

1. Candidates will be admitted to the Examination Hall/Room on production of their Admit Card and Original ID such as **EPIC/Aadhaar/Driving License** with a view to establish the true identity of the candidate.
2. Candidates shall reach the venue of examination at least 30 minutes in advance and admission will be refused to a candidate who is late by 10 minutes from the start of the examination.
3. No candidate shall be permitted to leave the Examination Hall/Room until the time for the examination is over or until permitted to do so but not until the half of the allotted time.
4. Candidates must use a **BLUE/BLACK** ball point pen ONLY to make entries on the OMR Answer Sheet.
5. The candidates should not bring any articles (other than those specified above) such as books, notes, loose sheets, mobile phones, pagers, digital diaries, calculators, smart watches, etc. inside the Examination Hall/Room. Any candidate found in possession of the said articles will be liable to be de-barred from applying all future examinations to be conducted by the Board.
6. After receiving the Test Booklet with OMR inserted, the candidates may pull out the OMR Answer Sheet and fill in the necessary details. However the candidates are not allowed to break open the seal of the Test Booklet until the invigilator informs them to do so.
7. Mark carefully your Roll Number, Question Booklet Code and Booklet Series on the OMR Answer Sheet and append signature at the appropriate place. Write your Roll Number and **Name in the Question Booklet**. In the absence of the Roll Number and Question Booklet Series on the OMR Answer Sheet, it may NOT be evaluated.
8. The entire Test is of Objective Type Questions comprising 100 questions.
9. Candidates must check that the Question Booklet contains 100 multiple choice questions. If any discrepancy found, report to the invigilator immediately.
10. Every question carries a total of 2 marks each. Candidates will also keep in mind that there is negative marking of $1/3^{rd}$ for every wrong answer.
11. Rough work may be done on the space provided in this Question Booklet, but not on the OMR Answer Sheet.
12. In the event of a mistake made in marking the Roll Number in the OMR Answer Sheet or the OMR Series the candidates will not be given a new OMR Answer Sheet but he/she will be allowed to use whitener or correcting fluid for correction of the Roll Number and the Booklet Series only.
13. **Change of answer will not be permitted in the OMR Answer Sheet. Using of correcting fluid (of any sort) will be treated as wrong attracting negative marking.**
14. The candidates must abide by such instructions as may be specified on the cover of the Answer Paper or instructions to candidates given at the back of the Admit Card. If a candidate fails to do so or indulges in improper conduct, he/she will render himself/herself liable to expulsion from the examination or such other punishment as the Board deemed fit to impose.
15. At the end of the Test, candidates must submit the OMR Answer Sheet to the invigilator on duty. Candidates shall be allowed to take their Question Booklet only after the end of the examination session.
16. Any candidate found to be intoxicated with alcohol and/or psychotropic substances will be expelled from the Examination Hall/Room.
17. Examination centre once opted cannot be changed.

**PLEASE REFER THE BACKSIDE OF THE QUESTION BOOKLET FOR MORE INSTRUCTIONS.**

SEAL

1. Glycine (Gly) is often found in β-turns because it is
   (A) Large and rigid
   (B) Hydrophobic
   (C) Small and flexible
   (D) Positively charged

2. Overall three-dimensional arrangement of all atoms in protein is referred to as its
   (A) Primary structure
   (B) Secondary structure
   (C) Quarternary structure
   (D) Tertiary structure

3. Glucose is made up of three elements. Which of the following is not one of the those elements ?
   (A) Hydrogen
   (B) Carbon
   (C) Oxygen
   (D) Phosphorus

4. Chitin is a structural polysaccharide found in the exoskeleton of
   (A) Plants
   (B) Arthropods
   (C) Vertebrates
   (D) None of the above

5. 5-hydroxylysine is derived from
   (A) Proline
   (B) Methyl lysine
   (C) Glutamate
   (D) Lysine

6. Who is credited with developing the reagent 1-fluoro-2, 4-dinitrobenzene for labeling the amino-terminal amino acid residue ?
   (A) Sanger (B) Pauling
   (C) Watson (D) Crick

7. Immunodiffusion occurs between
   (A) Two different antibodies
   (B) Two different antigens
   (C) Complement protein and antibodies
   (D) An antibody and an antigen

8. Who was awarded the Nobel prize in physiology or medicine for the development of RIA ?
   (A) James Watson
   (B) Rosalyn Yalow
   (C) Francis Crick
   (D) Alexander Fleming

9. Which part of the antibody is associated with allelic forms that are not present in all individuals ?
   (A) CDRs (B) Idiotypes
   (C) Isotypes (D) Allotypes

10. What is required for a hapten to become antigenic ?
   (A) It must be a small unit
   (B) It must be able to bind to multiple antigens
   (C) It must bind to larger carrier molecule
   (D) It must be presented by specialized cell

11. A germicide is a chemical agent that

(A) Inhibits growth of micro-organism

(B) Specially targets and kills bacterial spores

(C) Kills pathogens, but not necessarily kill bacterial endospores

(D) Is safe to use on living tissue to prevent infections

12. When microbial population is exposed to a lethal agent, population death typically occurs in what manner ?

(A) Arithmetical

(B) Logarithmical

(C) Linear

(D) Sporadical

13. For a majority of enzymes, what is the value of $Q_{10}$ between 0°C and 40°C ?

(A) 1 (B) 3

(C) 1.5 (D) 2

14. Double reciprocal plots for K-class of allosteric enzymes show inhibition patterns similar to

(A) Competitive inhibition

(B) Uncompetitive inhibition

(C) Mixed inhibition

(D) None of the above

15. What is the genome of the tobacco mosaic virus ?

(A) DNA (B) Lipid

(C) Protein (D) RNA

16. The relationship between a temperate phage and its host is called

(A) Lysis

(B) Transduction

(C) Conjunction

(D) Lysogeny

17. Which of the following types of RNA are components of ribosomes and carry out the synthesis of protein ?

(A) mRNAs (B) tRNAs

(C) rRNAs (D) All of the above

18. What is the primary function of transfer RNA (tRNA) ?

(A) Form part of structure of ribosome

(B) Promote maturation of mRNA

(C) Interaction with protein

(D) Carry amino acids to the ribosomes

19. Pasteur and Chamberland developed an attenuated anthrax vaccine by

(A) Growing it in an abnormal host

(B) Treating cultures with $K_2Cr_2O_7$ (Potassium bichromate) and incubating at 42-43°C

(C) Using cowpox lesions

(D) Using spinal cord extracts

20. Alcoholic fermentation converts sugar into

(A) Pyruvate and $CO_2$

(B) Lactate and NADH

(C) Ethanol and $CO_2$

(D) Acetaldehyde and Pyruvate

21. The amino acid sequence of a protein determines its

(A) Cellular location

(B) Rate of synthesis

(C) Three-dimensional structure and structure to function

(D) Degradation pathway

22. The acid-base behaviour of a peptide can be predicted from

(A) Total number of amino acid in the peptide

(B) Nature of free α-amino group only

(C) The sequence of amino acid only

(D) Free α-amino and α-carboxyl groups as well as nature and number of its ionizable R-groups

23. What type of bonds hold the two strands of a DNA double helix together ?

(A) Hydrogen bonds between pairs of bases

(B) Covalent bonds between sugar

(C) Ionic bonds between phosphates

(D) Peptide bond between nucleoides

24. How many base pairs per helical turn does Z-DNA have ?

(A) 12

(B) 10.5

(C) 11

(D) 2

25. Which of the following is the main component stored in adipocytes ?

(A) Phospholipids

(B) Cholesterol

(C) Triglycerides

(D) Glycogen

26. Lecithin is a type of

(A) Triglycerol

(B) Phospholipid

(C) Nitrogenous base

(D) Phosphatic acid

27. Most chemotherapeutic agents are synthesized by

(A) The host organism in response to infection

(B) Microbes, which are effective in controlling the growth of bacteria

(C) Chemical reactions in a laboratory setting

(D) Plants as a defence mechanism against pathogens

28. Which of the following is not a component included in study of Immunology ?

(A) Chemical aspects of immune system

(B) The distinction between self and non-self

(C) Biological aspects of immune system

(D) Economical impact of immune system

29. What happens when some molecule absorb radiant energy in fluorescence microscopy ?

(A) They become excited and later release light

(B) They change colour

(C) They become ionized

(D) They become transparent

30. What is a mechanical stage clip used for ?

(A) To rotate the objective lenses

(B) To adjust condenser

(C) To control light source

(D) To hold the slide

31. Under most conditions, denatured proteins exist in

(A) A set of partially folded states

(B) A set of completely folded states

(C) A single, well defined unfolded state

(D) An aggregated, insoluble form

32. Which of the following is a major contributor to stabilizing the globular form of most soluble proteins ?

(A) Disulfide bonds

(B) Hydrophobic interactions

(C) Peptide bonds

(D) Glycosidic bonds

33. Glycosaminoglycans are characterised by

(A) Repeating disaccharide units

(B) Only fractose residues

(C) Only glucose residues

(D) Only galactose residues

34. Carbon atom involved in the osazone formation in glucose is

(A) C5 and C6

(B) C3 and C4

(C) C2 and C3

(D) C1 and C2

35. Ionic interactions between an enzyme-bound metal ion and a substrate can help

(A) Orient the substrate for reaction

(B) Denature the enzyme

(C) Prevent the formation of the enzyme substrate complex

(D) None of these

36. Allosteric enzymes typically possess
(A) One or more regulatory sites in addition to the active site
(B) Only an active site
(C) Regulatory site that is same as the active site
(D) No specific binding sites for modulators

37. What role do hopanoids likely play in bacterial membrane ?
(A) They increase membrane permeability
(B) They stabilize the membrane
(C) They facilitate protein transport across the membrane
(D) They provide energy for the cell

38. What does the term lophotrichous refer to ?
(A) Bacteria with a single flagellum
(B) Bacteria with flagella spread evenly over the surface
(C) Bacteria with cluster of flagella in one/both ends
(D) Bacteria with flagellum in each pole

39. What was introduced to maintain uniformity in the expression of enzyme activities world wide ?
(A) Somogyi units
(B) Reitman-Frankel units
(C) Katal
(D) King-Armstrong units

40. What is the pH at which enzyme exhibits maximum catalytic activity called ?
(A) Optimum temperature
(B) Catalytic optimum
(C) Optimum pH
(D) Enzyme efficiency

41. The SUDS-HIV-I test utilizes antigen-coated latex beads to detect HIV serum antibodies in approximately
(A) 10 minutes
(B) 30 minutes
(C) 20 minutes
(D) 40 minutes

42. Immunofluorescence is a process in which fluorochromes are exposed to
(A) Infrared light
(B) UV, violet/blue light
(C) Green light
(D) Red light

43. How many subclasses of IgG are there in humans ?
(A) Two (B) Five
(C) Three (D) Four

44. Where is secretory IgA primarily located ?
(A) Blood stream
(B) Cerebroidal fluid
(C) Bone marrow
(D) Saliva, tears, breast milk

45. Plots of log $K_m$ and log $V_{max}$ or $k_{cat}$ against pH are typically
(A) Bell-shaped
(B) Exponential
(C) Linear
(D) Hyperbolic

46. In electrophoresis, molecules with a net positive charge are called
(A) Anions (B) Cations
(C) Neutrons (D) Electrons

47. The importance of TH cells is dramatically illustrated by the effects of which virus ?
(A) Influenza virus
(B) Human Immunodeficiency Virus
(C) Hepatitis virus
(D) Rhinovirus

48. The covalent linkage between two adjacent amino acids in a protein chain is called a
(A) Glycosidic bond
(B) Phosphodiester bond
(C) Peptide bond
(D) Hydrogen bond

49. Which of the following best describes protozoa ?
(A) Multicellular, photosynthetic organism
(B) Unicellular, animal like protists
(C) Filamentous, fungal like organisms
(D) Unicellular, plant like protists

50. What was Edward Jenner's major contribution to the concept of immunization ?
(A) He discovered penicillin
(B) He developed the smallpox vaccine using cowpox lesions
(C) He proved bacteria causes fermentation
(D) He invented microscope

51. In a protein with multiple domains, each domain may appear as
(A) Long, extended strand
(B) Distinct globular lobe
(C) Region of high flexibility
(D) Binding site for small ions

52. The food product gelatin is derived from
(A) Collagen (B) Keratin
(C) Elastin (D) Fibroin

53. β-D-galactose is a component of
(A) Sucrose (B) Glycogen
(C) Maltose (D) Lactose

54. Which of the following is a defining characteristic of lipids ?
(A) Water soluble
(B) Hydrophobic nature
(C) Composed of amino acids
(D) Made of monosaccharide

55. The subunits in hemoglobin are held together by

(A) Non-covalent interactions

(B) Covalent bonds

(C) Peptide bonds

(D) Disulfide bonds

56. The α-helix, the first protein folding pattern discovered was found in

(A) Fibroin (B) α-Keratin

(C) Collagen (D) Hemoglobin

57. What are the two co-enzyme forms of riboflavin ?

(A) FMN and FAD

(B) Ribotol and AMP

(C) FMN and ATP

(D) Ribotol and FAD

58. Pyridoxal phosphate is closely associated with the metabolism of

(A) Carbohydrates

(B) Nucleic acids

(C) Lipids

(D) Amino acids

59. What is the energy source for chemotrophs ?

(A) Oxidation of chemical compound

(B) Light

(C) $CO_2$

(D) Reduced inorganic substance

60. Who developed Petri dish ?

(A) Edward Jenner

(B) Alexander Fleming

(C) Louis Pasteur

(D) Julius Richard Petri

61. Gel electrophoresis separates molecules based on their

(A) Only charge

(B) Size and electrical charge

(C) Only size

(D) Isoelectric point

62. The gels commonly used in gel electrophoresis are

(A) Agarose and polyacrylamide

(B) Cellulose and starch

(C) Paper and cellulose acetate

(D) Sephadex and sepharose

63. The primary mechanism of action for phenolics involves

(A) Denaturing proteins and disrupting cell membranes

(B) Inhibiting cell wall synthesis

(C) Interfering with DNA replication

(D) Blocking metabolic pathways

64. The phenol coefficient test used to determine the

(A) Potency of a disinfectant is compared with that of phenol

(B) Minimum inhibitory concentration of an antibiotic

(C) Spectrum of activity of an antiseptic

(D) Rate at which bacteria develop resistance to a disinfectant

65. Pepsin, a digestive enzyme found in the stomach, functions optimally at a pH of

(A) 2 (B) 14

(C) 5.8 (D) 7

66. Diagnosis of Hereditary Fructose Intolerance (HFI) can be made based on which of the following ?

(A) Blood glucose level

(B) Urine analysis, enzyme assay, DNA based testing

(C) Dietary history alone

(D) Physical examination only

67. Upon exposure to antigen, B cell proliferates and forms two main types of cells

(A) Antibody producing plasma cells and memory cells

(B) Helper T cells and cytotoxic T cells

(C) Memory T cells and cytotoxic cells

(D) Macrophages and dendric cells

68. The complement system is composed of over how many serum proteins ?

(A) 10

(B) 20

(C) 30

(D) 50

69. Chargaff's rule states that in all cellular DNAs, regardless of the species

(A) Adenine equals to guanine

(B) Cytosine equals to thymine

(C) The sum of purine residues equals to sum of pyrimidine residues

(D) The ratio of A + G to G + T is always one

70. What is removed during the formation of N-β-glycosyl bond ?

(A) Phosphate group

(B) Pentose sugar

(C) Elements of water

(D) None of the above

71. What does the term numerical aperture of the lens refer to ?

(A) Magnification power of the lens

(B) The ability of the lens to gather light

(C) Refractive index of lens material

(D) The angle of light entering the objective

72. What makes substances like poly-β-hydroxyalkanoate, sulfur, polymetaphosphate visible in phase contrast microscopy ?

(A) They absorb specific wavelength of light

(B) They have refractive indices marked different from that of water

(C) They are stained by cellular components

(D) They fluorescence under specific illumination

73. What is the role of electrophoresis in DNA sequencing ?

(A) To amplify the DNA sample

(B) To separate DNA strands differing in size by only one nucleotide

(C) To label DNA fragments

(D) To induce specific cleavage of DNA molecule

74. Which gel matrix is generally used for separating longer pieces of DNA during electrophoresis ?

(A) Polyacrylamide

(B) Agarose

(C) Lactic acid

(D) None of the above

75. What is the use of Ziehl-Neelsen method ?

(A) Gram staining

(B) Endospore staining

(C) Capsule staining

(D) Acid-fast staining

76. What is the protein coat surrounding the viral nucleic acid called ?

(A) Plasma membrane

(B) Matrix

(C) Capsid

(D) Tegument

77. Which of the following is activated by trypsin ?

(A) Pepsinogen

(B) Gastric lipase

(C) Chymotrypsinogen

(D) Rennin

78. Which of the following is given as an example of a monomeric enzyme ?

(A) Lactate dehydrogenase

(B) Aspactate transcarbamoyla

(C) Ribonuclease

(D) Pyruvate dehydrogenase

79. Which of the following is not a characteristic of prokaryotic cells ?

(A) They have a simpler morphology than eukaryotic cell

(B) They lack a true membrane delimited nucleus

(C) They are generally larger than eukaryotic cells

(D) They have a primordial nucleus

80. Who proposed the five-kingdom classification system ?

(A) Charles Darwin

(B) Gregor Mendel

(C) Robert Whittaker

(D) Louis Pasteur

81. In sugars, the end of the molecule containing the free anomeric carbon is called

(A) The epimeric center

(B) The glycosidic bond

(C) An acetal

(D) The reducing end

82. Simple sequence DNA is also referred to as

(A) Transposons

(B) Coding DNA

(C) Satellite DNA

(D) Unique DNA

83. What is the abbreviation commonly used for electrophoresis in acrylamide gels ?

(A) BIS

(B) TEMED

(C) PAGE

(D) None of the above

84. On average, how many amino acid residues does one SDS molecule bind to ?

(A) Two (B) One

(C) Ten (D) Five

85. Eosinophils play a significant role in defending against

(A) Protozoan and helminth parasites

(B) Viral infections

(C) Bacterial infections

(D) Fungal infections

86. What is the primary function of lymph nodes ?

(A) To produce red blood cells

(B) To filter out harmful micro-organisms and antigens from the lymph

(C) To store white blood cells

(D) To regulate blood pressure

87. Opsonins function by

(A) Direct killing micro-organism through enzymatic activity

(B) Blocking the adherence of micro-organism to host cells

(C) Neutralizing toxins produced by bacteria

(D) Acting as a bridge between the micro-organism and phagocyte

88. Cellular (cell-mediated) immunity is primarily based on the action of

(A) Specific kinds of T lymphocytes

(B) Antibodies circulating in the blood

(C) Phagocytic cells engulfing pathogens

(D) The inflammatory response

89. Which scientist's swan-neck flask experiments played a crucial role in disproving the theory of spontaneous generation ?

(A) Francesco Redi

(B) Edward Jenner

(C) Robert Koch

(D) Louis Pasteur

90. The first person to publish extensive, accurate observations of micro-organism was the amateur microscopist

(A) Edward Jenner

(B) Robert Koch

(C) Louis Pasteur

(D) Antony van Leeuwenhoek

91. Enzymes that catalyze the transfer of electrons (hydride ions/ H-atoms) belongs to which class ?

(A) Oxidoreductase

(B) Isomerases

(C) Ligases

(D) Transferases

92. In covalent catalysis, _____ bond is formed between the enzyme and the substrate.

(A) Permanent ionic bond

(B) A hydrogen bond

(C) A transient covalent

(D) A hydrophobic interaction

93. What are plasmids ?

(A) Essential organelles found in all cells

(B) Extrachromosomal DNA molecules found in some prokaryotes and fungi

(C) Proteins involved in DNA replication

(D) Lipids that form cell membrane

94. What role does potassium ($K^+$) play in cells ?

(A) It is a component of cytochromes

(B) It contributes to heat resistance in bacterial endospores

(C) It serves as a co-factor for many enzymes

(D) It is involved in protein synthesis

95. How is the total magnification of a compound microscope calculated ?

(A) By adding magnification of objective and eye-piece lenses

(B) By subtracting the magnification of eye-piece from the objective

(C) By multiplying magnification of objective and eye-piece lenses

(D) By dividing the magnification of the objective by the eye-piece

96. What is the mordant used in Gram staining procedure ?

(A) Safranin

(B) Iodine

(C) Acid-alcohol

(D) None of the above

97. Louis Pasteur's initial work with pasteurization in the 1860s focused on preventing the spoilage of

(A) Water

(B) Milk

(C) Meat

(D) Wine

98. Ionizing radiation is described as an excellent sterilizing agent because it

(A) Primarily affects the surface of objects

(B) Readily penetrates deep into objects and will destroy bacterial endospores and vegetative cells

(C) Cannot penetrate solid objectives

(D) Is only effective against viruses and not bacteria

99. How can competitive inhibition could be overcome ?

(A) By increasing enzyme concentration

(B) By decreasing the inhibition concentration

(C) By high substrate concentration

(D) By decreasing product concentration

100. According to ping-pong mechanism of facilitated diffusion, a transport protein exist in

(A) Two conformations

(B) A single stable conformation

(C) Three or more intermediate conformations

(D) Conformation that constantly changes