

## PG/INTEGRATED PG ENTRANCE EXAMINATION, APRIL 2023

## MICROBIOLOGY

Time : Two Hours

Maximum : 400 Marks

*Each questions carries 4 marks.**1 mark will be deduced for each wrong answer.*

1. Streptomycin is discovered by :
  - (a) Alexander Fleming.
  - (b) Selman Waksman.
  - (c) Sergei Winogradsky.
  - (d) Joseph Lister.
2. Theory of spontaneous generation was disproved by :
  - (a) Robert Koch.
  - (b) Edward Jenner.
  - (c) Franscisco Reddi.
  - (d) Louis Pasteur.
3. *Mycobacterium tuberculosis* was first cultivated by :
  - (a) Robert Koch.
  - (b) Antonie van Leeuwenhoek.
  - (c) Martinus Beijerinick.
  - (d) Alexander flexing.
4. The term animalcules were coined by :
  - (a) Louis Pasteur.
  - (b) Antonie van Leeuwenhoek.
  - (c) Paul Ehrlich.
  - (d) Paul Berg.
5. Pure culture is a culture that contain :
  - (a) A type of organism.
  - (b) A species of organism.
  - (c) A genus of organisms.
  - (d) A family of organisms.
6. Agar was first extracted from :
  - (a) Plant.
  - (b) Algae.
  - (c) Actinomycetes.
  - (d) Bacteria.
7. The earthy smell of soil is due to the present of \_\_\_\_\_.
  - (a) Actinomycetes.
  - (b) Soil bacteria.
  - (c) Fungal spores.
  - (d) Soil nutrients.

**Turn over**

8. The symbiotic association between fungi and plant root :
- (a) Lichen. (b) Mycorrhiza.  
(c) Both (a) and (b). (d) Auxotroph.
9. The organisms that fix the nitrogen are termed as :
- (a) Nitrogen fixers. (b) Diazotrophs.  
(c) Mixotrophs. (d) Autotrophs.
10. Which of the following is a selective medium for Salmonella ?
- (a) EMB agar. (b) Mannitol Salt Agar.  
(c) DC agar. (d) Tellurite Blood agar.
11. A small molecule that elicits an immune response only when attached to a large carrier such as a protein is called \_\_\_\_\_.
- (a) Complement. (b) Hapten.  
(c) Adjuvant. (d) Epitope.
12. The antibodies that cross the placenta :
- (a) IgG. (b) IgM.  
(c) IgD. (d) IgE.
13. The monoclonal antibodies are first produced by hybridoma technology were \_\_\_\_\_.
- (a) Élie Metchnikoff. (b) Georges Köhler.  
(c) Tasuku Honjo. (d) Gregory Winter.
14. The part of an antigen that is recognized by antibodies, B cells, or T cells are called :
- (a) Epitope. (b) Paratope.  
(c) Isotope. (d) Allotope.
15. An example of secondary lymphoid organ is \_\_\_\_\_.
- (a) Bone marrow. (b) Thymus.  
(c) Spleen. (d) All of these.

16. Immediate hypersensitivity reactions are :
- (a) Type I. (b) Type II.  
(c) Type III. (d) All of these.
17. The MHC molecules that are expressed in macrophages, B cells, and dendritic cells are :
- (a) MHC class I. (b) MHC class II.  
(c) MHC class III. (d) All of these.
18. Which of the following is not an autoimmune disease ?
- (a) Rheumatoid arthritis. (b) Celiac disease.  
(c) All of these. (d) None of these.
19. The serological test used for the detection of syphilis :
- (a) WIDAL. (b) RA.  
(c) HBsAg. (d) RPR.
20. An infection after medical or surgical management, whether or not the patient was hospitalized is called \_\_\_\_\_.
- (a) Congenital infection. (b) Iatrogenic infection.  
(c) Nosocomial infection. (d) Systemic infection.
21. The humoral immune response is mediated by \_\_\_\_\_:
- (a) Antigen. (b) Antibody.  
(c) Dendritic cell. (d) Complement.
22. ELISA test can be used to detect :
- (a) Antigen. (b) Antibody.  
(c) Both. (d) HIV.
23. In the case of agglutination reaction, the antigen is \_\_\_\_\_.
- (a) Soluble. (b) Insoluble.  
(c) Partially soluble. (d) Neither soluble nor insoluble.

Turn over

24. An inflammatory disease caused when the immune system attacks its own tissues is called:
- (a) Systemic lupus erythematosus.
  - (b) Polymyalgia rheumatica.
  - (c) Sjögren's syndrom.
  - (d) Celiac disease.
25. The molecular weight of IgG is \_\_\_\_\_ kDA.
- (a) 150.
  - (b) 110.
  - (c) 160.
  - (d) 180.
26. Which of the following is the weakest interactions ?
- (a) Hydrophobic.
  - (b) Ionic.
  - (c) Vander Waals.
  - (d) Electrostatic.
27. The hybridisation in water molecules :
- (a)  $Sp^2$ .
  - (b)  $Sp^3$ .
  - (c)  $Sp$ .
  - (d)  $Sp^4$ .
28. Lactose is made up of \_\_\_\_\_ and \_\_\_\_\_.
- (a) Glucose, Fructose.
  - (b) Glucose, Galactose.
  - (c) Galactose, Fructose.
  - (d) Glucose, Mannose.
29. Which of the following is an example of homopolysaccharide ?
- (a) Peptidoglycan.
  - (b) Cellulose.
  - (c) Chitin.
  - (d) Starch.
30. The specific rotatory power of  $\alpha$ -D-Glucose is :
- (a)  $+ 52.2^\circ$ .
  - (b)  $- 52.2^\circ$ .
  - (c)  $+ 112^\circ$ .
  - (d)  $- 112^\circ$ .
31. The enzyme sucrose alpha-glucohydrolase is known as :
- (a) Sucrase.
  - (b) Invertase.
  - (c) Lactase.
  - (d) None of these.

32. Which of the following is anticoagulating agent ?
- (a) Hyaluronic acid. (b) Heparin.  
(c) Pectin. (d) Inulin.
33. According to Henderson-Hasselbalch equation, the pH can be defined as :
- (a) Sum of dissociation constant and logarithmic values of ratio of proton donor to proton acceptor.  
(b) Sum of dissociation constant and logarithmic values of ratio of proton acceptor to proton donor.  
(c) Sum of ionization constant and logarithmic values of ratio of proton acceptor to proton donor.  
(d) Sum of ionization constant and logarithmic values of ratio of proton donor to proton acceptor.
34. A Lewis acid is :
- (a) A chemical substance that accept electrons.  
(b) A chemical substance that accept proton.  
(c) A chemical substance that stabilized by conjugate base pair.  
(d) All of these.
35. The substance which are reduced in a chemical reaction :
- (a) Oxidizing agent. (b) Reducing agent.  
(c) Redox agent. (d) All of these.
36. Which of the following the most commonly used and widely accepted structural representation of glucose ?
- (a) Fitting Bayer formula. (b) Fischer's projection formula.  
(c) Haworth perspective formula. (d) All of these.
37. The cell wall component of bacterial cell named N- acetyl muramate is an example of :
- (a) Amino sugar. (b) Deoxy sugar.  
(c) Acid sugar. (d) Basic sugar.

Turn over

38. Which of the following component is directly attached to the peptidoglycan content of Gram-positive bacteria ?
- (a) Lipo-polysaccharide. (b) O-Antigen.  
(c) Teichoic acid. (d) All of these.
39. Which of the following body part is commonly affected by Gaucher disease ?
- (a) Kidney. (b) Brain.  
(c) Liver. (d) All of these.
40. Niemann-Pick syndrome is a disease characterized by the absence of sphingomyelinase which cleave \_\_\_\_\_, in the absence of this enzyme sphingomyelins accumulate in the brain
- (a) Spingosine. (b) Choline.  
(c) Phosphocholine. (d) Fatty acid.
41. Which of the following fat has maximum percentage of PUSFA ?
- (a) Pork. (b) Beef.  
(c) Butter. (d) Chicken.
42. The approximate percentage of triglyceride present in cytoplasm of a cell :
- (a) 60. (b) 70.  
(c) 80. (d) 90.
43. Which of the following oil can be used to make biodiesel ?
- (a) Jatropha. (b) Algae.  
(c) Pongamia. (d) All of these.
44. Which of the following compound present in the venom of King Cobra ?
- (a) Lecithin. (b) Lysolecithin.  
(c) Cephalin. (d) All of these.
45. Which of the following polysaccharide used in food industries to make jam and jellies ?
- (a) Starch. (b) Pectin.  
(c) Chitin. (d) Xylan.

46. The cell wall of *Aspergillus niger* is mainly composed of \_\_\_\_\_.
- (a) Starch. (b) Chitin.  
(c) Pectin. (d) Xylan.
47. Which of the following polysaccharides are known as biological lubricants ?
- (a) Pectin. (b) Chitin.  
(c) Hyaluronate. (d) Heparin.
48. The major amino acids present in the peptide unit of peptidoglycan in Gram negative bacteria :
- (a) L alanine, D glutamine, L lysine, D alanine.  
(b) L-alanine, D-glutamic acid, mesodiaminopimelic acid, D-alanine.  
(c) L-alanine, D glutamine, mesodiaminopimelic acid, D-alanine.  
(d) L alanine, mesodiaminopimelic acid, L lysine, D alanine.
49. What is the standard used to compare the results in pH scale ?
- (a) The value of acid- base concentration.  
(b) The dissociation constant of acid and bases.  
(c) Water.  
(d) All of these.
50. The pH of a solution as the negative logarithm of the concentration in \_\_\_\_\_ of hydrogen ions.
- (a) KJ/mol. (b) Mol/litre.  
(c) Litre/mol. (d) Mol/KJ.
51. Which of the following amino acid is exemplified from Ramachandran plot :
- (a) F. (b) D.  
(c) P. (d) N.
52. The probable structural conformations of the amino acids in which Phi ( $\phi$ ) and the Psi ( $\psi$ ) angles fall in the lower left side of the Ramachandran plot is :
- (a) Right-handed alpha helices. (b) Left-handed alpha helices.  
(c) Anti-parallel Beta sheet. (d) Parallel Beta sheet.

Turn over

53. The major biochemical process involved in the formation of the peptide linkage :
- (a) Condensation. (b) Dehydration.  
(c) Hydrolytic condensation. (d) Hydrolysis.
54. Which of the following is the latest method for the structural elucidation of protein ?
- (a) X-ray Crystallography. (b) Nuclear Magnetic Resonance.  
(c) Mass spectroscopy. (d) Cryoelectron Microscopy
55. The single letter code E stands for :
- (a) Glutamine. (b) Aspartate.  
(c) Glutamate. (d) Asparagine.
56. The main low molecular weight regulatory glycoproteins produced by many eukaryotic cells in response to numerous inducers are called :
- (a) Defensins. (b) Interleukins.  
(c) Interferons. (d) Endorphins.
57. Which of the following non-standard amino acid is present in Gram positive bacteria ?
- (a)  $\gamma$  Carboxyglutamate. (b)  $\alpha$  Amino adipate.  
(c)  $\alpha \epsilon$  Diaminopimelate. (d) All of these.
58. Which of the following is NOT a primary objective of gel electrophoresis of protein ?
- (a) To analyse the purity of a protein sample.  
(b) To study the heterogeneity and extent of degradation of a protein sample.  
(c) To analyse the composition of protein subunit.  
(d) To elucidate the 3D structure of protein.
59. Which of the following component is used as an anionic detergent in Sodium dodecyl sulphate polyacrylamide gel electrophoresis ?
- (a) Polyacrylamide. (b) Acrylamide.  
(c) Bis acrylamide. (d) SDS.



60. You have a mixture of three proteins with a molecular weight of 180 kDA, 90 kDA and 50 kDA. You are planning to separate these proteins by PAGE. What is the probable concentration of acrylamide you will use for the preparation of the gel for effective separation of these three proteins ?
- (a) 8, 10 and 12.5 % acrylamide for 180, 90 and 50 kDA proteins respectively.
  - (b) 12.5, 8 and 10 % acrylamide for 180, 90 and 50 kDA proteins respectively.
  - (c) 12.5, 10 and 8 % acrylamide for 180, 90 and 50 kDA proteins respectively.
  - (d) 8, 12.5, 10 % acrylamide for 180, 90 and 50 kDA proteins respectively.
61. The group of enzymes that catalyse the removal of groups from particular substrate by a mechanism except hydrolytic degradation is called :
- (a) Ligases.
  - (b) Lyases.
  - (c) Transferases.
  - (d) Synthetases.
62. Which of the following is an Iron porphyrin containing enzyme ?
- (a) Phosphorylase.
  - (b) Pyruvate mutase.
  - (c) Catalase.
  - (d) Glycine oxidase.
63. Which of the following reagent contain the chemical compound p-dimethyl aminobenzaldehyde ?
- (a) Barrit's reagent.
  - (b) Kovac's reagent.
  - (c) Hucker's reagent.
  - (d) None of these.
64. The EC number of hexokinase by IUB is E. C.2.7.1.1. The first digit of this number represents :
- (a) The enzyme.
  - (b) Subclass.
  - (c) Class.
  - (d) sub subclass.
65. In the case of competitive inhibition, the inhibitor binds specifically to \_\_\_\_\_.
- (a) Allosteric site.
  - (b) Catalytic site.
  - (c) Surface of the enzymes.
  - (d) Structurally similar regions.

Turn over

66. Induced fit model mainly deals with the :
- (a) Formation of enzyme substrate complex in presence of inhibitors.
  - (b) The enzyme is specifically bound with the substrate with a specific activation energy.
  - (c) The concentration of the substrate is higher than that of the inhibitors.
  - (d) The enzyme active site undergoes dynamic conformational change for ideal interaction.
67. A collection of highly conserved protein regions that are specialised with a particular structure and function is known as :
- (a) Motif.
  - (b) Domain.
  - (c) Both of these.
  - (d) Fold.
68. The 3D structure of Myoglobin is elucidated by :
- (a) Frederick Sanger.
  - (b) Linus Pauling.
  - (c) John Kendrew.
  - (d) Max Perutz.
69. Michaelis constant ( $K_m$ ) is :
- (a) The ideal substrate concentration required to achieve **maximal velocity** of an enzymatic reaction.
  - (b) The ideal substrate concentration required to achieve **half maximal velocity** of an enzymatic reaction.
  - (c) The half substrate concentration required to achieve **maximal velocity** of an enzymatic reaction.
  - (d) The half substrate concentration required to achieve **half maximal velocity** of an enzymatic reaction.
70. In an enzymatic reaction, the energy level of the products will be always \_\_\_\_\_ to that of the substrates.
- (a) Equal.
  - (b) Lower.
  - (c) Higher.
  - (d) Neither low nor high.
71. The first person who conducted the x ray crystallographic studies to elucidate the structure of DNA :
- (a) Maurice Wilkins.
  - (b) Rosalind Franklin.
  - (c) James D Watson.
  - (d) Franklin H Shal.

72. The term "ribose puckering" denote :
- (a) The possible number of cis and trans isomers of sugar.
  - (b) The structural conformation of the ribose ring.
  - (c) The position of hydroxyl group present in the ribose sugar.
  - (d) The number of carbon atom present in the five membered rings.
73. The DNA structure proposed by Watson and Crick :
- (a) A DNA.
  - (b) B DNA.
  - (c) Z DNA.
  - (d) C DNA.
74. The scientist who studies the conformations of the nitrogenous bases in DNA :
- (a) WT Astbury.
  - (b) Maurice Wilkins.
  - (c) Erwin Chargaff.
  - (d) Linus Pauling.
75. The major force that stabilized by sugar and phosphate group in DNA :
- (a) Glycosidic linkage.
  - (b) Phosphodiester bond.
  - (c) Both of the above.
  - (d) Hydrogen bonding.
76. Which of the following is known as Kornberg enzyme ?
- (a) RNA polymerase.
  - (b) DNA Polymerase.
  - (c) Reverse transcriptase.
  - (d) Topoisomerase.
77. The major enzyme that possesses 5'-3' exonuclease activity in DNA replication :
- (a) RNA polymerase I.
  - (b) DNA polymerase I.
  - (c) DNA dependant RNA polymerase.
  - (c) RNA dependant DNA polymerase.

Turn over

78. Okazaki fragments are \_\_\_\_\_.
- (a) Short sequences of nucleotides which are synthesized discontinuously and linked by DN ligase.
  - (b) Short sequences of nucleotides which are synthesized continuously and linked by DN ligase.
  - (c) Short sequences of nucleotides which are synthesized discontinuously and linked by RN polymerase.
  - (d) Short sequences of nucleotides which are synthesized continuously and linked by RN polymerase.
79. The Sequence Present in the Pribnow box of DNA which binds to the sigma factor of RNA polymerase is :
- (a) TATAAT.
  - (b) TATATA.
  - (c) ATTATA.
  - (d) ATATAT.
80. The "charged tRNA" in translation is mainly happened due to the activity of \_\_\_\_\_.
- (a) Ribozymes.
  - (b) Peptidyl transferase.
  - (c) Aminoacyl tRNA synthetase.
  - (d) All of these.
81. Which of the following is a typical inhibitor of protein synthesis ?
- (a) Tetracycline.
  - (b) Gentamycin.
  - (c) Nitrofurantoin.
  - (d) Amoxicillin.
82. The translation is taking place in :
- (a) Ribosomes present in cytosol.
  - (b) Ribosomes present in cytosol and rough endoplasmic reticulum.
  - (c) In free ribosomes.
  - (d) Both in nucleus and ribosomes present in cytosol.
83. Shine- Dalgarno sequence is mainly present near to \_\_\_\_\_ of mRNA in E. coli
- (a) 3'-OH codon.
  - (b) 5'- methionine codon.
  - (c) 5'- formyl-methionine codon.
  - (d) 3-polyA tail.

84. The permissible limit for the chlorination level in Household treatment of water is :
- (a) 0.01-0.005 ppm. (b) 0.1-0.5 ppm.  
(c) 1-5 ppm. (d) 10-50 ppm.
85. The percentage of freshwater in the earth available for drinking ?
- (a) 2.8 %. (b) 3.2 %.  
(c) 1.7 %. (d) 4.6 %.
86. According to WHO, the permissible Coliform count per 100 ml for drinking water is
- (a) 1.  
(b) 10.  
(c) 0.  
(d) There is no specific value, but it should be less than 10.
87. Which of the following is NOT an ideal criterion expected for an indicator bacterium ?
- (a) The indicator bacterium should survive almost same time as the enteric pathogen.  
(b) The quantity of indicator organisms correlates with the amount of pollution.  
(c) The indicator bacterium should be present whenever enteric pathogens are present.  
(d) All of these.
88. The major coagulant-Alum used for the purification of drinking water is \_\_\_\_\_.
- (a) Calcium sulfate. (b) Aluminum sulfate.  
(c) Magnesium sulfate. (d) Iron sulfate.
89. Which of the following is NOT a conventional medium used for the presumptive test in MPN analysis ?
- (a) Lactose broth. (b) Lauryl tryptose broth.  
(c) MacConkey broth. (d) Brilliant green lactose broth.
90. If the BOD values of the water sample are high, then the amount of dissolved oxygen present in that water sample is \_\_\_\_\_.
- (a) High. (b) Low.  
(c) Low to high. (d) Intermediate.

Turn over

99. A group of organisms believed to **comprise all the** evolutionary descendants of a common ancestor is called :

(a) Node.

(b) Taxa.

(c) Clade.

(d) Root.

100. Which of the following is a specialised data base ?

(a) UniProt.

(b) DDBJ.

(c) OMIM.

(d) PIR.