

Roll No.

Question Booklet Number

O. M. R. Serial No.

--	--	--	--	--	--	--	--

M. Sc. (Biotechnology) (Second Semester)

EXAMINATION, 2022-23

MICROBIOLOGY

Paper Code

M	B	T	2	0	0	2
---	---	---	---	---	---	---

Questions Booklet
Series

A

Time : 1:30 Hours]

[Maximum Marks : 75

Instructions to the Examinee :

परीक्षार्थियों के लिए निर्देश :

- Do not open the booklet unless you are asked to do so.
 - The booklet contains 100 questions. Examinee is required to answer 75 questions in the OMR Answer-Sheet provided and not in the question booklet. All questions carry equal marks.
 - Examine the Booklet and the OMR Answer-Sheet very carefully before you proceed. Faulty question booklet due to missing or duplicate pages/questions or having any other discrepancy should be got immediately replaced.
- प्रश्न-पुस्तिका को तब तक न खोलें जब तक आपसे कहा न जाए।
 - प्रश्न-पुस्तिका में 100 प्रश्न हैं। परीक्षार्थी को 75 प्रश्नों को केवल दी गई OMR आन्सर-शीट पर ही हल करना है, प्रश्न-पुस्तिका पर नहीं। सभी प्रश्नों के अंक समान हैं।
 - प्रश्नों के उत्तर अंकित करने से पूर्व प्रश्न-पुस्तिका तथा OMR आन्सर-शीट को सावधानीपूर्वक देख लें। दोषपूर्ण प्रश्न-पुस्तिका जिसमें कुछ भाग छपने से छूट गए हों या प्रश्न एक से अधिक बार छप गए हों या उसमें किसी अन्य प्रकार की कमी हो, तो उसे तुरन्त बदल लें।

(Remaining instructions on the last page)

(शेष निर्देश अन्तिम पृष्ठ पर)

(Only for Rough Work)

1. For the examination of microbial cells we require the use of :
 - (A) High-power microscope
 - (B) Low-power microscope
 - (C) High-power microscope at a magnification of about 1,000 ×
 - (D) Low-power microscope at a magnification of about 1,000 ×

2. Lipopolysaccharide in cell walls is characteristic of :
 - (A) Gram-positive bacteria
 - (B) Gram-negative bacteria
 - (C) Fungi
 - (D) Algae

3. Which microorganism(s) among the following perform photosynthesis by utilizing light ?
 - (A) Cyanobacteria
 - (B) Fungi
 - (C) Viruses
 - (D) Cyanobacteria, Fungi and Viruses

4. Growth of microbes in a solid media is identified by the formation of :
 - (A) pellicle at the top of media
 - (B) colonies
 - (C) sediment at the bottom
 - (D) turbidity

5. The DNA molecule of microorganisms is made up of base pairs of
 - (A) guanine-cytosine
 - (B) adenine-thymine
 - (C) adenine-cytosine
 - (D) guanine-cytosine and adenine-thymine

6. Bdellovibrios is :
 - (A) Bacteriophage
 - (B) Bacterial predator
 - (C) Fungal predator
 - (D) Algal predator

7. Type strain is used for referring to :
 - (A) species
 - (B) genus
 - (C) family
 - (D) division

8. The correct order of taxonomic groups from higher to lower rank is :
 - (A) Kingdom-Order-Class-Family
 - (B) Order-Class-Division-Family-Genus-Species
 - (C) Kingdom-Order-Division-Family-Class-Genus-Species
 - (D) Kingdom-Division-Class-Order-Family-Genus-Species

9. % Similarity (%S) of each strain to every other strain is calculated by which method ?
- (A) Intuitive Method
 - (B) Numerical Taxonomy
 - (C) Genetic Relatedness
 - (D) DNA homology experiments
10. Two organisms which are very closely related to each other have which of the following property ?
- (A) similar mol% G + C values
 - (B) different mol% G + C values
 - (C) similar mol% G + C values and heteroduplexes are formed
 - (D) different mol% G + C values and heteroduplexes are not formed
11. What are ribosomes composed of ?
- (A) Proteins
 - (B) DNA
 - (C) RNA
 - (D) Proteins and RNA
12. If two organisms are distantly related and show no DNA homology, their rRNA cistrons may still be similar.
- (A) True
 - (B) False
13. Which of the following are characteristics of archaeobacteria different from eubacteria ?
- (A) methane-producers
 - (B) extreme halophiles
 - (C) thermoacidophiles
 - (D) methane-producers, extreme halophiles, and thermoacidophiles
14. Which among the following come under Gram-positive eubacteria ?
- (A) Clostridium
 - (B) Actinomyces
 - (C) Rhizobium
 - (D) Clostridium, Actinomyces
15. According to Bergey's Manual of Systematic Bacteriology, prokaryotes that lack a cell wall belong to the group ?
- (A) Gracilicutes
 - (B) Firmicutes
 - (C) Tenericutes
 - (D) Mendosicutes
16. The dye eosinate of methylene blue belongs to which group ?
- (A) Acidic dye
 - (B) Basic dye
 - (C) Neutral dye
 - (D) Oxazine dye

17. What is the correct order of staining reagents in Gram-Staining ?
- (A) Crystal violet, alcohol, iodine solution, safranin
- (B) Crystal violet, iodine solution, alcohol, safranin
- (C) Crystal violet, safranin, alcohol, iodine solution
- (D) Iodine solution, crystal violet, alcohol, safranin
18. Which bacteria appears purple-violet colour after staining ?
- (A) Gram-positive
- (B) Gram-negative
- (C) Both Gram-positive and Gram-negative
- (D) Neither Gram-positive nor Gram-negative
19. Plasmids are circular DNA molecules capable of autonomous replication.
- (A) True
- (B) False
20. Gram-positive bacteria are usually more susceptible to :
- (A) streptomycin
- (B) tetracyclin
- (C) penicillin
- (D) ampicillin
21. Which of the staining technique helps in demonstrating spore structure in bacteria as well as free spores ?
- (A) Acid-fast stain
- (B) Endospore stain
- (C) Capsule stain
- (D) Flagella stain
22. In Gram-staining, iodine is used as a
- (A) fixative
- (B) mordant
- (C) solublizer
- (D) stain
23. Which of the following is the example of Gram-negative bacteria ?
- (A) Lactobacillus
- (B) Eschericia coli
- (C) Staphylococcus aureus
- (D) Bacillus subtilis

24. What are the blood serum proteins produced by animals called ?
- (A) Enzymes
 - (B) Antibodies
 - (C) Amino acids
 - (D) Toxins
25. In the classification of bacteria according to shape, which among the following refers to cuboidal arrangement of bacterial cells ?
- (A) Tetrads
 - (B) Staphylococci
 - (C) Sarcinae
 - (D) Streptococci
26. Which group of bacteria among the following have the largest area of contact ?
- (A) Palisades
 - (B) Trichomes
 - (C) Streptobacilli
 - (D) Diplobacilli
27. Which among the following are "Spirochetes" ?
- (A) *Spirillum volutans*
 - (B) *Corynebacterium diphtheriae*
 - (C) *Streptomyces* sp.
 - (D) *Treponema pallidum*
28. Which of the following are true for Gram-negative bacteria ?
- (A) upon alcohol treatment, the permeability of the cell wall increases
 - (B) crystal violet-iodine (CV-I) complex is extracted
 - (C) pore size decreases and the CV-I complex cannot be extracted
 - (D) alcohol treatment increases the permeability of the cell wall and the CV-I complex can be extracted
29. Which among the following kingdoms were proposed by Whittaker ?
- (A) Monera
 - (B) Protista, Fungi
 - (C) Plantae, Animalia
 - (D) Monera, Protista, Fungi, Plantae, Animalia
30. Bacteria with less than a complete twist or comma shaped is known as :
- (A) spirilla
 - (B) helical
 - (C) vibrioid
 - (D) spirochetes

31. Which of the following are functions of the stalk ?
- (A) nutrient absorption
 - (B) motility
 - (C) attachment of the cells to surfaces
 - (D) human infection
32. Peptidoglycan is made up of
- (A) N-acetylglucosamine
 - (B) N-acetylmuramic acid
 - (C) N-acetylglucosamine, N-acetylmuramic acid
 - (D) N-acetylglucosamine, N-acetylmuramic acid, amino acids
33. The L Ring in Gram-Negative bacterium flagella is associated with
- (A) Peptidoglycan
 - (B) Outer membrane
 - (C) Cytoplasmic membrane
 - (D) Cell membrane
34. When rod shaped bacteria appears in pairs, it is known as :
- (A) Diplobacilli
 - (B) Streptobacilli
 - (C) Diplococci
 - (D) Staphylococci
35. Which among the following acts as a transport protein for protons in flagellar motion ?
- (A) fli protein
 - (B) cGMP
 - (C) atp
 - (D) mot protein
36. F pilus has a major role as
- (A) motility of the cell
 - (B) port of entry of genetic material during mating
 - (C) attachment to host cell
 - (D) human infection
37. Prosthecae helps in
- (A) motility
 - (B) nutrient absorption and attachment to surfaces
 - (C) human infection
 - (D) protection from the environment
38. The capsule of *Klebsiella pneumoniae* is composed of heteropolysaccharides.
- (A) True
 - (B) False

39. When a bacteria swim towards a chemical, it is termed as
- (A) positive chemotaxis
 - (B) phototaxis
 - (C) negative chemotaxis
 - (D) magnetotaxis
40. Which type of force drives the flagellar motion ?
- (A) Protonmotive force
 - (B) ATP driven
 - (C) Protonmotive and ATP driven
 - (D) No protonmotive nor ATP driven
41. Peptidoglycan layer is present in large quantity in :
- (A) Gram-positive bacteria
 - (B) Gram-negative bacteria
 - (C) Fungi
 - (D) Algae
42. Teichoic acid present in Gram-positive bacteria can bind to which ion ?
- (A) Fe ions
 - (B) Phosphorus ions
 - (C) Mg ions
 - (D) Sulphur ions
43. Bacteria having clusters of flagella at both poles of cells are known as :
- (A) Lophotrichous
 - (B) Peritrichous
 - (C) Amphitrichous
 - (D) Monotrichous
44. Cord factor is a
- (A) protein
 - (B) teichoic acid derivative
 - (C) mycolic acid derivative
 - (D) carbohydrate
45. The outer membrane of the Gram-negative cell wall is anchored to the underlying peptidoglycan by means of which of the following ?
- (A) Braun's Lipoprotein
 - (B) Phospholipids
 - (C) Proteins
 - (D) Lipopolysaccharide
46. Which among the following acts as receptors for bacteriophage attachment in Gram-negative bacteria ?
- (A) Cilia
 - (B) O antigens
 - (C) Lipid A
 - (D) Teichoic acid
47. Porins are special proteins act as channels in the outer membrane of Gram-negative bacteria.
- (A) True
 - (B) False

48. Gram-negative bacteria are more resistant to antibiotics due to the presence of :
- (A) Thin peptidoglycan wall
 - (B) Outer lipopolysaccharide layer
 - (C) Porin proteins
 - (D) Teichoic acid
49. Polyisoprenoid branched-chain lipids, are present in which of the following ?
- (A) Archaeobacteria
 - (B) Eubacteria
 - (C) Archaeobacteria and Eubacteria
 - (D) Cannot be determined
50. Cytoplasmic membrane and the cell material bounded by it plus the outer membrane of cell is known as
- (A) Protoplast
 - (B) Cytoplasm
 - (C) Spheroplast
 - (D) Cell membrane
51. Ribosomes of prokaryotes have a sedimentation coefficient of :
- (A) 90S
 - (B) 80S
 - (C) 50S
 - (D) 70S
52. Poly-beta-hydroxybutyrate(PHB) present in aerobic bacteria can serve as :
- (A) a reserve carbon and energy source
 - (B) a reserve source of phosphate
 - (C) acceptor of oxygen
 - (D) provides buoyancy
53. Which among the following compound when added to cytoplasmic membrane helps in maintaining the rigidity of cell ?
- (A) lipopolysaccharide
 - (B) hopanoid
 - (C) phosphoglycerides
 - (D) amino acids
54. The nucleoid can be made visible under the light microscope by
- (A) Methylene blue
 - (B) Iodine
 - (C) Nile blue
 - (D) Feulgen staining
55. What helps in the heat resistance of the endospore ?
- (A) calcium-DPA complex
 - (B) water
 - (C) methylene
 - (D) calcium

56. What is the approximate size of the bacterial cell ?
- (A) 2 mm in diameter
 (B) 1 mm in diameter
 (C) 2 micrometer in diameter
 (D) 0.5 to 1.0 micrometer in diameter
57. Cysts also have high heat resistance like endospores.
- (A) True
 (B) False
58. Which of the following methods can be utilized for removing peripheral proteins of the cytoplasmic membrane ?
- (A) treatment by detergents
 (B) osmotic shock
 (C) heat application
 (D) None of the above
59. Which of the following are true for cytoplasmic membrane ?
- (A) hydrophilic barrier
 (B) hydrophobic barrier
 (C) site of generation of protonmotive force
 (D) hydrophobic barrier and site of generation of protonmotive force
60. The organisms which can use reduced inorganic compounds as electron donors are known as
- (A) chemotrophs
 (B) organotrophs
 (C) lithotrophs
 (D) phototrophs
61. Which of the following is the nutritional characterization of Escherichia coli ?
- (A) Chemotrophic
 (B) Organotrophic
 (C) Autotrophic
 (D) Organotrophic, Heterotrophic
62. Which of the following amino acids require sulphur for their synthesis ?
- (A) tryptophan
 (B) methionine
 (C) cystine
 (D) methionine and cystine
63. Phosphorus is essential component of
- (A) teichoic acid
 (B) nucleotides
 (C) phospholipids
 (D) teichoic acid, nucleotides, phospholipids

64. Which of the following is trace elements ?
- (A) Potassium ion
 - (B) Sodium ion
 - (C) Copper ion
 - (D) Magnesium ion
65. Which of the following ions are cofactors for various enzymes ?
- (A) Potassium ion
 - (B) Iron ion
 - (C) Magnesium ion and Iron ion
 - (D) Calcium ion
66. "Red extreme halophiles", are members of the archaebacterial which cannot grow with less than 12 to 15 percent NaCl.
- (A) True
 - (B) False
67. Which of the following are present in teichoic acids ?
- (A) Ribitol residues
 - (B) Glycerol residues
 - (C) Glucose residues
 - (D) Ribitol or glycerol residues
68. Which of the following are functions of water in the culture medium ?
- (A) nutrients must be in aqueous solution
 - (B) cofactor of enzymes
 - (C) provides resistance to sudden transient temperature changes
 - (D) it is a chemical reactant, nutrients must also be present in aqueous solution and provide resistance to sudden temperature changes
69. Which of the following is used as a solidifying agent for media ?
- (A) Beef extract
 - (B) Peptone
 - (C) Agar
 - (D) Yeast extract
70. Which of the following is a rich source of B vitamins ?
- (A) Peptone
 - (B) Yeast extract
 - (C) Beef extract
 - (D) Agar

71. The isolation of gonorrhoea-causing organism, *Neisseria gonorrhoeae* by the use of certain antibiotics in media is an example of which of the following ?
- (A) Selective media
 - (B) Differential media
 - (C) Enriched media
 - (D) Assay media
72. Which of the following instrument is used for sterilizing the media after it has been prepared ?
- (A) Autoclave
 - (B) Laminar Air Flow Chamber
 - (C) Inoculum Needle
 - (D) Incubator
73. Colony formation can be observed in liquid media broth.
- (A) True
 - (B) False
74. Which of the following is a Complex media for fungal growth ?
- (A) Nutrient broth
 - (B) Luria-Bertani media
 - (C) Potato Dextrose Agar (PDA) media
 - (D) Mac Conkey Agar media
75. Which of the following are functions of Maintenance Media ?
- (A) Used for assay of vitamins, amino acids
 - (B) Used for determining the bacterial content
 - (C) Used for determining the type of growth produced by bacteria
 - (D) Used for the maintenance of the viability and physiological characteristics
76. Which of the following bacteria requires nicotinic acid as a growth factor in their media ?
- (A) *Proteus vulgaris*
 - (B) *Nitrosomonas* sp.
 - (C) *E. coli*
 - (D) *Leuconostoc mesenteroides*
77. Growth of bacteria or microorganisms refer to
- (A) an increase in the size of an individual organism
 - (B) an increase in the mass of an individual organism
 - (C) changes in the total population
 - (D) an increase in number of cells

78. Transverse binary fission requires the formation of a crosswall.
- (A) True
(B) False
79. Which of the following bacterial species divides by fragmentation ?
- (A) *Bacillus subtilis*
(B) *Streptococcus faecalis*
(C) *Rhodopseudomonas acidophila*
(D) *Nocardia* sp.
80. *Rhodopseudomonas acidophila* reproduces by which of the following methods ?
- (A) Binary fission
(B) Budding
(C) Fragmentation
(D) Sporulation
81. The synthesis of new membrane material during reproduction in Gram-positive cells is performed by which of the following organelles ?
- (A) Nucleus
(B) Mesosome
(C) Endoplasmic Reticulum
(D) Cytoplasmic membrane
82. When septum formation occurs near the pole of cell then it results in the formation of daughter cell known as
- (A) microcell
(B) macrocell
(C) minicell
(D) daughter cell
83. A bleb or fold like formation occurs in which of the following bacteria ?
- (A) *Rhodopseudomonas acidophila*
(B) *Bacillus subtilis*
(C) *E. coli*
(D) *Streptococcus faecalis*
84. NAG and NAM of peptidoglycan layer is linked by
- (A) beta-(1, 4) glycosidic linkage
(B) alpha-(1, 4) glycosidic linkage
(C) alpha-(1, 6) glycosidic linkage
(D) beta-(1, 6) glycosidic linkage
85. Which of the following does not occur during binary fission in bacteria ?
- (A) Cell elongation
(B) Cytokinesis
(C) DNA duplication
(D) Spindle formation

86. Which of the following is an indirect method for measuring bacterial growth ?
- (A) Cell count
 - (B) Cell mass
 - (C) Cell activity
 - (D) Both Cell mass and Cell activity
87. Which of the following instrument is used for the bacterial count ?
- (A) Petroff-Hausser counting chamber
 - (B) Microscope
 - (C) Chemostat
 - (D) Turbidostat
88. Which of the following is the relationship between optical density and cell mass ?
- (A) Exponentially proportional
 - (B) Linearly proportional
 - (C) Inversely proportional
 - (D) Not related
89. Which among the following are produced by microorganisms ?
- (A) Fermented dairy products
 - (B) Breads
 - (C) Alcoholic beverages
 - (D) Fermented dairy products, breads and alcoholic beverages
90. Bayer's junctions are sites which help in joining which of the following ?
- (A) Cytoplasmic membrane and outer membrane
 - (B) Outer membrane and capsule
 - (C) Cytoplasmic membrane and periplasmic space
 - (D) Peptidoglycan layer and cytoplasmic membrane
91. Which of the following methods is used for a viable count of a culture ?
- (A) Direct microscopic count
 - (B) Plate-count method
 - (C) Membrane-filter count
 - (D) Plate-count method and membrane-filter count
92. Sabouraud media for the growth of fungi is composed of
- (A) glucose and ammonia
 - (B) maltose and peptone
 - (C) sucrose and peptone
 - (D) peptone

93. Complement-fixation is done for laboratory diagnosis of which of the following diseases ?
- (A) Poliomyelitis
 - (B) Mumps
 - (C) Measles
 - (D) FMD
94. Yellow fever is caused by
- (A) Alphaviruses
 - (B) Rubellaviruses
 - (C) Flaviviruses
 - (D) Pestiviruses
95. Which of the following viruses consists of a helical nucleocapsid ?
- (A) Picornaviruses
 - (B) Togaviruses
 - (C) Adenoviruses
 - (D) Coronaviruses
96. Which drug is used to cure influenza caused by type A strains ?
- (A) Penicillin
 - (B) Amantadine
 - (C) Ampicillin
 - (D) Tetracycline
97. What is the shape of the Rhabdoviruses ?
- (A) Bullet
 - (B) Circular
 - (C) Brick-shaped
 - (D) Ovoid
98. For the malaria protozoa, mosquitoes are the definitive host.
- (A) True
 - (B) False
99. Laboratory diagnosis of *Entamoeba histolytica* depends on identification in the
- (A) blood
 - (B) urine
 - (C) saliva
 - (D) stool
100. The schizonts enter which body part ?
- (A) Bloodstream
 - (B) Spleen
 - (C) Mouth
 - (D) Liver

4. Four alternative answers are mentioned for each question as—A, B, C & D in the booklet. The candidate has to choose the correct answer and mark the same in the OMR Answer-Sheet as per the direction :

Example :

Question :

Q. 1 (A) ● (C) (D)

Q. 2 (A) (B) ● (D)

Q. 3 (A) ● (C) (D)

Illegible answers with cutting and over-writing or half filled circle will be cancelled.

5. Each question carries equal marks. Marks will be awarded according to the number of correct answers you have.
6. All answers are to be given on OMR Answer sheet only. Answers given anywhere other than the place specified in the answer sheet will not be considered valid.
7. Before writing anything on the OMR Answer Sheet, all the instructions given in it should be read carefully.
8. After the completion of the examination candidates should leave the examination hall only after providing their OMR Answer Sheet to the invigilator. Candidate can carry their Question Booklet.
9. There will be no negative marking.
10. Rough work, if any, should be done on the blank pages provided for the purpose in the booklet.
11. To bring and use of log-book, calculator, pager and cellular phone in examination hall is prohibited.
12. In case of any difference found in English and Hindi version of the question, the English version of the question will be held authentic.

Impt. : On opening the question booklet, first check that all the pages of the question booklet are printed properly. If there is any discrepancy in the question Booklet, then after showing it to the invigilator, get another question Booklet of the same series.

4. प्रश्न-पुस्तिका में प्रत्येक प्रश्न के चार सम्भावित उत्तर—A, B, C एवं D हैं। परीक्षार्थी को उन चारों विकल्पों में से सही उत्तर छँटना है। उत्तर को OMR आन्सर-शीट में सम्बन्धित प्रश्न संख्या में निम्न प्रकार भरना है :

उदाहरण :

प्रश्न :

प्रश्न 1 (A) ● (C) (D)

प्रश्न 2 (A) (B) ● (D)

प्रश्न 3 (A) ● (C) (D)

अपठनीय उत्तर या ऐसे उत्तर जिन्हें काटा या बदला गया है, या गोले में आधा भरकर दिया गया, उन्हें निरस्त कर दिया जाएगा।

5. प्रत्येक प्रश्न के अंक समान हैं। आपके जितने उत्तर सही होंगे, उन्हीं के अनुसार अंक प्रदान किये जायेंगे।
6. सभी उत्तर केवल ओ. एम. आर. उत्तर-पत्रक (OMR Answer Sheet) पर ही दिये जाने हैं। उत्तर-पत्रक में निर्धारित स्थान के अलावा अन्यत्र कहीं पर दिया गया उत्तर मान्य नहीं होगा।
7. ओ. एम. आर. उत्तर-पत्रक (OMR Answer Sheet) पर कुछ भी लिखने से पूर्व उसमें दिये गये सभी अनुदेशों को सावधानीपूर्वक पढ़ लिया जाये।
8. परीक्षा समाप्ति के उपरान्त परीक्षार्थी कक्ष निरीक्षक को अपनी OMR Answer Sheet उपलब्ध कराने के बाद ही परीक्षा कक्ष से प्रस्थान करें। परीक्षार्थी अपने साथ प्रश्न-पुस्तिका ले जा सकते हैं।
9. निगेटिव मार्किंग नहीं है।
10. कोई भी रफ कार्य, प्रश्न-पुस्तिका के अन्त में, रफ-कार्य के लिए दिए खाली पेज पर ही किया जाना चाहिए।
11. परीक्षा-कक्ष में लॉग-बुक, कैलकुलेटर, पेजर तथा सेल्युलर फोन ले जाना तथा उसका उपयोग करना वर्जित है।
12. प्रश्न के हिन्दी एवं अंग्रेजी रूपान्तरण में भिन्नता होने की दशा में प्रश्न का अंग्रेजी रूपान्तरण ही मान्य होगा।

महत्वपूर्ण : प्रश्नपुस्तिका खोलने पर प्रथमतः जाँच कर देख लें कि प्रश्न-पुस्तिका के सभी पृष्ठ भलीभाँति छपे हुए हैं। यदि प्रश्नपुस्तिका में कोई कमी हो, तो कक्षनिरीक्षक को दिखाकर उसी सिरीज की दूसरी प्रश्न-पुस्तिका प्राप्त कर लें।