Roll No. .....

Question Booklet Number

O. M. R. Serial No.

M. Sc. (Biotechnology) (Second Semester)

EXAMINATION, July, 2022

MICROBIOLOGY

Paper Code				
MBT	2	0	0	2

Questions Booklet Series
A

Time : 1:30 Hours] [*Maximum Marks : 100*

Instructions to the Examinee :

1. Do not open the booklet unless you are asked to do so.
2. The booklet contains 60 questions. Examinee is required to answer any 50 questions in the OMR Answer-Sheet provided and not in the question booklet. If more than 50 questions are attempted by student, then the first attempted 50 questions will be considered for evaluation. All questions carry equal marks.
3. 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.

परीक्षार्थियों के लिए निर्देश :

1. प्रश्न-पुस्तिका को तब तक न खोलें जब तक आपसे कहा न जाए।
2. प्रश्न-पुस्तिका में 60 प्रश्न हैं। परीक्षार्थी को किन्हीं 50 प्रश्नों को केवल दी गई OMR आन्सर-शीट पर ही हल करना है, प्रश्न-पुस्तिका पर नहीं। यदि छात्र द्वारा 50 से अधिक प्रश्नों को हल किया जाता है तो प्रारम्भिक हल किये हुए 50 उत्तरों को ही मूल्यांकन हेतु सम्मिलित किया जाएगा। सभी प्रश्नों के अंक समान हैं।
3. 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. Grouping organisms together based on evolutionary relationships rather than external appearance is called as :

(A) Phylogenetic classification

(B) Phenetic classification

(C) Numeric classification

(D) Determinative classification

2. Flexible, spiral-shaped bacteria that have a unique, internal flagellar arrangement are :

(A) Pleomorphic

(B) Spirochetes

(C) Vibrios

(D) Bacilli

3. A group of Gram–positive bacteria containing high G + C relatives :

(A) Basidiomycetes

(B) Actinomycetes

(C) Proteobacteria

(D) *Nostoc*

4. Virulence can be defined as :

(A) The degree or intensity of pathogenicity of an organism as indicated by case survival rates.

(B) The degree or intensity of pathogenicity of an organism as indicated by case fatality rates and/or ability to invade host tissues and cause disease.

(C) Ability to invade host tissues and cause disease.

(D) Both (A) and (C)

5. An infectious agent that is a single-stranded RNA not associated with any protein; the RNA does not code for any proteins and is not translated :

(A) Virusoid

(B) Viroid

(C) Prions

(D) Virion

6. A small, rounded nodular lesion produced by *Mycobacterium tuberculosis* :

(A) Bubo

(B) Sarcoma

(C) Tubercle

(D) None of the above

7. Zoonosis is a disease that can be transmitted from :

(A) humans to animals

(B) animals to humans

(C) animals to animals

(D) air to animals

8. Symbiosis is :

(A) The living together or close association of two similar organisms, each of these organisms being known as a symbiont.

(B) The living together or close association of two dissimilar organisms, each of these organisms being known as a symbiont.

(C) The living together or close association of two similar organisms, each of these organisms being known as a host.

(D) All of the above

9. A microorganism that has its growth optimum between about pH 0 and 5.5 :

(A) Acidophiles

(B) Neutrophiles

(C) Basophiles

(D) Alkaliphiles

10. Transport systems that use ATP hydrolysis to drive translocation across the plasma membrane; can be used for nutrient uptake :

(A) Group translocation system

(B) ATP-binding cassette transporters

(C) Carrier protein

(D) PMF derived system

11. A major change in the antigenic character of an organism that makes it unrecognized by host immune mechanisms :

(A) antigenic drift

(B) antigenic shift

(C) antigenic lift

(D) None of the above

12. Coupled transport of two molecules in which one molecule enters the cell as the other leaves the cell :

(A) Symport

(B) Antiport

(C) Biport

(D) None of the above

13. An energy-conserving process in which the terminal electron transport chain acceptor is a molecule other than oxygen :

(A) Aerobic respiration

(B) Anaphylactic reaction

(C) Anaerobic respiration

(D) Photosynthesis

14. A secreted bacterial protein that kills other closely related bacteria :

(A) Hemolysin

(B) Bacteriocin

(C) Neurotoxin

(D) Cytotoxin

15. A rod-shaped bacterium or archaeon is :

(A) *Streptococcus pyogenes*

(B) *Vibrio cholerae*

(C) *Bacillus anthracis*

(D) *Yersinia pestis*

16. Bacteremia is a pathogenic state related with :

(A) The presence of bacteria toxin in the blood.

(B) The presence of viable bacteria in the blood.

(C) The presence of viable bacteria in the RBCs.

(D) None of the above

17. Archaerhodopsin is :

(A) A transmembranous Fe-S protein, functions as a light-driven proton pump resulting in photo-phosphorylation with chlorophyll or bacteriochlorophyll.

(B) A transmembranous protein to which retinal is bound; it functions as a light-driven proton pump resulting in photophosphorylation without chlorophyll or bacteriochlorophyll.

(C) Found in the purple membrane of halophilic archaea.

(D) Both (B) and (C)

18. Batch culture is :

(A) Growth of microorganisms in an open culture vessel without adding fresh or removing old (spent) medium.

(B) Growth of microorganisms in a closed culture vessel with continuous addition of fresh medium and removal of old (spent) medium.

(C) Growth of microorganisms in a closed culture vessel without adding fresh or removing old (spent) medium.

(D) Growth of microorganisms in an open culture vessel with continuous addition of fresh medium and removal of old (spent) medium.

19. Binomial system is :

(A) The classification system in which an organism is given its identification.

(B) The nomenclature system in which an organism is given one name.

(C) The nomenclature system in which an organism is given two names; the first is the capitalized generic name, and the second is the uncapitalized specific epithet.

(D) The nomenclature system in which an organism is given two names; the first is the capitalized species name, and the second is the uncapitalized generic name.

20. The oxidation and reduction of substances carried out by living organisms and abiotic processes that results in the cycling of elements within and between different parts of the ecosystem and the atmosphere :

(A) Geochemical cycling

(B) Biochemical cycling

(C) Biogeochemical cycling

(D) Eco-chemical cycling

21. The protein coat or shell that surrounds a virion's nucleic acid :

(A) Envelop

(B) Sporangium

(C) Capsid

(D) Nuclear wall

22. A layer of well-organized material, not easily washed off, lying outside the cell wall :

(A) Biofilms

(B) Slime layer

(C) Capsule

(D) Holdfast

23. The minimal, maximal and optimum temperatures for growth is known as :

(A) Cardinal temperatures

(B) Marginal temperatures

(C) Survival temperatures

(D) All of the above

24. The use of biologically mediated processes to remove or degrade pollutants from specific environments :

(A) Bioterrorism

(B) Bioremediation

(C) Bioremuneration

(D) None of the above

25. The intentional or threatened use of microorganisms or organic toxins to produce death or disease in humans, animals and plants :

(A) Organotropism

(B) Bioterrorism

(C) Bioremediation

(D) Biotropism

26. Chemolithotroph is :

(A) A microorganism that uses reduced inorganic compounds as a source of energy and carbon.

(B) A microorganism that uses reduced inorganic compounds as a source of energy and electrons.

(C) A microorganism that uses reduced organic compounds as a source of energy and electrons.

(D) A microorganism that uses reduced organic compounds as a source of carbon and electrons.

27. Members of the genera *Chlamydia* and *Chlamydiophila* : Gram–negative, are :

(A) Obligate extracellular pathogens

(B) Obligate intracellular pathogens

(C) Facultative intracellular pathogens

(D) Facultative extracellular pathogens

28. The number of microorganisms that form colonies when cultured using spread plates or pour plates, an indication of, the number of viable microorganisms in a sample :

(A) PFU

(B) CFU

(C) TFU

(D) None of the above

29. A compatible solute is :

(A) A high molecular weight molecule used to protect cells against changes in solvent concentration in their habitat; it can exist at high concentrations within the cell with hindering metabolism or growth.

(B) A low molecular weight molecule used to protect cells against changes in temperature in their habitat; it can exist at low concentrations within the cell without hindering metabolism or growth.

(C) A low molecular weight molecule used to protect cells against changes in solute concentrations (osmolarity) in their habitat; it can exist at high concentrations within the cell without hindering metabolism or growth.

(D) All of the above

30. The establishment of a site of microbial reproduction on an inanimate surface or organism without necessarily resulting in tissue invasion or damage :

(A) Evasion

(B) Invasion

(C) Colonization

(D) Multiplication

31. A physical association of two or more different organisms, usually beneficial to all of the organisms :

(A) Commensalism

(B) Consortium

(C) Embolism

(D) None of the above

32. Diauxic growth is :

(A) Polyphasic growth response in which a microorganism, when exposed to two nutrients, initially uses one of them for growth and does not alter its metabolism to make use of the second.

(B) Biphasic growth response in which a microorganism, when exposed to two nutrients, initially uses one of them for growth and then alters its metabolism to make use of the second.

(C) Biphasic growth response in which a microorganism, when exposed to two nutrients, initially uses one of them for growth and uses second one without altering its metabolism.

(D) Monophasic growth response in which a microorganism, when exposed to two nutrients, uses both of them simultaneously without altering its metabolism.

33. Diglycerol tetraether lipids are :

(A) Archaeal lipids formed when saturated hydrocarbons are linked to two glycerols by ether bonds.

(B) Archaeal lipids formed when isoprenoid hydrocarbons are linked to two glycerols by ether bonds.

(C) Archaeal lipids formed when isoprenoid hydrocarbons are linked to two glycerols by ester bonds.

(D) None of the above

34. An agent, usually chemical, that disinfects; normally, it is employed only with inanimate objects :

(A) Antiseptic

(B) Disinfectant

(C) Sterilant

(D) Antianalgesic

35. A collection of proteins that aggregate at the region in a dividing microbial cell where a septum will form :

(A) Myosin

(B) Flagellin

(C) Divisome

(D) All of the above

36. A respiratory droplet is :

(A) Small aqueous particles (10 to 14 micron in diameter) produced by coughing, consisting of saliva or mucus and other matter derived from gastrointestinal tract surfaces that represent what is left from the evaporation of larger particles (100 micron or more in diameter).

(B) Small aqueous particles (0 to 4 micron in diameter) produced by exhalation, consisting of saliva or mucus and other matter derived from respiratory tract surfaces that represent what is left from the evaporation of larger particles (10 micron or more in diameter) .

(C) Both (A) and (B)

(D) None of the above

37. A pathway that converts glucose to pyruvate and glyceraldehyde 3-phosphate by producing 6-phosphogluconate and then dehydrating it :

(A) Embden-Meyerhof-Parnas pathway

(B) Entner-Doudoroff pathway

(C) Pentose-Phosphate pathway

(D) Glyoxalate pathway

38. The study of the factors determining and influencing the frequency and distribution of disease, injury and other health-related events and their causes in defined human populations :

(A) Pathology

(B) Nematology

(C) Epidemiology

(D) Oncology

39. Fermentation is :

(A) An energy-yielding process in which an organic molecule is oxidized without an exogenous electron acceptor.

(B) Usually, pyruvate or a pyruvate derivative serves as the electron acceptor.

(C) Both (A) and (B)

(D) None of the above

40. NAG and NAM of peptidoglycan layer is linked by _____.

(A) beta-(l, 4) glycosidic linkage

(B) alpha-(1, 4) glycosidic linkage

(C) alpha-(1, 6) glycosidic linkage

(D) beta-(1,6) glycosidic linkage

41. Fomite is :

(A) A plant insect vector

(B) An insect vector for babesiosis

(C) Common inanimate materials that transmit pathogens to humans.

(D) None of the above

42. The resistance of a population to infection and spread of an infectious agent due to the immunity of a high percentage of the population :

(A) Passive immunity

(B) Herd immunity

(C) Communal immunity

(D) All of the above

43. Heterocysts are :

(A) A resting or dormant stage of a bacterium or a protist that helps the organism to survive in unfavorable environmental conditions.

(B) A vegetative stage of a bacterium that helps the organism to survive in unfavorable environmental conditions.

(C) Specialized cells of cyanobacteria that are the sites of nitrogen fixation.

(D) Specialized cells of cyanobacteria that are the sites of photosynthesis.

44. Microorganisms that ferment sugars to form lactate and other products such as ethanol and CO_2 :

(A) Homolactic fermenters

(B) Butane diol fermenters

(C) Heterolactic fermenters

(D) Mixed acid fermenters

45. What is not true for hyperthermophile ?

(A) A microbe that has its growth optimum between 85°C and about 120°C.

(B) Hyperthermophiles usually do not grow well below 55°C.

(C) Hyperthermophiles can grow well below 55°C.

(D) Thermostable proteins are present in Hyperthermophiles

46. Which of the following is symbiotic nitrogen fixing bacteria ?

(A) *Rhizobium trifolii*

(B) *Clostridium pasteurianum*

(C) *Azotobacter* sp.

(D) *Escherichia coli*

47. An organism that uses organic compounds as sources of energy, electrons and carbon for biosynthesis :

(A) Chemoorganoautotroph

(B) Chemoorganoheterotroph

(C) Chemolithoheterotroph

(D) Chemolithoautotroph

48. Lipopolysaccharide in cell walls is characteristic of :

(A) Gram-positive bacteria

(B) Gram-negative bacteria

(C) Fungi

(D) Algae

49. 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

50. Bacteria having clusters of flagella at both poles of cells are known as :

(A) Lophotrichous

(B) Peritrichous

(C) Amphitrichous

(D) Monotrichous

51. Peptidoglycan is made up of _____.

(A) N-acetyl glucosamine

(B) N-acetyl muramic acid

(C) N-acetyl glucosamine, N-acetyl muramic acid

(D) N-acetyl glucosamine, N-acetyl muramic acid, amino acids

52. Which among the following compounds when added to cytoplasmic membrane helps in maintaining the rigidity of cell ?

(A) Lipopolysaccharide

(B) Hopanoid

(C) Phosphoglycerides

(D) Amino acids

53. The respiratory chain of bacteria is associated with the _____.

(A) Mitochondrial membrane

(B) Cytoplasmic membrane

(C) Cell wall

(D) Cytoplasm

54. Which of the following are not the features of component II of nitrogenase enzyme complex ?

(A) Component II is nitrogenase reductase.

(B) Component II is known as the Mo-Fe protein.

(C) Contains sulfur.

(D) Not active without component I.

55. In the growth curve of plaque-forming units, the time from infection until lysis is known as _____.

(A) Eclipse period

(B) Rise period

(C) Burst period

(D) Latent period

56. Which molecule will combine with the four-carbon oxaloacetate in the TCA cycle to form the six-carbon citrate ?

(A) Lactic acid

(B) NADH

(C) ATP

(D) Acetyl-Co-A

57. What is the shape of the Rhabdoviruses ?

(A) Bullet

(B) Circular

(C) Brick-shaped

(D) Ovoid

58. During exponential phase, growth rate is _____.

(A) Same as generation time

(B) Reciprocal of generation time

(C) Time required for population to double

(D) Rate of doubling population

59. Which of the following is a major virulence factor of *Streptococcus pneumoniae* ?

(A) Polysaccharide capsule

(B) M protein

(C) Streptolysin-O

(D) Streptolysin-S

60. 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

(Only for Rough Work)

4. Four alternative answers are mentioned for each question as—A, B, C & D in the booklet. The candidate has to choose the most correct/appropriate 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 ny 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 एक सबसे सही अथवा सबसे उपयुक्त उत्तर छाँटना 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।