

Booklet Series

A

Register Number

[Empty box for Register Number]

2010 MICROBIOLOGY

Time Allowed : 3 Hours]

[Maximum Marks : 300

Read the following instructions carefully before you begin to answer the questions.

IMPORTANT INSTRUCTIONS

- This Booklet has a cover (this page) which should not be opened till the invigilator gives signal to open it at the commencement of the examination. As soon as the signal is received you should tear the right side of the booklet cover carefully to open the booklet. Then proceed to answer the questions.
- This Question Booklet contains 200 questions.
- Answer all questions.
- All questions carry equal marks.
- The Test Booklet is printed in four series e.g. [A] [B] [C] or [D] (See Top left side of this page). The candidate has to indicate in the space provided in the Answer Sheet the series of the booklet. For example, if the candidate gets [A] series booklet, he/she has to indicate in the side 2 of the Answer Sheet with Blue or Black Ink Ball point pen as follows :

[A] [B] [C] [D]

- You must write your Register Number in the space provided on the top right side of this page. Do not write anything else on the Question Booklet.
- An Answer Sheet will be supplied to you separately by the Invigilator to mark the answers. You must write your Name, Register No. and other particulars on side 1 of the Answer Sheet provided, failing which your Answer Sheet will not be evaluated.
- You will also encode your Register Number, Subject Code etc., with Blue or Black ink Ball point pen in the space provided on the side 2 of the Answer Sheet. If you do not encode properly or fail to encode the above information, your Answer Sheet will not be evaluated.
- Each question comprises four responses (A), (B), (C) and (D). You are to select ONLY ONE correct response and mark in your Answer Sheet. In case you feel that there are more than one correct response, mark the response which you consider the best. In any case, choose ONLY ONE response for each question. Your total marks will depend on the number of correct responses marked by you in the Answer Sheet.
- In the Answer Sheet there are four brackets [A] [B] [C] and [D] against each question. To answer the questions you are to mark with Ball point pen ONLY ONE bracket of your choice for each question. Select one response for each question in the Question Booklet and mark in the Answer Sheet. If you mark more than one answer for one question, the answer will be treated as wrong. e.g. If for any item, (B) is the correct answer, you have to mark as follows :

[A] [B] [C] [D]

11. You should not remove or tear off any sheet from this Question Booklet. You are not allowed to take this Question Booklet and the Answer Sheet out of the Examination Hall during the examination. After the examination is concluded, you must hand over your Answer Sheet to the Invigilator. You are allowed to take the Question Booklet with you only after the Examination is over. Failure to comply with any of the above instructions will render you liable to such action or penalty as the Commission may decide at their discretion. Do not tick-mark or mark the answers in the Question Booklet.

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1. Which of the following vitamins is formed out of linkage between 5, 6-dimethyl benzimidazole ribonucleotide and cobinamide molecule ?
 - A) Vitamin A
 - B) Vitamin B₂
 - C) Vitamin B₁₂
 - D) Vitamin C.

2. Effectiveness of β -lactam antibiotics have been greatly increased
 - A) by side chain removal
 - B) by side chain modification
 - C) both (A) and (B)
 - D) none of these.

3. Sequence in correct order is
 - A) Strain selection, Media production, Downstream process, Fermentation
 - B) Strain selection, Media production, Fermentation, Downstream process
 - C) Media production, Strain selection, Fermentation, Downstream process
 - D) Strain selection, Downstream process, Media production, Fermentation .

4. Which of the following techniques follows batch fermentation process ?
 - A) Chemostat
 - B) Turbidostat
 - C) Auxostat
 - D) None of these.

5. *Corynebacterium glutamicum* is used in the production of
 - A) L-Glutamic acid
 - B) L-Lysine
 - C) both L-Glutamic acid and L-Lysine
 - D) none of these.

6. A compound present in the outer layer of fruits & vegetables is
 - A) chitin
 - B) pectin
 - C) hydrin
 - D) somatin.

7. Saccharolytic bacteria acts on
- A) peptides
B) amino acids
C) sugar
D) lipids.
8. How much of H^+ are pumped per second by each bacteriorhodopsin pigment under light condition ?
- A) 100 H^+
B) 200 H^+
C) 300 H^+
D) 400 H^+ .
9. Osmophilic bacteria
- A) survive in high pressure
B) survive in low salt
C) survive in high sugar
D) both (A) and (B).
10. Consider the following statements :
- Biogas can be used for
- I. cooking
 - II. lighting
 - III. running space vehicles
 - IV. running trains.
- Of these
- A) I & III are correct
B) II & III are correct
C) I & IV are correct
D) I & II are correct.
11. Biogas forms a combustible mixture with air in the range of
- A) 6% to 15%
B) 15% to 25%
C) 20% to 30%
D) 30% to 40%.
12. Mixing of malt and water in Beer production is called
- A) Flavouring
B) Mashing-off
C) Mashing-in
D) Malt milling.

13. After microbial fermentation, the ethanol is recovered by
- A) Pyrolytic process B) Liquefaction process
C) Distillation process D) Condensation process.
14. Choose the correct match :
- A) *Pseudomonas cepeciae* — Degradation of 2, 4, 5-T
B) *Fusarium solani* — Degradation of 4-methyl phenol
C) *Trichodema viridae* — Degradation of 3, 4-dichloroaniline
D) *Geotrichum candidum* — Degradation of malathion.
15. Bacteria that utilize CO₂ as their carbon source are known as
- A) Chemotrophs B) Heterotrophs
C) Autotrophs D) None of these.
16. Prey population acts through natural selection to exchange evolution of features that provide mechanisms for escape from predators. Such adaptations include :
- i. the ability to develop resting stages such as endospores
 - ii. the ability to acquire surface structures, such as spines, that discourage predators
 - iii. the ability to reproduce rapidly
 - iv. the ability to attack on predator
- Of these
- A) (i) alone is correct B) (i) and (ii) are correct
C) (i), (ii) and (iii) are correct D) all are correct.

17. Which of the following is not an extremophile ?

- A) Psychrophiles
- B) Mesophiles
- C) Thermophiles
- D) Halophiles.

18. Bactofugation is

- A) a method of Pasteurization
- B) a method of Cold treatment
- C) Chemical method of bacterial removal
- D) Physical method of bacterial removal.

19. Consider the following statements :

- i. Measurable variables are quantitative variables
- ii. Unmeasurable variables are qualitative variables
- iii. Qualitative variables are of 2 types
- iv. Quantitative variables are non-classifiable.

Of these statements

- A) (i) alone is correct
- B) (i) and (ii) are correct
- C) (i), (ii) and (iii) are correct
- D) all are correct.

20. The Dark field microscope has a special

- A) condenser
- B) lens
- C) objective
- D) light source.

21. Which of the following is not correctly matched ?

- A) *Mic phage* ↔ *Transposing phage*
- B) *E. Coli* bacteriophage ↔ $p^{BR 322}$
- C) Protoplast transformation ↔ Polyethylene glycol
- D) *Agrobacterium tumefaciens* ↔ Oncogenic bacterium.

22. Dimorphic fungi are the fungi that
- A) exist in two geographical locations
 - B) exist in two hosts
 - C) exist in two forms
 - D) none of these.
23. Which of the following statements related to Smut disease is not true ?
- A) Order Ustilaginales of phylum Basidiomycota are commonly called Smut Fungi
 - B) Smut refers to Black dusty mass of teliospores
 - C) Homokaryotic phase of Smut fungi is obligate parasite
 - D) Smut disease is also called Bunt disease.
24. Work on malaria parasite was done by
- A) Ross
 - B) Richard
 - C) Koch
 - D) Reed.
25. Photosynthesis is the
- A) pathway that uses organic carbon to produce carbohydrate
 - B) pathway that brings about oxidation of inorganic substrate to produce carbohydrate
 - C) pathway that utilizes carbon dioxide, light and chlorophyll to produce carbohydrates
 - D) none of these.

26. Which one of the following pairs is correct ?

- | | | | |
|------|----------------------|---|----------------------|
| i) | Endonuclease | — | Joining the DNA |
| ii) | Alkaline phosphatase | — | 5' end modification |
| iii) | Ligase | — | Cutting the DNA |
| iv) | Polymerases | — | 3' end modification. |

- A) (i) is correct B) (ii) is correct
C) (iii) is correct D) (iv) is correct.

27. A relationship in which the product of one organism has a negative effect on another organism is called

- A) Mutualism B) Amensalism
C) Commensalism D) Metabolism.

28. Increasing the amount of Ammonium persulphate and TEMED in making PAGE results in

- A) decrease in the average polymer chain length
B) increase in gel turbidity
C) decrease in gel elasticity
D) all of these.

29. Pectin is mainly made up of

- A) β -1, 4-D-galacturonic acid B) Rhamnose
C) Arabinose D) All of these.

30. Rhizocoenosis process

- i. is a N_2 fixing association
- ii. is symbiotic association with root nodule formation
- iii. involves the action of symbiotic diazotrophs
- iv. is e.g. *Beijerinckia* with roots of sugarcane.

Of these

- A) (i) alone is correct B) (i) and (ii) are correct
C) (i), (ii) and (iii) are correct D) All are correct.
31. Monoclonal antibodies are
- A) more sensitive & have more than one antigenic determinant
B) directed against single antigenic determinant
C) polyclonal
D) produced by T-lymphocytes.
32. Ribose is
- A) Triose B) Hexose
C) Heptose D) Pentose.
33. Experiment on pasteurization was carried out by Pasteur for the first time in
- A) milk B) grape juice
C) wine D) culture media.
34. Which form of rust fungi have autoecious life cycle ?
- A) Macrocytic form B) Demicyclic form
C) Microcytic form D) All of these.

35. Trypanomastigote is a type of flagellate that has
- A) flagellae from anterior end
 - B) flagellae at posterior end
 - C) flagellae arise at posterior end and runs towards anterior end
 - D) none of these.
36. An example of a skin disinfectant is
- A) Povidone-iodine
 - B) Nystalin
 - C) Sodium hypochlorite
 - D) Silver sulfadiazine.
37. Computation of geometric mean requires that all the observations
- A) be a positive value
 - B) be a negative value
 - C) can have a value as zero
 - D) be any real value.
38. Advisable limit of chlorine content in drinking water is
- A) 0.2 to 2 mg/L
 - B) 0.1 to 1.00 mg/ L
 - C) 0.3 to 3.0 mg/L
 - D) 0.4 to 4.0 mg/L.
39. Which of the following causes milkborne illness ?
- A) *Campylobacter jejuni*
 - B) *Listeria monocytogenes*
 - C) *Yersinia enterocolitica*
 - D) All of these.
40. Commensalism is a type of interaction between microbial populations in which
- A) both are benefited
 - B) both are inhibited
 - C) one population is benefited and the other is affected
 - D) one population is benefited and the other is unaffected.

41. Electroendosmosis is the kind of osmotic movement of liquid flow through the agarose gel towards

- A) anode
- B) cathode
- C) both (A) and (B)
- D) none of these.

42. Which of the following concepts is correct ?

- i) Bacterial ligase is used to link the blunt end of DNA
- ii) Phase ligase is used to link the cohesive end of DNA
- iii) Polymerase enzyme is used to remove the protein during DNA synthesis
- iv) Endonuclease enzyme is used to remove the RNA during protein synthesis.

Of these

- A) (i) and (ii) are correct
- B) (iii) and (iv) are correct
- C) All are correct
- D) All are wrong.

43. Phenol oxidase can also break down

- A) Lignolytic fibre
- B) Pectin layer
- C) Cellulosic fibre
- D) All of these.

44. The first antibody to appear bacterial infection is

- A) Ig M
- B) Ig D
- C) Ig A
- D) Ig E.

45. The cocci produce endospore which is

- A) Staphylococcus
- B) Sporosarcina
- C) Neisseria
- D) none of these.

46. Résistant and dormant structure of bacteria is known as
- A) fimbriae
 - B) capsule
 - C) endospore
 - D) none of these.
47. Allosteric regulation is
- A) non-competitive inhibition
 - B) regulatory molecules attach away form the active site
 - C) their attachment alters the shape of the active site. & is unable to accept substrate
 - D) all of these.
48. The parasitic organism under the genus *Schistosoma* has the habitat of
- A) blood
 - B) intestine
 - C) liver
 - D) none of these.
49. Indirect ELISA technique is used to detect
- A) antigen only
 - B) antibody only
 - C) enzyme only
 - D) antigen or antibody.
50. Which is the suitable medium to select cellulose and lignin degraders ?
- A) Omeliansky's medium
 - B) Pikovskaya's medium
 - C) Hofer's Alkaline medium
 - D) Congo-red medium.
51. An adjuvant
- A) inhibits the immune response
 - B) neutralizes the antigens
 - C) enhances the immunogenicity of an antigen
 - D) neutralizes the antibodies.

52. Pick out the correct statement about cholera disease :
- A) Microbes invade the intestinal wall
 - B) A fever of 40° C is the main symptom
 - C) Under unfavourable condition the vibrio cells shrink into non-infectious dormant form
 - D) The treatment antibiotic is doxycyclin.
53. *Azolla anbaena* association is a symbiotic N₂ fixing association where the cyanobacteria resides in
- A) Stem
 - B) Leaf
 - C) Root
 - D) Seed.
54. Increased amount of organic matter in water bodies is called
- A) Putrefaction
 - B) Eutrophication
 - C) Purification
 - D) Sterilization.
55. The scientist who investigated silkworm disease was
- A) Robert Koch
 - B) Joseph Lister
 - C) Louis Pasteur
 - D) Oliver Holmes.
56. The confirmation of recombination can be assured by the expression of
- A) specific inserted gene marker
 - B) insertion inactivation marker
 - C) vector expression marker
 - D) all of these.
57. The member of DNA viruses is
- A) Picornaviridae
 - B) Retroviridae
 - C) Rhabdoviridae
 - D) None of these.

58. Sterilization of vaccines is done by

- A) Formalin
- B) Alcohol
- C) Beta propiolactone
- D) Hydrogen peroxide.

59. Gram positive bacteria will be coloured

- A) Red
- B) Pink
- C) Purple
- D) Blue.

60. General characteristics of Lichens include

- i. Varied in colours
- ii. Perennial nature
- iii. Slow growing and long lived
- iv. Grow luxuriously under moist condition

Of these

- A) (i) alone is correct
- B) (i) and (ii) are correct
- C) (i), (ii) and (iii) are correct
- D) All are correct.

61. During centrifugation, the sediment of the particles occurs in the side wall of the entire tube when using which of the following rotor systems ?

- A) Vertical tube rotor system
- B) Fixed angle rotor system
- C) Swinging bucket rotor system
- D) Zonal rotor system.

62. Carotenoids are

- A) inclusion bodies in heterotrophs.
- B) water insoluble pigment, yellow, orange or red composed of isoprene units
- C) water soluble green pigment
- D) none of these.

63. Consider the following statements :

- i. Polymer fibre is one of the phenol formaldehydes
- ii. Polymer fibre is one of the minerals
- iii. Polymer fibre is one of the bioactive compounds
- iv. Polymer fibre is one of the polyolefins

Of these statements

- | | |
|------------------------------------|--------------------------------------|
| A) (i) and (ii) are correct | B) (i) and (iii) are correct |
| C) (i), (iii) and (iv) are correct | D) (ii), (iii) and (iv) are correct. |

64. IgE binds to

- | | |
|----------------|----------------|
| A) T cells | B) B cells |
| C) Macrophages | D) Mast cells. |

65. Peritrichous flagella refers to

- | | |
|-----------------------------------|------------------------|
| A) flagella all over the organism | B) flagella at one end |
| C) tuft of flagella on end | D) none of these. |

66. Choose the correct statements about the AIDS viral mutants lacking *rev* and *env* genes :

- i. Are efficient in attacking CD₄ cells
- ii. Cause fast replication of viral genome
- iii. Stimulate CD₈ cell production
- iv. Unable to multiply

Of these

- | | |
|-------------------------------|--------------------------------|
| A) all are correct | B) (i) and (ii) are correct |
| C) (ii) and (iii) are correct | D) (iii) and (iv) are correct. |

67. Which of the following is type of milk spoilage ?
- A) Souring
 - B) Rot formation
 - C) Dairy moulds
 - D) All of these.
68. What is the sequence of the correct order of steps involved in ANOVA ?
- A) Calculating variance between samples, calculating variance within samples, calculating the ratio F , comparing with the table F value
 - B) Calculating variance within samples, calculating the ratio F , calculating variance between samples, comparing with the table F value
 - C) Calculating the ratio F , comparing with the table F value, calculating variance between samples, calculating variance within samples
 - D) Calculating variance within samples, calculating variance between samples, calculating the ratio F , comparing with the table F value.
69. The process of conversion of biomass into solid, liquid and gaseous energy is called
- A) Bioconversion
 - B) Transformation
 - C) Pyrolysis
 - D) Incineration.
70. Which of the following is important for the action of sequence specific single stranded DNA nucleases using oligonucleotide moiety ?
- A) Formation of an enzyme dimer by disulfide linkage
 - B) Binding of DNA molecules complementary to the oligonucleotide sequences
 - C) Formation of oligonucleotide dimers by their free sulfhydryl moiety
 - D) Removal of cysteine residue that contained 3'-sulfhydryl group.

71. The centrifuge possesses an optical analyzing system called as
- A) Preparative centrifuge B) Analytical centrifuge
C) Refrigerated centrifuge D) Clinical centrifuge.
72. Grave's disease belongs to which of the following types of hypersensitivity ?
- A) Type I Anaphylactic
B) Type III Immune Complex
C) Type IV Delayed
D) Type V Cytotoxic or cell simulating.
73. Sequence in correct order is
- A) Initiation, Root curling, Infection thread formation, Nodule maturation
B) Root curling, Initiation, Infection thread formation, Nodule maturation
C) Initiation, Infection thread formation, Root curling, Nodule maturation
D) Infection thread formation, Initiation, Root curling, Nodule maturation.
74. A chemical added to intensify the stain is called
- A) Adjuvant B) Mordant
C) Dye D) Hapten.
75. Murine of bacterial cell wall is a polymer containing
- A) N-acetyl muramic acid B) N-acetyl glucosamine
C) N-acetyl clavulnic acid D) None of these.
76. The first person to challenge doctrine of spontaneous generation was
- A) Francesco Redi B) Felix Pouchet
C) Norman Pace D) G. E. Fox.
77. The virus that has RNA genome is
- A) Parvoviridae B) Paramyxoviridae
C) Polyomaviridae D) None of these.

78. BT stands for

- A) Bacillus Transformation B) *Bacillus Thurlensis*
C) *Bacillus Thuringiensis* D) *Bacillus Thyrogens*.

79. The plasmids which can maintain their copy number at very high frequency are called as

- A) Stringent plasmids B) Relaxed plasmids
C) Conjugative plasmids D) Mobilized plasmids.

80. "Superbug" was a name used for organisms engineered for

- A) Antibiotic production B) Enzyme production
C) Hydrocarbon degradation D) Enzyme degradation.

81. Cyclic AMP is

- A) derived from ATP
B) a molecule that helps to regulate gene transcription via the process of catabolic repression
C) a molecule that reacts with catabolite activator protein
D) all of these.

82. Each organism of an ecological niche has its own

- i. Characteristics, structures and features
- ii. Specific nutritional requirement
- iii. Distinct biochemical abilities
- iv. Defined tolerance to the environmental conditions

Of these

- A) (i) alone is correct B) (i) and (ii) are correct
C) (i), (ii) and (iii) are correct D) All are correct.

83. MBRT is one of the methods

- A) to check milk quantity B) to check milk quality
C) to analyze milk components D) to analyse milk hardness.

84. Problem in prokaryotic linear DNA replication is

- A) no occurrence of rolling circle model replication
B) no theta replication
C) increase of genomic sequences at terminal ends
D) shortening of genome segments at terminal ends.

85. The enzymes used in the diagnostic test for Tuberculosis confirmation using mycophage is

- A) Luciferase B) ATPase
C) Transaminase D) Glyoxylase.

86. Consider the following statements :

Assertion (A) : Secondary data is highly reliable

Reason (R) : Secondary data is obtained from already collected primary data.

Now select your answer according to the coding scheme given below :

- A) Both (A) and (R) are true and (R) is the correct explanation of (A)
B) Both (A) and (R) are true, but (R) is not the correct explanation of (A)
C) (A) is true, but (R) is false
D) (A) is false, but (R) is true.

87. Consider the following statements :

- i. Rapid degradation of cellulose occurs when associated with pectin
- ii. Rapid degradation of cellulose occurs when associated with mannan
- iii. Rapid degradation of cellulose occurs when associated with lignin
- iv. Rapid degradation of cellulose occurs when associated with xylan.

Of the statements

- | | |
|------------------------------|------------------------------|
| A) (i) and (ii) are correct | B) (i) and (iii) are correct |
| C) (ii) and (iv) are correct | D) (iii) alone is correct. |

88. Autoimmune disease is

- | | |
|---------------------------------|------------------|
| A) Systemic Lupus Erythematosus | B) Hepatitis |
| C) Diphtheria | D) Tuberculosis. |

89. Which of the following detector systems is present in HPLC ?

- | | |
|-----------------------------|----------------------------------|
| A) UV-Vis photometer | B) Diode array spectrophotometer |
| C) Refractive index monitor | D) All of these. |

90. Which one of the following is correctly matched ?

- | | |
|--------------------|--------------|
| A) Synthetic fibre | — Elastomers |
| B) Natural fibre | — Elastomers |
| C) Synthetic fibre | — Sinew |
| D) Natural fibre | — Spandex. |

91. Archaeal DNA dependent RNA polymerase resembles

- | | |
|---------------------|-------------------|
| A) Prokaryotes | B) Eukaryotes |
| C) Both (A) and (B) | D) None of these. |

92. Which of the following gases is used as carrier gas in gas chromatography ?
- | | |
|-------------|------------------|
| A) Nitrogen | B) Helium |
| C) Hydrogen | D) All of these. |
93. Microbes which tend to grow at low temperature are
- | | |
|------------------|------------------|
| A) Mesophiles | B) Thermophiles |
| C) Psychrophiles | D) Neutrophiles. |
94. To improve the affinity of enzyme tyrosyl-tRNA synthetase for ATP, which of the following changes can be made ?
- i. Removed of weak hydrogen bonds between threonine and oxygen of ribose
 - ii. Threonine residue at position 51 replaced by alanine
 - iii. Modification by oligonucleotide directed mutagenesis
 - iv. Changing one or more amino acids at active site after computer graphic predictions.
- Of these*
- | | |
|------------------------|-------------------------------|
| A) (i) and (ii) only | B) (ii) and (iv) only. |
| C) (iii) and (iv) only | D) All steps are appropriate. |
95. Lactic acid produced in milk is mainly due to microbial utilization of
- | | |
|-----------------|------------------|
| A) Carbohydrate | B) Protein |
| C) Fat | D) All of these. |
96. In gram staining, mordant is
- | | |
|-------------------|-------------------|
| A) Crystal violet | B) Iodine |
| C) Suffrenin | D) None of these. |
97. The Ti Plasmid is derived form
- | | |
|---------------------------------------|------------------------------------|
| A) <i>Agrobacteriaum tumefactens</i> | B) <i>Escherichia coli</i> |
| C) <i>Bacillus stearothermophilus</i> | D) <i>Xanthomonas campestris</i> . |

98. Lyases

- A) catalyse hydrolysis by addition of water
- B) catalyse formation of bonds between two compounds
- C) catalyse removal of groups of atoms without hydrolysis
- D) catalyse conversion of substrate to its isomer.

99. Cholera toxin causes the host cell to secrete water along with electrolytes especially

- A) Sodium
- B) Potassium
- C) Magnesium
- D) Calcium.

100. Swan neck flasks were used by

- A) Louis Pasteur
- B) Robert Koch
- C) Stanley Cohn
- D) Annie Chang.

101. Which of the following fungi is a predominant genus for cellulose degradation ?

- A) *Aspergillus* sp.
- B) *Trametes* sp.
- C) *Zygorynchus* sp.
- D) *Verticillium* sp.

102. Technique based on precipitation is

- A) Radial immunodiffusion
- B) Immunoelectrophoresis
- C) Rocket immunoelectrophoresis
- D) All of these.

103. Spirulina contains protein content of

- A) 70 - 75%
- B) 60 - 65%
- C) 40 - 45%
- D) below 50%.

104. Which is not a true statement related to HIV patients ?

- A) Exposed but not infected cases give HIV negative test result
- B) Long-term non-progressors give HIV positive test result
- C) In HIV infected cases there is a daily net loss of 20 million CD₄ T cells
- D) In HIV patients humoral antibodies have long-term virus neutralizing effect.

105. Which organisms are sulphur dependent ?

- | | |
|-------------------------|-------------------|
| A) <i>Salmonellae</i> | B) <i>E. Coll</i> |
| C) <i>Crenarchaeota</i> | D) None of these. |

106. For the measure of central values/tendency, types of averages include

- i. Mathematical average
- ii. Positional average
- iii. Moving average
- iv. High DNA melting point.

Of these

- | | |
|------------------------------------|-----------------------------|
| A) (i) alone is correct | B) (i) and (ii) are correct |
| C) (i), (ii) and (iii) are correct | D) All are correct. |

107. The drug of choice for *Bacteroides* infection in GI tract is

- | | |
|-------------------|-------------------|
| A) Sulfa | B) Quinolone |
| C) Aminoglycoside | D) Metronidazole. |

108. Which is a not a correct match ?

- | | |
|----------------------|-------------------------------------|
| A) <i>lac Z</i> gene | — β -glucosidase |
| B) <i>gus A</i> gene | — β -glucuronidase |
| C) <i>rev</i> gene | — Regulatory proteins of AIDS virus |
| D) <i>env</i> gene | — Functional enzymes of AIDS virus. |

109. The incorrect example for symbiotic association without root nodulation is

- A) *Azospirillum* with roots of monocots and dicots
- B) *Beijerinckia* with roots of sugarcane
- C) *Frankia* with roots of casuarinas
- D) *Azotobacter paspali* with roots of wheat, corn, sorghum.

110. The amount of water in milk is

- | | |
|--------|---------|
| A) 87% | B) 50% |
| C) 94% | D) 63%. |

111. Dairy wastes contain

- A) more *Lactobacillus* sp. B) more *Thiobacillus* sp.
C) more *Aspergillus* sp. D) more *Methanogenes*.

112. Interaction type between microbial populations in which both the populations are benefited is called

- i. Synergism
- ii. Mutualism
- iii. Neutralism
- iv. Commensalism.

Of these

- A) (i) alone is correct B) (i) and (ii) are correct
C) (i), (ii) and (iii) are correct D) All are correct.

113. Which of the following statements is correct ?

- i. Autoradiography is a technique used to detect the presence of Radio-active isotopes
- ii. Autoradiography is a technique used to detect the presence of Isomers
- iii. Autoradiography is a technique used to detect the presence of Ampholytes
- iv. Autoradiography is a technique used to detect the presence of Racemic alcohols.

Of these statements

- A) (i) alone is correct B) (i) and (ii) are correct
C) (iii) alone is correct D) (iii) and (iv) are correct.

114. The movement of gene from one position to another position of the chromosome is called

- A) Transformation B) Transposition
C) Conjugation D) Transduction.

115. Consider the following statements :

- i. Lignin degradation is faster than starch
- ii. Lignin is mostly associated with cellulose
- iii. Lignin is microbially converted to humus
- iv. Lignin cannot degrade.

Of the statements

- A) (i) alone is correct B) (i) and (ii) are correct
C) (ii) and (iii) are correct D) (iv) alone is correct.

116. Theobald Smith was the first to describe

- A) Yellow fever
B) Arthropod-borne mucosal diseases
C) Rheumatic fever
D) Staphylococci.

117. Phenotypic traits exhibited by plasmid carrier genes are

- i. Antibiotic resistance
- ii. Hemolysin production
- iii. Sugar fermentation
- iv. Degradation of aromatic compounds.

Of these

- A) (i) and (iv) B) (i) and (ii)
C) (ii) and (iii) D) all of these.

118. Carboxysome is

- A) Inclusion bodies present in autotrophs and involved in CO₂ fixation
- B) Algal spore
- C) Basal bodies bearing female gametes
- D) Red algal spore produced during fertilization.

119. Ammonia oxidizing bacteria is

- A) Nitrozococcus
- B) Nitrosomonas
- C) Nitrospora
- D) All of these.

120. Optimum growth temperature of pyrodictium is

- A) 37° C
- B) 22° C
- C) 105° C
- D) None of these.

121. The s in 70s ribosome stands for.

- A) Sediment unit
- B) Sped unit
- C) Svedberg unit
- D) None of these.

122. Dysfunction of immune system is

- A) Allergy
- B) Toxic shock syndrome
- C) Endotoxemia
- D) All of these.

123. Consider the following statements :

- i. Cellulose degraders can produce humus
- ii. Cellulose degraders can produce amylase
- iii. Cellulose degraders can produce catalase
- iv. Cellulose degraders can produce glucose.

Of the statments

- A) (i) alone is correct
- B) (i) and (ii) are correct
- C) (ii) and (iii) are correct
- D) (i) and (iv) are correct.

124. *Rhizobium* can form nodules in
- A) only roots
 - B) only stem
 - C) both roots and stem
 - D) none of these.
125. Complement fixation test for syphilis was developed by
- A) Wassermann
 - B) Ehrlich
 - C) Rous
 - D) Ruska.
126. MacConkey agar is a/an
- A) Assay medium
 - B) Enriched medium
 - C) Selective-differential medium
 - D) Basal medium.
127. L-protein of foot and mouth disease virus modulates which interferon response ?
- A) Interferon receptor decoy
 - B) Inhibition of Interferon synthesis
 - C) Inhibition of Interferon signalling
 - D) Blocking the function of IFN induced protein.
128. Consider the following statements :
- Assertion (A)* : Regression lines cut each other at the point of average of X and Y .
- Reason (R)* : Average value of Y is obtained, if a perpendicular line is drawn from the point of intersection to the X axis.
- Now select your answer according to the coding scheme given below :
- A) Both (A) and (R) are true and (R) is the correct explanation of (A)
 - B) Both (A) and (R) are true, but (R) is not the correct explanation of (A)
 - C) (A) is true, but (R) is false
 - D) (A) is false, but (R) is true.

129. For convenient separating DNA fragments smaller than 20 kb, the electrophoretic gel used is

- A) Cellulose ester B) Silica
C) Agarose D) Sephadex.

130. Micro-organisms play a significant role in cycling nutrients in

- i. Sulfur cycle
- ii. Nitrogen cycle
- iii. Carbon cycle
- iv. Iron cycle.

Of these

- A) (i) alone is correct B) (i) and (ii) are correct
C) (i), (ii) and (iii) are correct D) All are correct.

131. The IS element is also called as

- A) Transposable element B) Conjugative element
C) Transduction element D) Sexduction element.

132. The R : S ratio is obtained by

- A) dividing the number of microbes in rhizosphere soil by number of microbes in the non-rhizosphere soil
B) dividing the number of microbes in rhizosphere soil by number of microbes in the phyllosphere region
C) dividing the number of microbes in rhizosphere soil by number of microbes in spermosphere soil
D) dividing the number of microbes in rhizosphere soil by number of microbes in rhizoplane soil.

133. The direct fluorescent antibody technique is preformed to detect the presence of

- | | |
|------------------------|-------------------|
| A) Antigen | B) Antibody |
| C) Antigen or Antibody | D) None of these. |

134. Ribosomes contain

- | | |
|-------------|---------------------|
| A) Proteins | B) Proteins and RNA |
| C) RNA | D) None of these. |

135. Latex agglutination is

- | | |
|-----------------------------|--------------------------|
| A) agglutination inhibition | B) passive agglutination |
| C) immune adherence | D) co-agglutination. |

136. Vancomycin is a/an

- | | |
|-------------------|-----------------|
| A) Aminoglycoside | B) Glycopeptide |
| C) Cephalosporin | D) Quinolone. |

137. Cumulative frequency curve or ogives can be

- i. less than ogive
- ii. more than ogive
- iii. equal to ogive
- iv. unrelated ogive.

Of these

- | | |
|------------------------------------|-----------------------------|
| A) (i) alone is correct | B) (i) and (ii) are correct |
| C) (i), (ii) and (iii) are correct | D) All are correct. |

138. Cell wall-less archaea is

- | | |
|-----------------------|------------------------|
| A) <i>E. Coll</i> | B) <i>Thermoplasma</i> |
| C) <i>Clostridium</i> | D) None of these. |

139. Fungi involved in VAM association with plants are

- A) facultative biotrophs B) obligate biotrophs
C) facultative autotrophs D) obligate autotrophs.

140. A cellulosic enzyme system consists component.

- A) endo- β -glucanase B) exo- β -glucanase
C) β -glucosidase D) all of these.

141. Salvarsan was discovered by

- A) Alexander Fleming B) Elie Metchnikoff
C) Paul Ehrlich D) Gerhard Domagk.

142. Which of the following converts milk into cheese ?

- A) *Lactobacillus* B) *Thiobacillus*
C) *Microbacterium* D) *Pseudomonas*.

143. Mountain experiments in support of biogenesis were done by

- A) Felix Pouchet B) Girolamo Fracastoro
C) Louis Pasteur D) Francesco Redi.

144. Examination of surface of micro-organisms is done using

- A) SEM B) TEM
C) Bright field microscope D) Dark field microscope.

145. In the external environment the HIV virus can survive for about

- A) 10 minutes B) 3 days
C) 6 hrs D) 48 hrs.

146. Which method does not involve PCR ?

- A) Multiple Displacement Amplification
- B) Primer Extension Preamplification
- C) Whole Genome Amplification
- D) Degenerate Oligonucleotide Primed.

147. Consider the following statements :

Assertion (A) : The spores of *Clostridium botulinum* spores remain viable in food products.

Reason (R) : Some microbes possess adaptations, like ability to form spores, which allow them to survive for long periods of time in foreign ecosystem.

Now select your answer according to the coding scheme given below :

- A) Both (A) and (R) are true and (R) is the correct explanation of (A)
- B) Both (A) and (R) are true, but (R) is not the correct explanation of (A)
- C) (A) is true, but (R) is false
- D) (A) is false, but (R) is true.

148. The Ti plasmid is used to clone the gene into

- A) Animals
- B) Plants
- C) Virus
- D) All of these.

149. The separation of components in TLC is based on

- A) Solubility
- B) Adsorption
- C) Size
- D) All of these.

150. Phagocytosis

- A) is carried by cells of adaptive immune system
- B) is restricted to macrophages
- C) is important in bacterial infections
- D) is a process that does not involve energy.

151. In the case of *EcoRI* restriction enzyme, the 'R' indicates

- A) genus name of the organism from which it was derived
- B) species name of the organism from which it was derived
- C) strain name of the organism from which it was derived
- D) series indication of the enzyme when it was derived.

152. Bacteria that are existing in different shapes are known as

- A) bacilli
- B) cocci
- C) pleomorphic
- D) none of these.

153. Diagrammatic presentation can be done by

- i. Bar diagram
- ii. Pie diagram
- iii. Pictogram
- iv. Cartogram.

Of these

- A) (i) alone is correct
- B) (i) and (ii) are correct
- C) (i), (ii) and (iii) are correct
- D) All are correct.

154. HEPA filter have an effective pore size of about

- A) 0.1 μm
- B) 0.2 μm
- C) 0.3 μm
- D) 0.4 μm .

155. The transmission of Rocky mountain spotted fever was described by

- A) Griffith
- B) Stanley
- C) Ruska
- D) Ricketts.

156. Bacilli are normally of shape.

- | | |
|-------------|-------------------|
| A) helical | B) rod-like |
| C) circular | D) none of these. |

157. ATP is generated by

- | | |
|------------------------------------|------------------------------|
| A) substrate level phosphorylation | B) oxidative phosphorylation |
| C) photophosphorylation | D) all of these. |

158. Which one is not correctly matched ?

- | | | |
|------------------------------------|---|----------------------|
| A) Alternative to Ethidium bromide | — | SYBR Green I |
| B) Real-time Quantitative PCR | — | TaqMan™ probe system |
| C) Dot blot | — | Nucleic acid RNA |
| D) Western blot | — | DNA. |

159. Consider the following statements :

Assertion (A) : Parasites provide a mechanism for population control and is density dependent.

Reason (R) : Parasites can thrive only as long as host survives.

Now select your answer according to the coding scheme given below :

- | |
|---|
| A) Both (A) and (R) are true and (R) is the correct explanation of (A) |
| B) Both (A) and (R) are true, but (R) is not the correct explanation of (A) |
| C) (A) is true, but (R) is false |
| D) (A) is false, but (R) is true. |

160. Bacterization is a process of artificial inoculation of bacterial preparation on :

- i. Seed
- ii. Soil
- iii. Stem
- iv. Leaf.

Of these

- | | |
|------------------------------------|-----------------------------|
| A) (i) alone is correct | B) (i) and (ii) are correct |
| C) (i), (ii) and (iii) are correct | D) All are correct. |

161. The annular stop is seen in
- A) Phase contrast microscope
 - B) Electron microscope
 - C) Bright field microscope
 - D) Dark field microscope.
162. Which of the following is used as gel material in gel permeation chromatography ?
- A) Sephadex
 - B) Sepharose
 - C) Polyacrylamide
 - D) All of these.
163. The most of the stages in life cycle of *Neurospora crassa* is
- A) Haploid
 - B) Diploid
 - C) Budding
 - D) All of these.
164. Which of the following is transmitted disease by milk ?
- A) Diphtheria
 - B) Scarlet fever
 - C) Septic sore throat
 - D) All of these.
165. Immune cell important in cancer cell surveillance is
- A) Red blood cell
 - B) Platelet
 - C) B-lymphocyte
 - D) Natural killer cell.
166. When there is no correlation between two variables then
- A) $r < 1$
 - B) $r > 1$
 - C) $r \neq 0$
 - D) $r = 0$.
167. Methanogenic archaea are
- A) strictly aerobic
 - B) strictly anaerobic
 - C) facultative anaerobic
 - D) none of these.

168. Packaged heat sensitive material is sterilized by

- | | |
|-------------------|-------------------------|
| A) Ethylene oxide | B) Copper sulfate |
| C) Alcohol | D) Cationic detergent . |

169. Tears contain

- | | |
|-------------|------------------|
| A) IgA | B) IgG |
| C) Lysozyme | D) All of these. |

170. Reducing the quality of products by microbial enzymes is called

- | | |
|---------------------|-----------------------|
| A) Biomagnification | B) Bioleaching |
| C) Biodeterioration | D) Biotransformation. |

171. The problems faced initially in the production of hGH by using recombinant technology are

- The 26 amino acid long signal peptide was not expressed in *E. coli* along with hGH
- Signal peptide remained attached to the hgH
- Ligation of signal peptide to hGH peptide was difficult to make it biologically active
- The removal of signal peptide was difficult to make it biologically active

Of these

- | | |
|------------------------------|------------------------------|
| A) (i) and (iii) are correct | B) (ii) and (iv) are correct |
| C) (i) and (iv) are correct | D) None of these. |

172. Properties of Arithmetic mean are

- $\Sigma (X - \bar{X}) = 0$
- $\bar{X}_{12} = (N_1\bar{X}_1 + N_2\bar{X}_2)/(N_1 + N_2)$
- $\bar{X} = \Sigma X / N$
- $\Sigma (X - \bar{X})^2 =$ Maximum compared to Arithmetic mean

Of these

- | | |
|------------------------------------|-----------------------------|
| A) (i) alone is correct | B) (i) and (ii) are correct |
| C) (i), (ii) and (iii) are correct | D) All are correct. |

173. Consider the following statements :

Assertion (A) : Microbial ecology is of importance to studies of evolution

Reason (R) : High level of horizontal gene transfer among microbial communities is seen.

Now select your answer according to the coding scheme given below :

- A) Both (A) and (R) are true and (R) is the correct explanation of (A)
- B) Both (A) and (R) are true, but (R) is not the correct explanation of (A)
- C) (A) is true, but (R) is false
- D) (A) is false, but (R) is true.

174. Who suggested pasteurization technique in milk ?

- A) Franz von Soxhlet
- B) Louis Pasteur
- C) Claude Bernard
- D) Sir Alexander Fleming.

175. Activity of nitrogenase enzyme gets inactivated

- A) at > 0.1 atm O_2 level
- B) at < 0.1 atm O_2 level
- C) at > 0.5 atm O_2 level
- D) at < 0.5 atm O_2 level.

176. The digested slurry released out of biogas plant is for

- A) Ethanol production
- B) Hydrogen production
- C) Animal feed
- D) Organic manure.

177. Black rot disease in fruits is caused by

- A) *Alternaria* sp.
- B) *Aspergillus niger*
- C) *Fusarium* sp.
- D) *Candida* sp.

178. In KVIC biogas plant, an average production of gas from cattle dung will be

- A) 0.026 m³ per kg per day B) 0.030 m³ per kg per day
C) 0.033 m³ per kg per day D) 0.036 m³ per kg per day.

179. Sauerkraut is fermented from

- A) Carrot B) Corn
C) Cabbage D) Tomato.

180. Biogas is also referred to as

- A) Klar gas B) Gobar gas
C) Fool's fire D) All of these.

181. HTST means

- A) Holding Temperature Short Time B) High Time Short Temperature
C) High Temperature Short Time D) High Thermal Standard Time.

182. The ratio of methane with diesel that could run a gas turbine most efficiently is

- A) 80 : 20 B) 80 : 25
C) 80 : 30 D) 80 : 35.

183. A neurotoxin produced by *clostridium* is

- A) Saponin B) Aflatoxin
C) Botulin D) Auxin.

184. The key substrate for methane producing bacteria is

- A) Acetate B) Butyrate
C) Biocarbonate D) Sodium bicarbonate.

189. Consider the following statements :

When comparison is made between fed-batch and continuous culture processes -

- i. the substrate addition is continuously maintained as chemostat, auxostat, etc. whereas fed-batch involves addition of substrate at regular intervals
- ii. product is simultaneously removed out of the fermenter while adding substrate in case of continuous but not in fed-batch culture
- iii. large space is required for accommodating added volumes of substrate in fed-batch culture process, whereas continuous culture does not encounter this problem
- iv. Fed-batch process is optimized process than continuous culture process.

Of these statements

- | | |
|------------------------------------|-----------------------------|
| A) (i) alone is correct | B) (i) and (ii) are correct |
| C) (i), (ii) and (iii) are correct | D) All are correct. |

190. The main process(es) for the microbial conversion of dilute ethanolic solutions to acetic acid during stage-II (acetic acid fermentation stage) of industrial vinegar production includes

- | | |
|------------------------------|--------------------|
| A) Quick vinegar process | B) Orleans process |
| C) Deep fermentation process | D) All of these. |

191. Match List I correctly with List II and select your answer using the codes given below :

List I	List II
a) Neutralism	1. Getting nutrition from dead organic materials
b) Mutualism	2. Deriving nutrition from a living plant or animal host
c) Parasitism	3. Both partners get benefits from the association
d) Saprophytism	4. The host remains unaffected by the microbe.

Codes :

	a	b	c	d
A)	1	2	3	4
B)	2	4	3	1
C)	3	2	1	4
D)	4	3	2	1.

192. A plant genera which bears both stem as well as root nodules is

- | | |
|----------------------------------|---------------------------------|
| A) <i>Sesbania rostrata</i> | B) <i>Sesbania aculeata</i> |
| C) <i>Aeschynomene americana</i> | D) <i>Monotropia hypopitys.</i> |

193. A short lived, rapidly changing and microbiologically dynamic zone of soil surrounding a germinating seed is called as

- | | |
|----------------|------------------|
| A) Phylloplane | B) Rhizoplane |
| C) Rhizosphee | D) Spermosphere. |

194. Outside the root surface fungal mycelia form a compact and multilayered covering known as

- A) Sclerotium B) Mantle
C) Nodule D) Hartignet.

195. Consider the following statements :

Assertion (A) : The saprophytes are equipped with extracellular enzyme producing capacity according to the available substrate

Reason (R) : In the presence of available substrates, the saprophytes change their tendency and cause disease.

Now select your answer according to the coding scheme given below :

- A) Both (A) and (R) are true and (R) is the correct explanation of (A)
B) Both (A) and (R) are true, but (R) is not the correct explanation of (A)
C) (A) is true, but (R) is false
D) (A) is false, but (R) is true.

196. The microbial activities that take place in the spermosphere are governed by

- A) Seed exudation B) Stem exudation
C) Root exudation D) Microbial exudation.

197. The ascending order of growth stages on the basis of R : S ratio is

- A) Seedling, Flowering, Post-flowering, Senescent
B) Flowering, Seedling, Post-flowering, Senescent
C) Seedling, Post-flowering, Flowering, Senescent
D) Senescent, Flowering, Post-flowering, Seedling.

198. The term 'rhizosphere' was coined by

- A) Clark
B) Balandreau
C) Knowles
D) Hiltner.

199. Consider the following statements :

Assertion (A) : In parasitism advantages are only to the host organism

Reason (R) : A parasite, in the absence of a suitable living host can pass its life as saprophyte.

Now select your answer according to the coding scheme given below :

- A) Both (A) and (R) are false
B) (A) is true, but (R) is false.
C) (A) is false, but (R) is true
D) Both (A) and (R) are true.

200. The phenomenon of loss of organic and inorganic compounds from root surface is correctly termed as

- A) Root exudation
B) Root leaching
C) Root loss
D) Rhizospheric effect.
-