BRAINWARE UNIVERSITY

Term End Examination 2024-2025
Programme – M.Sc.(MB)-2024
Course Name – Advances in Microbiology
Course Code - MMB10101
(Semester I)

Full Marks : 60 **Time : 2:30 Hours**

[The figure in the margin indicates full marks. Candidates are required to give their answers in their own words as far as practicable.]

Group-A
(Multiple Choice Type Question) 1 x 15=15

1. *Choose the correct alternative from the following :*

(i) Explain the primary characteristic of selective media.

a) Allows all microorganisms to grow equally
b) Differentiates between bacterial species based on colony color
c) Inhibits the growth of unwanted organisms while promoting the growth of desired organisms
d) Enhances the growth of fastidious organisms by providing specific nutrients

(ii) Identify the media that can be used to differentiate lactose-fermenting bacteria from non-lactose fermenters.

a) Blood Agar
b) Nutrient Agar
c) MacConkey Agar
d) Mannitol Salt Agar

(iii) In case of SEM, select the reason behind image formation Image

a) Secondary electron beam
b) Primary electron beam
c) Both primary and secondary electron beam
d) None of these

(iv) In fluorescence microscopy, which of the following performs the function of removing all light except the blue light?

a) Exciter filter
b) Barrier filter
c) Dichroic mirror
d) Mercury arc lamp

(v) If the eyepiece magnification on light microscope is x10 and the objective is x40, select the overall magnification.

a) x10
b) x40
c) X400
d) Both option 1 and 2

(vi) A soup container was forgotten in the refrigerator and shows contamination. The contaminants are probably which of the following?

a) Thermophiles
b) Acidophiles
c) Mesophiles
d) Psychrotrophs

(vii) The association of endotoxin in Gram negative bacteria is a result of the presence of which of the following:

a) Peptidoglycan
b) Lipopolysaccharides
c) Calcified proteins
d) Sterol

(viii) Which antibiotic class is often associated with adverse effects like nephrotoxicity and ototoxicity?

a) Aminoglycosides
b) Macrolides
c) Tetracyclines
d) Sulfonamides

(ix) Select the process for biological calibration of autoclave

a) Colour changing strip
b) Sterilized sticker
c) Geobacillus spore strip
d) All of these

(x) Interpret the special characteristics of Acid fast organism.

a) Presence of teichoic acid
b) Presence of Mycolic acid
c) Presence of teichoic acid
d) Presence of LPS

(xi) Debate which method, physical or chemical, is more efficient for controlling microbial growth in hospital settings.

a) Physical methods like radiation are more effective because they cause DNA mutations
b) Chemical methods like phenolics are more efficient for sterilizing air
c) Physical methods like autoclaving are more efficient for sterilizing surgical equipment
d) Chemical methods like alcohol are more efficient because they kill all bacterial spores

(xii) Compare the effectiveness of moist heat and dry heat sterilization.

a) Dry heat is faster and more efficient than moist heat
b) Moist heat sterilizes by coagulating proteins, while dry heat oxidizes cellular components
c) Dry heat is preferable for sterilizing liquids, while moist heat is used for metals
d) Moist heat cannot kill bacterial spores, but dry heat can

(xiii) Calculate the total ATP yield when a glucose molecule is completely oxidized via the Embden-Meyerhoff pathway in bacterial respiration.

a) 2 ATP
b) 4 ATP
c) 18 ATP
d) 32 ATP

(xiv) Deduce why the glyoxylate pathway is important for bacteria growing on fatty acids.

a) It allows bacteria to use acetate as a carbon source
b) It generates ATP directly
c) It is involved in nitrogen fixation
d) It leads to the production of pyruvate

(xv) Explain the basic mechanism of ATP synthesis via the proton motive force in bacterial cells.

a) ATP is synthesized during glycolysis
b) ATP synthesis is driven by the flow of electrons
c) ATP is generated by the movement of protons across a membrane, driving ATP synthase
d) ATP is synthesized by substrate-level phosphorylation in the cytoplasm

Group-B

(Short Answer Type Questions) 3 x 5=15

2. Define iodophor with a proper explanation of its effectiveness (3)
3. Discuss in brief the colony characteristics of M.tuberculosis and M.bovis in L J medium (3)
4. Describethe Embden-Meyerhoff pathway and its role in bacterial metabolism. (3)
5. Describe phenol coefficient and its importance in antimicrobial testing. (3)

6. Calculate the potential errors in bacterial classification if 16S rRNA is not used as an evolutionary chronometer. (3)

OR

Illustrate the process of ribosomal RNA sequencing and explain its importance in molecular phylogeny. (3)

Group-C

(Long Answer Type Questions) 5 x 6=30

7. Evaluate the mode of action of Quaternary ammonium compounds . (5)
8. Briefly discuss the utility of capsule in bacterial cell. (5)
9. Conclude how reverse TCA (tricarboxylic acid) cycle differs from the forward TCA cycle in photosynthetic bacteria. What implications does this have for carbon fixation? (5)
10. Catalase and superoxide dismutase (SOD) enzymes are crucial for the growth of aerobic bacteria. Explain it briefly (5)
11. Justify with proper explanation: Very little bacterial growth if agar concentration in the medium is more than 4%. (5)
12. Calculate limit of resolution for Bright Field Microscope. (5)

OR

Correlate the basic concept of the enzyme inhibiting antibiotics and inhibition of THFA production. (5)

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