



BRAINWARE UNIVERSITY

Term End Examination 2024-2025

Programme – B.Sc.(BT)-Hons-2024

Course Name – Microbiology

Course Code - BBT17101 (T)

(Semester I)

Full Marks : 40

Time : 2:0 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 10=10

1. Choose the correct alternative from the following :

(i) Identify the role of the capsid in generalized transduction

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| a) It protects the viral genome. | b) It packages random fragments of the bacterial chromosome. |
| c) It helps the virus attach to the bacterial cell. | d) It transports the viral DNA into the host cell. |

(ii) Write the bacterium that primarily affects herbivores, especially ruminants, and causes symptoms such as fever and chest discomfort.

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|-------------------------|-------------------------------|
| a) Bacillus anthracis | b) Mycobacterium tuberculosis |
| c) Pseudomonas syringae | d) Xanthomonas campestris |

(iii) Predict how the degree of selective toxicity of a chemotherapeutic agent is expressed.

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|---|---|
| a) By the highest drug concentration killing the pathogen | b) By the ratio of the therapeutic dose to the toxic dose |
| c) By the lowest drug concentration inhibiting bacterial growth | d) By the ratio of the toxic dose to the therapeutic dose |

(iv) Predict the significance of size of the inhibition zone in a Kirby-Bauer disk diffusion test with the susceptibility of a bacterial pathogen to an antibiotic.

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|---|--|
| a) It directly correlates with the antibiotic's solubility. | b) It measures the bacterial density in the culture. |
| c) It reflects the antibiotic's effectiveness against the pathogen. | d) It represents the antibiotic's concentration in the test. |

(v) Choose the primary mode of action of polyene antifungal antibiotics like Amphotericin B.

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|--|--------------------------------------|
| a) Inhibition of DNA replication | b) Inhibition of cell wall synthesis |
| c) Disruption of fungal cell membranes | d) Interference with mitosis |

(vi) Choose the primary difference in the modes of action of antibiotics penicillin and vancomycin.

- a) Penicillin inhibits protein synthesis, while vancomycin disrupts DNA replication.
- b) Penicillin interferes with bacterial metabolism, while vancomycin inhibits cell membrane synthesis.
- c) Penicillin inhibits peptidoglycan synthesis, while vancomycin binds to D-alanine residues.
- d) Penicillin disrupts cell membrane integrity, while vancomycin inhibits ribosomal activity.
- (vii) Report the mechanisms by which bacteria can develop resistance to antibiotics.
- a) Antibiotic resistance is a rare phenomenon with limited impact on public health.
- b) Bacteria can develop resistance through genetic mutations or horizontal gene transfer.
- c) Antibiotics are effective against resistant bacterial strains.
- d) Public health is not significantly affected by antibiotic resistance.
- (viii) Select the correct combination where conjugation can't take place.
- a) F- and F+
- b) F' and F-
- c) HFR and F-
- d) HFR and F+
- (ix) State the importance of performing serial dilutions of the sample?
- a) To increase the concentration of bacteria for better visualization
- b) To decrease the concentration of bacteria for easier counting
- c) To ensure uniform distribution of bacteria on the agar surface
- d) To prevent the growth of bacteria on the agar medium
- (x) Select the primary method to synchronize cells in a synchronous culture.
- a) Nutrient enrichment
- b) Temperature control
- c) Cell cycle arrest
- d) Oxygen saturation

Group-B

(Short Answer Type Questions)

3 x 5=15

2. Explain the primary source of infection for late blight of potato, and how do infected seed potatoes contribute to the disease cycle. (3)
3. Recall the differences between prokaryotes and eukaryotes. (3)
4. Differentiate between gram positive and gram negative bacterial cell walls. (3)
5. Explain the process of specialized transduction in bacteriophages. (3)
6. Criticize how can molecular methods for TB diagnosis improve upon traditional diagnostic techniques, and what benefits do they offer in terms of sensitivity and specificity. (3)

OR

Differentiate latent TB infection (LTBI) and active TB disease. (3)

Group-C

(Long Answer Type Questions)

5 x 3=15

7. Classify antibiotics based on their mode of action. (5)
8. Explain generation time and its calculative derivation. (5)
9. Explain the components of the SARS-CoV-2 S protein, including the S1 and S2 subunits, and their respective functions in the viral life cycle. How does the fusion of the viral membrane with the host cell membrane occur, and what are the key components of the S protein involved in this process? (5)

OR

Explain the current technology used for testing the presence of the SARS-CoV-2 virus in tissue samples and the significance of RT-PCR in this context. (5)
