JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST - 3 EXAMINATION- 2025

M.Sc. (Microbiology) - I Semester

COURSE CODE (CREDITS): 21MSIMB111 (3) MAX. MARKS: 35

COURSE NAME: GENERAL MICROBIOLOGY AND BACTERIOLOGY

COURSE INSTRUCTORS: Dr. Rahul Shrivastava MAX. TIME: 2 Hour

Note: *(a) All questions are compulsory.* *(b)* ***Calculators are NOT ALLOWED***

<table>
<tr><th>Q. No.</th><th>Question</th><th>Marks</th></tr>
<tr><td>Q1.</td><td>In an experimental design for study and enumeration of bacteria in water samples, 10mL water samples were collected from four different parts of Shimla district:
a. What type of media would you use for culturing of the bacteria present in the samples – Synthetic, Complex or Differential? Give reason with an example for your choice.
b. List the environmental conditions that would be employed by you for the study, with justifications for your choice.
c. Calculate the average number of bacteria present in the water samples taken from Shimla District from the following data, if 50µl of sample was used for plating in each case (all rough calculations to be shown in main answer sheet)
<table>
<tr><th>Sample No.</th><th>Dilution Factor</th><th>No. of Colonies</th></tr>
<tr><td>Sample 1</td><td>-6</td><td>58, 70</td></tr>
<tr><td>Sample 2</td><td>-5</td><td>54, 98</td></tr>
<tr><td>Sample 3</td><td>-4</td><td>226, 328</td></tr>
<tr><td>Sample 4</td><td>-10</td><td>0, 4</td></tr>
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</td><td>[1]
[1]
[4]</td></tr>
<tr><td>Q2.</td><td>Write notes on the following (ANY TWO):
a. Fermented foods and beverages
b. Biofertilizers
c. Biological control of microorganisms</td><td>[4 X 2 = 8]</td></tr>
<tr><td>Q3.</td><td>Draw a labelled diagram of a typical bacterial cell elaborating important components. Provide role and utility of each organelle for the bacteria. Discuss the classification of bacteria based on presence of flagella.</td><td>[2+3+2=7]</td></tr>
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Q4.	In a Disk Diffusion test for 'Antibiotic Susceptibility Test' using Streptomycin, different strains of bacteria were compared for their susceptibility towards the antibiotic. Answer the following from the data provided: ***Bacterial Strain*** | **Diameter of the Zone of Inhibition** ***Escherichia coli*** | 12 cm ***Salmonella*** | 17 cm ***Staphylococcus aureus*** | 24 cm ***Pseudomonas aeruginosa:*** | 1 cm a. Compare and arrange the order of susceptibility of the above strains against Kanamycin, providing suitable reason for your order. b. Provide a flow-chart for the AST method employed for the testing. c. Illustrate application of the AST assay in diagnostics and therapeutics.	**[2 X 3 = 6]**
Q5.	***Case Study:*** You are designing an experiment involving transformation of non-pathogenic *Escherichia coli* with a plasmid for demonstration to undergraduate students: (a) Assess the risk involved and identify the BSL required to conduct this work. (b) Analyzing the BSL, provide a list of measures and precautions to be taken while the experiment. (c) Analyze and describe **components** of a plasmid which must be present so that such transformation experiments may be conducted successfully? (d) What methods may be employed for such 'Artificial Transformation', of plasmids.	**[1]** **[2]** **[2]** **[3]**