

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -3 EXAMINATION- December 2024

M.Sc. - I Semester (BT)

COURSE CODE (CREDITS):20MS1BT114 (2)

MAX. MARKS: 35

COURSE NAME: MICROBIOLOGY

COURSE INSTRUCTORS: Dr. Rahul Shrivastava

MAX. TIME: 2 Hours

*Note:(a) All questions are compulsory.*

*(b) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems*

*(c) Calculators are NOT ALLOWED*

| Q.No.      | Question  | Marks                 |                 |                 |          |    |        |          |    |        |          |    |          |          |     |      |   |
|------------|---|-----------------------|-----------------|-----------------|----------|----|--------|----------|----|--------|----------|----|----------|----------|-----|------|---|
| Q1.        | <p><b>Experimental Design:</b> For study and enumeration of bacteria in water samples, 10mL water samples were collected from four different parts of Shimla district:</p> <p>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.</p> <p>b. List the environmental conditions that would be employed by you for the study, with justifications for your choice.</p> <p>c. Describe the bacterial culture technique with diagrams that would be used by you with specific reasons for choice of technique.</p> <p>d. Calculate the average number of bacteria present in the water samples taken from Shimla District from the following data, if 50<math>\mu</math>l of sample was used for plating in each case (all rough calculations to be shown in main answer sheet)</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Sample No.</th> <th>Dilution Factor</th> <th>No. of Colonies</th> </tr> </thead> <tbody> <tr> <td>Sample 1</td> <td>-6</td> <td>48, 60</td> </tr> <tr> <td>Sample 2</td> <td>-5</td> <td>54, 78</td> </tr> <tr> <td>Sample 3</td> <td>-4</td> <td>126, 228</td> </tr> <tr> <td>Sample 4</td> <td>-10</td> <td>0, 2</td> </tr> </tbody> </table> | Sample No.            | Dilution Factor | No. of Colonies | Sample 1 | -6 | 48, 60 | Sample 2 | -5 | 54, 78 | Sample 3 | -4 | 126, 228 | Sample 4 | -10 | 0, 2 | <p>[1]</p> <p>[1]</p> <p>[4]</p> <p>[4]</p> |
| Sample No. | Dilution Factor   | No. of Colonies       |                 |                 |          |    |        |          |    |        |          |    |          |          |     |      |   |
| Sample 1   | -6  | 48, 60                |                 |                 |          |    |        |          |    |        |          |    |          |          |     |      |   |
| Sample 2   | -5  | 54, 78                |                 |                 |          |    |        |          |    |        |          |    |          |          |     |      |   |
| Sample 3   | -4  | 126, 228              |                 |                 |          |    |        |          |    |        |          |    |          |          |     |      |   |
| Sample 4   | -10   | 0, 2                  |                 |                 |          |    |        |          |    |        |          |    |          |          |     |      |   |
| Q2.        | <p>A. Draw and describe different phases of a typical Sigmoidal Bacterial Growth Curve.</p> <p>B. CFU of a bacterial culture is <math>4 \times 10^7</math>. Calculate the CFU of the culture after 2 hrs 40 mins, if generation time of the bacteria is 30 mins.</p>  | <p>[4]</p> <p>[2]</p> |                 |                 |          |    |        |          |    |        |          |    |          |          |     |      |   |

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|-----|--|--------------|
| Q3. | Write short note on economic importance of the following:<br>i. Biofertilizers<br>ii. Biopesticides  | [1.5X 2 = 3] |
| Q4. | Differentiate between the following:<br>1. Thermophiles and Thermoplasma<br>2. Probiotics and Prebiotics<br>3. Viroids and Prions<br>4. Lactic Acid Bacteria and Propionic Acid Bacteria<br>5. Bacterial and Fungal Cell | [2 X 5 = 10] |
| Q5. | Describe Lytic and Lysogenic Cycle of viral replication, using suitable diagrams.  | [6]          |

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