

## JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

## TEST -3 EXAMINATIONS- 2026

## M.Sc.-II Semester (Microbiology)

COURSE CODE (CREDITS): 21MS1MB211 (03)

MAX MARKS: 35

COURSE NAME: Enzymes and Bioprocess Technology

COURSE INSTRUCTOR: Dr. Saurabh Bansal

MAX. TIME: 2 Hours

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

(b) Use of calculator is allowed.

| Q. No. | Question                                                                                                                                                                         | Marks |
|--------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| Q1     | Calculate the relative centrifugal force applying on a particle while its centrifugation at 5000 RPM in a centrifuge of diameter 10 cm.                                          | 2     |
| Q2 a)  | What do you understand by sterilization, and how does it differ from disinfection?                                                                                               | 2     |
| Q2 b)  | Why is sterilization essential in a bioprocess?                                                                                                                                  | 1     |
| Q2 c)  | Why must effluent gas be sterilized before being released into the environment?                                                                                                  | 1     |
| Q3 a)  | Why the performance of any culture making a product at large scale (10,000 L) is different compared to the small scale (10 L)?                                                   | 2     |
| Q3 b)  | What are the major applications and advantages of scaling down a bioprocess?                                                                                                     | 2     |
| Q4 a)  | Explain how the addition of a filter aid improves the efficiency of the filtration process.                                                                                      | 2     |
| Q4 b)  | Is filtration considered a steady-state process? Provide justification for your answer.                                                                                          | 2     |
| Q4 c)  | Out of Rotary Vacuum Filter and Filter Press, identify which one is an example of continuous filtration.                                                                         | 1     |
| Q5     | Which of the organism is used commercially for the production of following products:<br>a) Lactic acid                      b) Gluconic Acid                      c) Citric Acid | 3     |

|       |                                                                                                                                                                                                                                            |   |
|-------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|
| Q6    | Write down the function of following:<br>a) Load Cell                      b) Baffle                      c) Sparger                                                                                                                       | 3 |
| Q7    | Protein A with a molecular weight of 80 kDa is hydrophilic in nature whereas other protein B having a molecular weight of 7000 Da and hydrophobic in nature. Which protein will come first out of a Gel Permeation Chromatography and why? | 2 |
| Q8    | Differentiate between:<br>a) Fixed Bed and Fluidized Bed Bioreactor<br>b) Ion Exchange Chromatography and Hydrophobic Interaction Chromatography<br>c) HPLC and FPLC                                                                       | 6 |
| Q9 a) | Explain why fermentation with <i>Rhizopus oryzae</i> is considered more advantageous than fermentation with <i>Lactobacillus</i> species for lactic acid production.                                                                       | 2 |
| Q9 b) | On what basis do many researchers advocate the use of <i>Zymomonas mobilis</i> instead of yeast for alcohol production?                                                                                                                    | 2 |
| Q9 c) | Why <i>Rhizopus oryzae</i> fermentation is advantageous over the <i>Lactobacillus</i> spp. fermentation for the Lactic acid production?                                                                                                    | 2 |