JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -3 EXAMINATION- 2024

M.Sc.-II Semester (Microbiology)

COURSE CODE(CREDITS): 21MS1MB211 (03) MAX. MARKS: 35

COURSE NAME: Enzymes and Bioprocess Technology

COURSE INSTRUCTORS: Dr. Saurabh Bansal MAX. TIME: 2 Hours

Note: (a)All questions are compulsory.

(b) Marks are indicated against each question in square brackets.

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

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1. **a)** What do you understand by sterilization? How it is different from the disinfection? **[2]**
   b) Why sterilization is important in a bioprocess? **[1]**
   c) Why effluent gas must be sterilized before releasing in environment? **[1]**

2. Which of the following bioreactor is efficient and why? **[4]**
   a) Airlift Bioreactor and Bubble Column Bioreactor
   b) Fluidized and Fixed Bed Bioreactor

3. What are the functions of following in a stirred tank Bioreactor? **[3]**
   a) Baffle **b)** Impeller **c)** Sparger

4. Differentiate between following: **[6]**
   a) FPLC and HPLC
   b) Radial Flow Impeller and Axial Flow impeller
   c) Ion-exchange Chromatography and Hydrophobic Interaction Chromatography

5. **a)** Why removal of nucleic acids from the cell lysate is necessary before the sample processing? **[1]**
   b) It is the fact that the density of nucleic acids (DNA and RNA) are higher than the cells. So whether nucleic acids would settle faster than cells and organelles? Justify your answer. **[2]**
   c) What are the different forces applied while settling of a spherical particle? Show the direction of each forces through a suitable diagram. **[2]**
   d) What are the major concerns in increasing the size beyond a limit for increasing the centrifuge capacity? **[1]**

6. **a)** Draw a suitable diagram representing the difference between cross flow filtration and dead end filtration. **[2]**
   b) Draw a schematic diagram representing the different region/parts of an airlift bioreactor. **[2]**
   c) Draw a suitable diagram representing the major parts of a stirred tank bioreactor. **[2]**

7. **a)** What are the major steps involved in a liquid-liquid extraction process? **[2]**
   b) Why liquid-liquid extraction (solvent extraction) is not suitable for protein extraction? **[1]**
   c) What are the different factors on which the partition behavior of a protein depends in a PEG/dextran aqueous two phase extraction? **[2]**

8. What will be the net charge on a protein (pI = 7.0) suspended in a buffer of pH 6.0? **[1]**