

BSc Sem 5 Examination

CC - 302

Biotechnology

May 2022

Time : 2-00 Hours]

[Max. Marks : 50

- Instructions:** (1) Draw figures wherever necessary.
(2) Show question number against each answer.
(3) Figures in right are marks.
(4) Answer any **Three** out of initial **Eight** main questions. Question **9** is compulsory.

Section - I

1. (A) Define a Bioreactor. Discuss Air-lift bioreactor with a suitable diagram. (07)
(B) Discuss Stirred tank bioreactor in detail and list its benefits. (07)
2. (A) Explain bioreactor scale-up process and give its significance. (07)
(B) Explain Hollow fiber bioreactor and discuss its advantages. (07)
3. (A) Discuss PID controls in a bioreactor explaining their significance. (07)
(B) Discuss the role of Biosensors explaining their significance in designing a Bioreactor. (07)
4. (A) List different Instrumentation control for a bioreactor. Discuss the measurement and control of temperature and dissolved oxygen in a bioreactor. (07)
(B) Discuss the principle and working of Multiple Internal Reflection Spectroscopy. (07)
5. (A) Discuss the factors affecting K_{La} values in a fermentation vessel. (07)
(B) Explain the rheological properties of fluid and discuss its significance in fermentation process. (07)
6. (A) Discuss the theory of oxygen transfer from air to the cell during a fermentation process, and explain the methods used for the determination of K_{La} . (07)
(B) Discuss the design and role of heat transfer equipments used in the transfer of heat in a bioreactor. (07)
7. (A) Discuss the physical methods of cell disruption used during downstream processing. (07)
(B) Discuss the concentration of the fermentation products by solid phase and precipitation techniques. (07)
8. (A) Discuss the methods used for cell removal during downstream processing. (07)
(B) Discuss any one technique used for the purification of the fermentation product. (07)

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Section - II

(08)

9. Answer in short (**Any Eight**)

- 1) What is a perfusion bioreactor?
- 2) What is the role of a sparger and an impeller in a bioreactor?
- 3) What is cascade feedback control?
- 4) Draw and label a bioreactor.
- 5) Define: Reverse Osmosis.
- 6) An ideal duration of fermentation required for manufacturing an antibiotic is _____.
- 7) What is the use of On/Off control in a bioreactor?
- 8) Define: Partition coefficient
- 9) Which salts are commonly used for the precipitation of proteins?
- 10) What is the difference between batch culture and fed-batch culture?
- 11) Name the antifoaming agents used in fermentation process.
- 12) Define: Flow Microfluorometry
- 13) Which chromatography techniques are used for the purification of antibiotics produced by microbial fermentation?
- 14) List the advantages of continuous fermentation.
- 15) How would you cause an increase in the rate of oxygen transfer in an aerated fermentation system?
- 16) Define: Formulation
- 17) Name the adsorbents used for the concentration of vitamins.
- 18) List the factors influencing the Rheology of the fermentation fluid.
- 19) Which metabolite is produced both intracellularly and extracellularly during the fermentation process?
- 20) Name the evaporators used for concentrating heat labile substances.
- 21) Name the stabilizers used for protein formulation.
- 22) Name the materials used to compose ultrafilters and microfilters.
