

## B.Sc. (Sem.-V) Examination

## 302 CC Biotechnology

May-2017

[Max. Marks : 70]

Time : 3 Hours]

## BTI-302 Biochemical Engineering

- Q-1 Answer the following Questions (Attempt any Two) 14
- Draw the schematic of a stirred tank bioreactor. Label the important parts and state their functions.
  - Enlist the fermenters used for shear sensitive cells. Explain their advantages over a stirred tank.
  - Describe in detail the process of achievement of aseptic conditions by sterilization in a bioreactor.
  - Write a short note on perfusion bioreactor.
- Q-2 Answer the following Questions (Attempt any Two) 14
- Explain in detail different modes of heat transfer and explain one heat exchanger design in detail.
  - Write a short note on fluid rheology.
  - Explain in detail the concept of  $k_L a$ .
  - Explain the sodium sulphite oxidation and dynamic gassing out technique.
- Q-3 Answer the following Questions (Attempt any Two) 14
- Enlist the physical and chemical parameters controlled in bioreactor and explain temperature controllers in detail.
  - What are the different parts of a control system? Write a comparison between P, PI, and PID controllers in detail.
  - Explain cascade control with an appropriate diagram.
  - Discuss mechanism for foam control in detail.
- Q 4 Answer the following Questions (Attempt any Two) 14
- Write principle of centrifugation and explain any one centrifuge type in detail.
  - What is the purpose of filtration? Explain any one using an appropriate diagram.
  - Describe the recovery of products by Chromatography.
  - What is the method for recovery of intracellular products? Explain the chemical methods in detail.
- Q 5 Answer the following 14
- Define proportional gain.
  - Show the relation between shear stress and viscosity for Newtonian fluid.
  - What is the principle of centrifugation?
  - State the principle of autoclave.
  - Define offset.
  - Which controller gives maximum oscillations?
  - What is the difference in pseudoplastic and dilatant fluids?
  - What is the advantage of bubble column bioreactor?
  - What is the role of stirrer in a bioreactor?
  - What are the different stages of microbial growth?
  - Define specific growth rate.
  - What is the difference in batch and continuous cultivation?
  - What is the role of jacket in a bioreactor?
  - What is heat conduction?