Roll No. | | | | | | | | | | | | | Total No. of Pages : 02

Total No. of Questions : 09

M.Sc.(BT) (2011 & Onwards) (Sem.–2)

BIOPROCESS ENGINEERING AND TECHNOLOGY

Subject Code : MSBT-104

Paper ID : [F0257]

Time : 3 Hrs. Max. Marks : 60

INSTRUCTION TO CANDIDATES :

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION-A

1. Describe briefly :

a) What is a bioprocess?

b) Define downstream processing.

c) What are Newtonian fluids?

d) What is Fourier's law?

e) What is mass transfer?

f) Define Z- value and D -value.

g) What is X_{90} concept in air sterilization?

h) What is tickle bed reactor?

i) What is reverse osmosis?

j) What is ultrafiltration?

SECTION-B

2. Describe various unit operations of a bioprocess with a neat and labeled diagram.

3. Describe the microbial growth kinetics of continuous system.

4. What is heat transfer? Describe the general equipment for heat transfer. Also highlight individual and overall heat transfer coefficient.

5. Describe the principle and applications of ion exchange and affinity chromatography.

6. What is liquid gas mass transfer? Describe factors affecting oxygen transfer from gas bubble to cell.

SECTION-C

7. What is a fermenter? Describe oxygen requirement of a fermenter. Also highlight factors affecting oxygen uptake rate in a fermenter.

8. What are inline and on-line measurement in bioreactors? Describe the monitoring and control of temperature, dissolved oxygen, pH and agitation in bioreactors.

9. What is molecular diffusion? Describe diffusion theory. Also highlight role of diffusion in mass transfer.