

(2½ Hours)

Total Marks : 60

N.B. :

- (1) All questions are compulsory.
- (2) All questions carry equal marks.
- (3) Draw neat and labelled diagrams wherever necessary.

1. Attempt any two of the following: 12M

- (a) Compare and contrast between Airlift fermenter and packed bed bioreactor.
- (b) Comment on the monitoring and control of temperature and pH in a submerged liquid fermentation.
- (c) Give an account of fermenters used for animal cell culture.
- (d) Write the advantages and disadvantages of Solid state fermentation and submerged fermentation.

2. Attempt any two of the following: 12M

- (a) Define Newtonian and non-Newtonian fluids. Explain the different types of non-Newtonian fluids.
- (b) Comment on the oxygen requirement of industrial fermentations.
- (c) Describe the sulfite oxidation and gassing out method for determination of KLa.
- (d) Write a note on Gas liquid mass transfer and comment on the factors affecting it.

3. Attempt any two of the following: 12M

- (a) Explain the industrial production of protease and its applications
- (b) Write a note on nutraceuticals using proper examples.
- (c) Explain the industrial production of lipase and its applications
- (d) Discuss the industrial production of erythromycin

4. Attempt any two of the following: 12M

- (a) What are the different methods to ensure the sterility of final product in a pharmaceutical industry?
- (b) Elaborate on the significance of pyrogen test in pharmaceutical products
- (c) Comment on the production and significance of Immune sera
- (d) Describe the various types of vaccine.

5. Write short notes (any three) 12M

- (a) Cylindroconical fermenter
  - (b) General features of a stirred tank fermenter
  - (c) Application of probiotics
  - (d) Parametric release
  - (e) Vitamin B<sub>12</sub>
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