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# E-62

## B. Tech. EXAMINATION, Dec. 2018

(Fifth Semester)

(B. Scheme) (Main & Re-appear)

(BT)

BT303B

BIOREACTOR ANALYSIS AND DESIGN

*Time :* 3 *Hours*] [*Maximum Marks :* 75

Before answering the question-paper candidates should ensure that they have been supplied to correct and complete question-paper. No complaint, in this regard, will be entertained after the examination.

**Note** : Attempt *Five* questions in all, selecting at least *one* question from each Unit. All questions carry equal marks.

## Unit I

**1.** (a) What is mathematical modelling ? Describe how you will model a CSTR ?

(b) What is residence time distribution ? Define E, C and F curves. **7½×2=15**

**2.** Write notes on the following :

(a) Fluidized bed reactor

(b) Plug flow reactor

(c) Airlift reactor. **5×3=15**

## Unit II

**3.** Write notes on the following :

(a) Control of a bioreactor

(b) Kalman filter

(c) Physical and chemical environment of a bioreactor. **5×3=15**

**4.** (a) Write applications and limitations of a solid state fermenter.

(b) How will you design a bioreactor for immobilized microbial cells ? **7½×2=15**



## Unit III

**5.** (a) Describe hollow fiber reactors.

(b) Membrane reactors for animal cell culture applications. **7½×2=15**

**6.** What are gas liquid reactors ? How are they beneficial for biotechnological applications. Design one with suitable example. **15**

## Unit IV

**7.** Describe the following :

(a) Tank in series model

(b) Series and parallel reactions

(c) Kinetics of enzyme deactivation. **5×3=15**

**8.** What are sterile and non-sterile operations ? Design a reactor in series with recycle. **15**