**Exam.Code:1033**
**Sub. Code: 7569**

**2063**

**M. E. (Bio-Technology)**

**Second Semester**

**ME-BIO-202: Bioprocess and Bioreactor Engineering**

**Time allowed: 3 Hours** **Max. Marks: 50**

***NOTE: Attempt five questions in all, including Question No. 1 which is compulsory and selecting two questions from each Section. State clearly your assumptions.***

*x-x-x*

1) Write briefly: *(2½×4 =10)*

a) What do you mean by aeration and agitation?

b) Explain mechanisms o f Heat Transfer.

c) Explain double-pipe heat exchanger.

d) What do you mean by Overall heat-transfer coefficient?

## SECTION – A

2) Discuss the importance of media design for any microbial process. Explain the function of various components in a media. *(10)*

3. A) Discuss the comparison of batch mode with continuous mode of operation for a bioreactor.

B) What do you mean by 'scale-up'? What are the factors involved in the scale-up process? Discuss some major problems related to scale-up of a bioreactor. *(5, 5)*

4. A) Differentiate between the working principle of continuous and batch sterilization process

B) An electric heating-coil is immersed tank. Solvent at 15°C with heat capacity 2.1 kJ $kg^{-1}$°C is fed into the tank at of 15 kg $h^{-1}$. Heated solvent is discharged at the same flow rate. The tank is filled initially with 125 kg cold solvent at 10°C. The rate of heating by electric coil is 800 W. Calculate the time required for the temperature of solvent to reach 60°C. *(5, 5)*

## SECTION – B

5) Write a critical review on "Machine learning Bioprocess based on machine learning Bioprocess optimization control management and biosafety issue". (10)

6) Elaborate the various measurements techniques for estimating $k_La$ in bioreactors. *(10)*

7. A) Describe how do estimate the conversions in bioreactor with non-ideal flow behaviour using dispersion model.

B) Explain diffusion theory and what are the major roles of diffusion? *(5, 5)*

*x-x-x*