2007 JAWAHARLAL NEHRUTECHNOLOGICAL UNIVERSITY

II B.TECH I SEMESTER REGULAR EXAMINATIONS
TRANSPORT PHENOMENA IN BIOPROCESS
(BIO-TECHNOLOGY)

SET NO -3
NOVEMBER 2007

TIME: 3 HOURS
MARKS: 80

Answer any FIVE Questions
All Questions carry equal marks

1. Explain the process of diffusion in bio processing. [16]

2. What are the various factors affecting oxygen mass transfer rate in fermentation broths. [16]

3. How are the agitators used to improve the mass transfer rate are classified. What type of agitators are used for better gas liquid contact, viscous liquids and slurries, semi solid masses. [16]

4. Discuss the significance of impeller Reynold's number and power number of gassed and un gassed Newtonian fluids. [16]

5. (a) What is a stream line and a stream line flow.

(b) Sketch the stream lines for a constant fluid velocity and for a steady flow over a submerged object.
[8+8]

6. Describe the importance of mixing in bio processing. [8+8]

7. (a) Draw the temperature profile for heat transfer between fluids separated by a solid wall.

(b) Explain the formation of thermal boundary layer.

[6+10]

8. A stirred fermenter of diameter 4m contains a jacket for heat transfer. The fermenter is mixed using and impeller of diameter of one meter and operated at 50rpm. The physical properties of the broth are viscosity is $4 \times 10\text{-}3$ PaS; density is 900kg/m3 ; heat capacity is 4.18KJ/kg 0C; thermal conductivity is 0.67 w/m0C. Calculate the heat transfer coefficient.