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2007 JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY

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

SET NO -4
NOVEMBER 2007

TIME: 3 HOURS
MARKS: 80

Answer any FIVE Questions
All Questions carry equal marks

1. (a) Define a transfer process
(b) What is the transport property for momentum transfer, write the units.
(c) What is the transport property for energy transfer, write the units. How does it vary with temperature. [4+4+8]
2. (a) Mention the different phases between which the mass transfer takes place.
(b) Write the equation to determine the liquid mass transfer flux.
(c) Write the equation to determine the mass transfer flux through gas film.
(d) Write the units of concentration . [4+5+5+2]
3. Write the equation to calculate the mass transfer coefficient for mould pellets and suspensions. Define the dimensionless numbers and write the units of each term appearing in the above equation. [16]
4. Write briefly on power requirement for mixing. [16]
5. (a) What are the factors to be considered while selecting an impeller for a particular operation.
(b) Sketch the impellers used for low to medium viscosity liquids.
(c) What are the important type of impellers used for mixing in agitated tanks.
(d) Draw the figure and explain the arrangement of baffles set away from the wall for moderate viscosity liquids. [4+4+4+4]
6. Write briefly on mixing and the importance of mixing in bio processing. [16]
7. (a) What is conduction.
(b) State Fourier's law of heat conduction.
(c) The front of a slab of lead ($k = 35 \text{ w/m Ok}$) is kept at 1100C and the back is kept at 500C . If the area of the slab is 0.4m^2 and it is 0.03m thick, compute the heat flux q , and the heat transfer rate, Q . [2+4+10]
8. (a) Give the Schematic representation of the double pipe heat exchanger.
(b) Draw the profile for temperature changes for counter current flow in a double pipe heat exchanger.
(c) Draw the profile for temperature changes for co current flow in a double pipe heat exchanger.