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2007 JAWAHARLAL NEHRUTECHNOLOGICAL UNIVERSITY

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

SET NO -2
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. Write the expression to calculate maximum cell concentration. Define each term in the above equation and write the units. *[16]*

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. Discuss the parameters on which the mixing power for non aerated fluids depend.

[16]

5. (a) Write the dimensions of dynamic viscosity.

(b) Write the SI units of viscosity.

(c) Define drag force.

(d) Define wall turbulence and free turbulence . *[4+4+4+4]*

6. Discuss the rheological parameters of the following cultures

(a) Endomuces sp

(b) Aureobasidium pullulans

(c) Penicillium chrysogenum

(d) Xanthomonas campestris *[4+4+4+4]*

7. Derive an equation for steady state heat flow through a flat wall of three layers. The layers are in perfect thermal contact.

[16]

8. A liquid stream is cooled from 700C to 320C in a double pipe heat exchanger. Fluidflowing counter currently with this stream is heated from 20 0C to 440C. Calcu- late the log mean temperature difference and the arithmetic mean temperature difference.