Code :R5102306

R5

B.Tech I Year (R05) Supplementary Examinations, May 2011
PROCESS ENGINEERING PRINCIPLES
(Biotechnology)

Time: 3 hours **Max Marks: 80**

Answer any FIVE questions
All questions carry equal marks
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1. (a) Distinguish between the unit processes: hydrolysis and esterification.
   (b) Distinguish between the unit operations: absorption and adsorption.

2. (a) Write the dimensions and S.I. units of the following:
   mass concentration, momentum, thermal conductivity and shear stress
   (b) Michaelis equation relates the rate of enzymatic reaction (V, gm/cc. min,) with substrate concentration (S, gm/cc,) by the following relation:
   V = V_m (S) / (K + S)
   where V_m is maximum reaction rate ,a constant, and K another constant. What are the units of K and V_m? What will be the equivalent value of V in SI system if the same in CGS system is .2 ?

3. (a) What is incompressible fluid?
   (b) With the help of a line sketch describe a simple inclined manometer.
   (c) Show that in a simple straight tube manometer : Δ P = R_m (ρ_A - ρ_B) Where Δ P is the pressure difference; R_m is the vertical level diffence of liquid in the manometer; ρ_A and ρ_B are the densities of the manometric fluid and fluid flowing respectively.

4. (a) Describe with the help of a neat sketch rotating cylinder viscometer.
   (b) State the steps for determining the viscosity using the same.

5. Define and explain in brief the following:
   (a) Mach number
   (b) Asterisk condition
   (c) Stagnant Temperature.
   And give the assumptions to represent the compressible flow in mathematical models.

6. Spherical particles 1mm in diameter are to be fluidized with water at twice the minimum velocity. The particles have an internal porosity of 40%, an average pore diameter of 10μm and a particle density of 1.5gm/cm^3. Prove that the flow through the internal pores is very small compared to the flow between the particles and that the internal porosity can be neglected if prediction the fluidization behavior.

7. Argon is flowing through a rotameter at 100cm^3/min. What flow of helium will give the same reading on the rotameter Cr is always 0.61. The float density is 2gm/cm^3.

8. (a) What is the chief advantage of the different arrangement in diaphragm pumps?
   (b) What is positive displacement?

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