Code No: R7102306

R7

B.Tech I Year(R07) Supplementary Examinations, May 2011
PROCESS ENGINEERING PRINCIPLES
(Bio-Technology)

Time: 3 hours   Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks
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1. (a) How are biotech industries classified? Give few examples.

   (b) State and explain the material balance equation for a given continuous distillation unit.   [8+8]

2. (a) What is universal gas constant value in CGS system?

   (b) What is the volume of 112 gm of nitrogen gas at 200 ^0C and 3 atm. pr?

   (c) What will be the weight of hydrogen of same volume as above at the same conditions? [3+10+3]

3. (a) Define and derive : average velocity, momentum and energy correction factors.

   (b) The velocity distribution(U) in a pipe is given by U = K$\{1 - (r/R)^2\}$ where K is a constant and R is the pipe radius. Find the average velocity.   [9+7]

4. (a) Enumerate Newton's law of viscosity giving a neat sketch.

   (b) Draw the plots of shear stress vs shear rate diagrams for Newtonian and Bingham fluids explain the significance of the yield stress.

   (c) Two infinite plates are separated by a fluid layer of 0.025 cm Calculate the shear stress on the stationary bottom plate when the upper plate is moved with constant velocity of 40 cm per sec. Assume viscosity of fluid , $\mu = 0.8cp$ .What are the assumptions.   [5+5+6]

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. [4+4+4+4]

6. Mention and explain continuous types of fluidization.   [16]

7. Water at 68^0F if flowing through an orifice meter. The discharge at point 3 is directly to the atmosphere. The actual pipe ID is 1in, and β is 0.6. The manometer contains an oil of specific gravity 1.10 and the reading for $\triangle$h is 1.50 in. Calculate the flow rate in m^3 per hour and the guage pressure at point 1in mm of water.   [16]

8. What are the different types of pumps? Explain one in detail.   [16]

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