Code :R5102306

R5

B.Tech I Year (R05) Supplementary Examinations, December 2010
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 operations: extraction and leaching.
   (b) Compare and contrast biosynthesis with biodegradation.
2. (a) What are N.T.P. conditions used in the PVT relations?
   (b) What is the volume of 132 gm of carbon dioxide gas at $200^o C$ and 3 atm. pr.
   (c) What will be the weight of hydrogen of same volume as above at the same conditions.
3. (a) The vertical level difference in a simple mercury (sp.gr.13.6) manometer connected across an orifice is found to be 10 cm. Find the down stream pressure in bars when the upstream water pressure is 760 mm mercury.
   (b) What will be the vertical level difference if the manometric fluid is replaced by carbon tetrachloride (sp.gr.1.36) instead of mercury.
4. (a) With the help of neat sketch write on the principles of rheology.
   (b) Draw the plots of shear stress vs shear rate diagrams for pseudoplastic and dilatant fluids. Define apparent viscosity and explain its variation.
   (c) A Newtonian fluid of $\mu = 0.8$ cp is held over an infinite plate. A plate of 30 cm by 30 cm placed on the upper surface of fluid at a vertical distance of 0.03 cm is moved with constant velocity of 30 cm per sec. Calculate the force required.
5. (a) Write Hagen-Poiseuille equation and explain the terms mentioned in it.
   (b) Derive a relation between average velocity and maximum velocity for laminar flow through pipes.
6. Mention and explain continuous types of fluidization.
7. Water at $68^0 F$ 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.
8. Suppose a selected pump requires a minimum NPSH of 16ft (4.9m) when pumping cold water. What will be the NPSH limitation to pump propane at 55^0F ($128^0 C$) with a vapor pressure of 100psi?

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