

I B.Tech Year(R05) Supplementary Examinations, May/June 2010
PROCESS ENGINEERING PRINCIPLES
(Bio-Technology)

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks

1. (a) With the help of neat line sketch depict the different phases involved in the transport of oxygen from rising gas bubbles into cells suspended in the liquid
(b) How does viscosity of gases and liquids change with temperature? [8+8]
2. (a) What is gravitational force constant (g_c) explain its importance with the CGS units and dimensions.
(b) Define poundal and pound weight. How are they related? What are the dimensions and units of this conversion factor. [8+8]
3. (a) What is a compressible fluid?
(b) With the help of a line sketch describe a simple manometer.
(c) Show that in a simple inclined tube manometer :
 $\Delta P = R_i (\rho_A - \rho_B) \sin \theta$ Where ΔP is the pressure difference; R_i is the level difference of liquid in the manometer measured along the inclined tube; ρ_A and ρ_B are the densities of the manometric fluid and fluid flowing respectively and θ is the angle of inclination of the tube to horizontal. [3+6+7]
4. (a) How are non Newtonian fluids classified by their shear stress shear rate behaviour illustrate with sketches.
(b) Explain power law fluid. Show the rheological behaviour. [8+8]
5. Explain with figures the process of compressible flow. [16]
6. Particles of sphalerite (specific gravity = 4) are settling under the force of gravity in CCl_4 is at $20^\circ C$ (Specific gravity 1.594). The diameter of the sphalerite particles is 0.1mm. The volume fraction of sphalerite in CCl_4 is 0.20. What is settling velocity? [16]
7. Show that for incompressible flow the losses per unit weight of fluid between the upstream section and throat of a venturimeter are
 $KV_2^2/2g$ if $K = \{ (1/C_v)^2 \} \{ (1 - (D_2/D_1))^4 \}$. [16]
8. Define pump and write the performance characteristic of a pump. [16]
