

**II B.Tech II Semester Supplementary Examinations, April/May 2005**  
**FLUID MECHANICS**  
**(Chemical Engineering)**

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions  
All Questions carry equal marks

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1. (a) What is the resultant pressure on an immersed surface in a static fluid . Derive an equation for the same. How do you find the centre of pressure?  
(b) What is Pascal's Law? Explain.
2. Differentiate between :
  - (a) Steady and Unsteady flow
  - (b) Uniform and Non-Uniform flow
  - (c) Laminar and Turbulent flow
  - (d) Rotational and Irrotational flow
3. (a) Define Hydraulic gradient and total energy line with the aid of a neat sketch.  
(b) A horizontal pipe line 35m long is connected to a water tank at one end and discharges freely in to the atmosphere at the other end. For the first 20m of its length from the tank, the pipe is 15 cm diameter and its diameter is suddenly enlarged to 30 cm. The height of water level in the tank is 7.5 m above the centre of the pipe. Considering all losses, determine the rate of flow.
4. (a) Define the terms sonic, sub-sonic super sonic flows, mach angle and mach cone.  
(b) A gas is flowing through a horizontal pipe at a temperature of 4°C. The diameter of the pipe is 8cm and at a section 1-1 in this pipe, the pressure is  $30.3N/cm^2$ (gauge). The diameter of the pipe changes from 8 cm to 4 cm at the section 2-2, where pressure is  $20.3 N/cm^2$  (gauge). Find the velocities of the gas at these sections assuming an isothermal process. Take  $R= 287.14$  Nm/kg K, and atmospheric pressure =  $10N/cm^2$ .
5. Derive Kozeny-Carman and Burke-plummer equation for flow through beds.
6. (a) Explain how the frictional losses in pipe fittings and valves can be accounted for design calculations.  
(b) How do you classify pumps?
7. What is Adiabatic compression and what is Isothermal compression.
8. Explain Venturimeter in detail. Also derive the expression for discharge through a venturimeter.

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