Fluid Mechanics
(ME-206/208, MAY 2007)

Time: 3 Hrs
Max. Marks: 60

Note: Section A is compulsory. Attempt any four questions from section B and any two from Section C.

Section-A

1. a) What is meant by vapour pressure and what is its importance in liquid flow systems?
   b) If the centre of gravity of a floating body is above its metacentre. What is the type of equilibrium of the body?
   c) What are the advantages of venturimeter over orificemeter?
   d) Capillary action is due to_____and_____.
   e) Mention two practical applications of the equation of hydrostatic law.
   f) What is the significance of upper and lower critical Reynolds number?
   g) List the assumptions made in deriving Bernoullis equation.
   h) What is the basic principle involved in the measurement of discharge in venturimeter & orificemeter?
   i) Show that f = 64/Re.
   j) Define normal and tangential acceleration.

Section-B

2. Show that the stream function and velocity potential function cut each other orthogonally.
3. Explain the different types of similarity laws.
4. Explain with a neat sketch the working of Rotometer.
5. In a 2D flow, the velocity components 'u' and 'v' are given by u = 2x & v = -2y. Determine the stream function.
6. Derive the equation of Rectangular Notch and Triangular Notch.

Section-C

7. a) Derive Hagen Poiseulle equation for laminar flow in circular pipes.
   b) An oil of viscosity 0.1 Ns/m^2 and specific gravity 0.9 is flowing through a circular pipe of diameter 5 am and of length 300 m/ If rate of flow is 3.5 litres/sec; find the pressure drop in a length of 300 m.
8. a) What is meant by Rotational and circulation?
   b) A fluid flow is given by V = $x^2yi + y^2zj – (2xyz + yz^2)j$. Prove that it is a case of possible steady incompressible flow. Calculate velocity at point (2, 1, 3)
9. a) Define Compressibility and Bulk Modulus.
   b) A uniform body of size 3 m long x 2 m wide x 1 m deep floats in water. What is the weight of the body, if the depth of immersion is 0.8 m. Also determine the metacentric height.