Code No: 07A4EC15 **R07** **Set No. 2**

II B.Tech II Semester Examinations,APRIL 2011
MECHANICS OF FLUIDS
Metallurgy And Material Technology

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) What is the disadvantage in having very high meta-centric heights for passenger ships?Explain.
   (b) What are mechanical gauges? Name three important mechanical gauges. [8+8]

2. (a) What is the relation between pressure and density of a compressible fluid for?
      i. Isothermal process
      ii. Adiabatic process.
   (b) A gas is flowing through a horizontal pipe at a temperature of 4^0C. The diameter of the pipe is 8cm and at a section I in the pipe, the pressure is 30.3N/cm^2 (gauge). The diameter of the pipe changes from 8cm to 4cm at the section II, where pressure is 20.3N/cm^2 (gauge). Find the velocities of the gas at these sections assuming an isothermal process. Take R=287.14Nm/Kg.K and atmosphere pressure=10N/ cm^2. [6+10]

3. (a) What is the importance of kinetic energy and momentum correction factors.
   (b) A nozzle of diameter 20mm is fitted to a pipe of diameter 40mm. Find the force exerted by the nozzle on the water, which is flowing through the pipe at the rate of $1.2m^3$/minute [7+9]

4. (a) Explain with a neat sketch the boundary layer characteristics when a fluid is flowing over a flat plate.
   (b) A thin flat plate 0.3 m wide and 0.6 m long is suspended and exposed parallel to air flowing with a velocity of 3 m/sec. Calculate drag force on both sides of the plate when the 0.3 m edge is oriented parallel to free stream. Consider flow to be laminar and assume for air kinematic viscosity is 0.18 stokes and density is 1.2 kg/m^3. [10+6]

5. (a) How the loss of energy at the entrance to the pipe and exit from the pipe is to be determined?
   (b) A horizontal pipeline 50 m long is connected to a water tank at one end and discharges freely into the atmosphere at the other end. For the first 30 m of its length from the tank, the pipe is 100 mm diameter and its diameter suddenly enlarged to 200 mm. The height of the water level in the tank is 10 m above the centre of the pipe. Determine the rate of flow. Take 4f = 0.04 for both sections of the pipe and consider minor losses. [6+10]

Code No: 07A4EC15 **R07** **Set No. 2**

6. (a) What do you meant by viscous flow? Mention various forces to be considered in Navier Stroke's equation.

   (b) Through a horizontal circular pipe of diameter 100 mm and of length 10m, an oil of dynamic viscocity 0.097 poise and relative density 0.9 is flowing. Calculate the difference of pressure at the two ends of the pipe, if 100 Kg of the oil is collected in a tank in 30 seconds. [10+6]

7. (a) Define the scale ratio in distorted models and obtain the expression of scale ratio for velocity and scale ratio for area of flow.

   (b) The rate of flow in a 120mm diameter pipe is measured with a venturimeter with a 40mm diameter throat. When a mercury manometer is connected across the converging section reads 7mm, the flow rate is 1.5kg/sec. What is the coefficient of discharge at that flow rate and what is permanent loss of head? (Specific gravity of mercury =13.6). [7+9]

8. (a) The Velocity components in x and y directions are given as $u = \frac{2xy^3}{3-x^2y}$ *and* $v = xy^2 - \frac{2yx^3}{3}$. Indicate whether the given velocity distribution is:

      i. a possible field of flow.

      ii. Not a possible field of flow.

   (b) Is the flow-net analysis applicable to rotational flow? If no, why? [8+8]

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Code No: 07A4EC15 **R07** **Set No. 4**

II B.Tech II Semester Examinations,APRIL 2011
MECHANICS OF FLUIDS
Metallurgy And Material Technology

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
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2. (a) What is the relation between pressure and density of a compressible fluid for?
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   (b) A thin flat plate 0.3 m wide and 0.6 m long is suspended and exposed parallel to air flowing with a velocity of 3 m/sec. Calculate drag force on both sides of the plate when the 0.3 m edge is oriented parallel to free stream. Consider flow to be laminar and assume for air kinematic viscosity is 0.18 stokes and density is 1.2 kg/m^3. [10+6]

6. (a) How the loss of energy at the entrance to the pipe and exit from the pipe is to be determined?

   (b) A horizontal pipeline 50 m long is connected to a water tank at one end and discharges freely into the atmosphere at the other end. For the first 30 m of its length from the tank, the pipe is 100 mm diameter and its diameter suddenly enlarged to 200 mm. The height of the water level in the tank is 10 m above the centre of the pipe. Determine the rate of flow. Take 4f = 0.04 for both sections of the pipe and consider minor losses. [6+10]

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   (b) Is the flow-net analysis applicable to rotational flow? If no, why? [8+8]

8. (a) What is the importance of kinetic energy and momentum correction factors.

   (b) A nozzle of diameter 20mm is fitted to a pipe of diameter 40mm. Find the force exerted by the nozzle on the water, which is flowing through the pipe at the rate of $1.2m^3$/minute. [7+9]

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Code No: 07A4EC15 **R07** **Set No. 1**

II B.Tech II Semester Examinations,APRIL 2011
MECHANICS OF FLUIDS
Metallurgy And Material Technology

Time: 3 hours **Max Marks: 80**

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Code No: 07A4EC15 **R07** **Set No. 3**

II B.Tech II Semester Examinations,APRIL 2011
MECHANICS OF FLUIDS
Metallurgy And Material Technology

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
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