

**End Semester Examinations - 2015-16 Even Semester - May 2016**

**14CE2003 Mechanics of Fluids**

**Set A**

**Time : 3 hrs**  
**Total Marks: 100**

1. An inverted U-tube manometer is connected to two horizontal pipes A and B through which water is flowing. The vertical distance between the axes of these pipes is 30cm. When an oil of specific gravity 0.8 is used as a gauge fluid, the vertical heights of water columns in the two limbs of the inverted manometer (when measured from the respective centre lines of the pipes) are found to be same and equal to 35cm. Determine the difference of pressure between the pipes. (20 marks)  

**OR**
2. i) Explain in detail on compressibility, bulk modulus, surface tension and capillarity. (10marks)  
ii) Write short note on 5 different types of fluids. (10 marks)
3. A 30 cm diameter pipe, conveying water, branches into two pipes of diameters 20cm and 15cm respectively. If the average velocity in the 30cm diameter pipe is 2.5 m/s, find the discharge in this pipe. Also determine the velocity in 15cm pipe if the average velocity in 20cm diameter pipe is 2m/s. Find discharge in pipe 1 or Q1 and velocity in pipe of diameter 15cm or V3 . (20 marks)  

**OR**
4. i) A 25cm diameter pipe carries oil of specific gravity 0.9 at a velocity of 3m/s. At another section the diameter is 20cm. Find the velocity at this section and also mass rate of flow of oil. (10marks)  
ii) A pipe, through which water is flowing, is having diameters, 20cm and 10cm at the cross sections 1 and 2 respectively. The velocity of water at section 1 is given 4m/s. Find the velocity head at sections 1 and 2 and also rate of discharge. (10marks)
5. A syphon of diameter 200mm connects two reservoirs having a difference in elevation of 15m. The total length of the syphon is 600 m and the summit is 4 m above the water level in the upper reservoir. If the separation takes place at 2.8m of water absolute, find the maximum length of syphon from upper reservoir to the summit. Take  $f = 0.004$  and atmospheric pressure = 10.3m of water. (20 marks)  

**OR**
6. The rate of flow of water through a horizontal pipe is 0.25m<sup>3</sup>/s. The diameter of the pipe which is 200mm is suddenly enlarged to 400 mm. The pressure intensity in the smaller pipe is 11.772 N/cm<sup>2</sup>. Determine i) loss of head due to sudden enlargement ii) pressure intensity in the large pipe iii) power lost due to enlargement. (20 marks)
7. i) Determine the height of a rectangular weir of length 6m to be built across a rectangular channel. The maximum depth of water on the upstream side of the weir is 1.8m and discharge is 2000 lit/s. Take  $C_d = 0.6$  and neglect end contractions. (10 marks)  
ii) A rectangular weir of crest length 50cm is used to measure the rate of flow of water in a rectangular channel of 80cm wide and 70cm deep. Determine the discharge in the channel if the water level is 80mm above the crest of weir. Take velocity of approach into consideration and value of 0.62. (10 marks)  

**OR**
8. Following are the data for stepped notch:  $L_1 = 40\text{cm}$ ,  $L_2 = 80\text{cm}$ ,  $L_3 = 120\text{cm}$ ,  $H_1 = 50 + 30 + 15 = 95\text{ cm}$ ,  $H_2 = 80\text{cm}$ ,  $H_3 = 50\text{ cm}$ ,  $C_d = 0.62$ . Find the discharge through the notch if  $C_d$  for all section = 0.62. (20 marks)
9. An orifice meter with orifice diameter 10cm is inserted in a pipe of 20cm diameter. The pressure gauges fitted upstream and downstream of the orifice meter gives readings of 19.62 N/cm<sup>2</sup> and 9.81 N/cm<sup>2</sup> respectively. Coefficient of discharge for the orifice meter is given as 0.6. Find the discharge of water through pipe. (20marks)

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**Wishing you All the Best**

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