ME 3004

III Semester B.Tech. in Mechanical Engineering Examination, August 2011
FLUID MECHANICS AND MACHINERY

Time : 3 Hours   Max. Marks : 75

Instruction : Answer any five questions from Part – A and Part – B.

PART – A

Answer any five questions :   (5×5=25)

1. Explain the Newton's law of viscosity and give examples of its application.

2. What are the kinds of fluids ?

3. What is meant by boundary layer ? Why does it increase with distance from the upstream edge ?

4. The converging pipe with inlet and outlet diameters of 200 mm and 150 mm carries the oil whose specific gravity is 0.8. The velocity of oil at the entry is 2.5 m/s, find the velocity at the exit of the pipe and oil flow rate in kg/sec.

5. Write a short note on Venturi Meter.

6. Explain with the block diagram of Laser Doppler Anemometer.

7. Define (i) Impulse turbine (ii) Reaction Turbine.

8. Describe the types of pumps.

PART – B

Answer any five questions :   (5×10=50)

9. Explain the classification and properties of fluids.

10. Obtain an expression for boundary layer thickness, shear stress and drag force on one side of the plate and coefficient of drag in terms of Reynolds number for the velocity profile for laminar boundary flow.

$$\frac{u}{U} = Sin\left[\frac{\pi}{2} \cdot \frac{y}{\delta}\right].$$

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11. For a turbulent flow in a pipe of diameter 300 mm, find the discharge when the centre-line velocity is 2.0 m/s and the velocity at a point 100 mm from the centre as measured by pitot-tube is 1.6 m/s.

12. Design a Pelton wheel for a head of 80 m and speed of 300 r.p.m. The Pelton wheel develops 103 kW. Take C_v = 0.98, speed ratio = 0.45, overall efficiency = 0.80.

13. Describe flow measurement using orifices, notches and weirs.

14. Give an account on steam turbines.

15. Draw the inlet and outlet velocity triangle for inward flow reaction turbine when discharge at outlet is zero.

16. What is an air vessel ? Describe the function of the air vessel for reciprocating pump with neat sketch.

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