3506

BOARD DIPLOMA EXAMINATION, (C–09)
OCT/NOV—2013
DME—FOURTH SEMESTER EXAMINATION

HYDRAULICS AND FLUID POWER SYSTEMS

Time : 3 hours]   [*Total Marks* : 80

PART—A

Instructions : (1) Answer **all** questions.

(2) Each question carries **three** marks.

(3) Answer should be brief and straight to the point and shall not exceed *five* simple sentences.

1. Determine the bulk modulus of elasticity of a liquid if the pressure of the liquid is increased from 70 N/cm^2 to 130 N/cm^2. The volume of the liquid decreases by 0·15 percent.

2. What is a venturi meter? State its use.

3. Write the equation for power transmission through pipes, mention what for each letter stands and state their units.

4. Derive the expression for the force exerted by the jet when it strikes at the centre of fixed curved vane.

5. A turbine develops 600 kW power. The net head available is 40 cm. If the overall efficiency of the turbine is 0·8, what is the discharge through the turbine?

6. Why are the blades of Pelton wheel made as double hemispherical shape?

7. Draw a neat sketch of a centrifugal pump and name its parts.

8. What is a hydraulic control valve? State its functions.

9. Give any six differences between hydraulic circuit and pneumatic circuit.

10. Briefly explain air-controlled hydraulic valve.

PART—B

Instructions : (1) Answer *any* **five** questions.

(2) Each question carries **ten** marks.

(3) Answers should be comprehensive and the criterion for valuation is the content but not the length of the answer.

11. Explain a differential manometer with a neat sketch and derive the expression for pressure head.

12. A circular pipe of 250 mm diameter carries an oil of specific gravity 0·8 at the rate 120 lit/sec and under a pressure of 2 kPa. Calculate the total energy in meters at a point which is 3 m above datum line.

13. A tank discharges water through a horizontal pipe of length 3 m to atmosphere. Determine the discharge in the pipe for a head of 5 m in the tank, when *(a)* the pipe is of 50 mm diameter and *(b)* the pipe is of 80 mm diameter.

Assume friction factor f = 0·008.

14. A jet of water impinges on a moving flat plate with a velocity of 35 m/s. With this force, the plate moves with a velocity of 6 m/s. If the diameter of the jet is 9·5 cm, find *(a)* force exerted on the plate, *(b)* work done and *(c)* power in kW.

15. Explain the working of Kaplan turbine with a neat sketch.

16. A double-acting reciprocating pump has piston diameter 50 mm, length of stoke is 400 mm and crank speed is 60 rpm. The suction and delivery heads are 5 m and 18 m respectively. Determine the quantity of water lifted/min and power required. Specific weight of water is 9·81 kN/m^3.

17. What are the merits and demerits of hydraulic control system?

18. Explain the working principle of the following pneumatic clamps with neat sketches :

(a) Lever clamp

(b) Toggle clamp

(c) Wedge clamp

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