C09–M–**406**

3506

BOARD DIPLOMA EXAMINATION, (C–09)
OCT/NOV—2015
DME—FOURTH SEMESTER EXAMINATION

HYDRAULICS AND FLUID POWER SYSTEMS

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

PART—A 3×10=30

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

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

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

1. Define the following and mention their units :

   (a) Specific gravity

   (b) Viscosity

2. Draw a neat sketch of venturi meter. State why the angle of divergency is to be maintained.

3. Write the equation for power transmission through pipes and explain each term and state their units.

4. Derive the expression for force exerted by the jet when it exerts a fixed curved vane at one tip and leaving at the other.

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

6. Write the classification of hydraulic turbines.

7. What are meant by priming and cavitation?

8. State the purpose of the following fluid reservoir elements :

(a) Strainer

(b) Oil level gauge

9. Briefly explain the working principle of pneumatically operated wedge clamp.

10. State the applications of hydro-pneumatic system.

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PART—B 10×5=50

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

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

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

11. A simple manometer (U-tube) containing mercury is connected to a pipe in which an oil of specific gravity 0·8 is flowing. The pressure in the pipe is vacuum. The other end of the manometer is opened to the atmosphere. Find the vacuum pressure in pipe, if the difference of mercury level in the two limbs is 20 cm and height of oil in the left limb from the center of the pipe is 15 cm below.

12. A circular pipe of 200 mm diameter carries oil of relative density 0·75. The discharge through the pipe is of 70 lit/sec. At a section 1 m above the datum the pressure is vacuum of 3 cm of mercury. What is the total head at the section in metres of oil?

13. *(a)* Explain the working principle of a syphon with a neat sketch.

(b) Water is discharged from a tank maintained at a constant head of 6 m above the exit of a straight 100 cm long pipe. Estimate the rate of flow if the diameter of pipe is 200 mm. Take Darcy's friction factor $f = 0.01$.

14. A jet of water 50 mm diameter moving with a velocity of 15 m/s, impringes on a series of vanes moving with a velocity of 6 m/s. Find—

(a) force exerted by the jet;

(b) work done by the jet;

(c) efficiency of the jet.

15. At what angle the guide blades of Francis turbine set to extract 7000 kW of power. The discharge is 20 m^3/s, when running at 200 r.p.m. The diameter of runner at inlet is 2 m and breadth of opening at inlet is 0·8 m. Assume the discharge is radial at outlet and diameter of runner at outlet is 1 m.

16. A centrifugal pump impeller has outer diameter of 40 cm and outer width of 6 cm. The impeller runs at a speed of 900 r.p.m. and the blades are curved backward with a blade angle of 30° at the outlet. The discharge delivered is 0·3 m^3/s. Determine all the velocities and angles of outlet velocity triangle. Sketch the velocity triangle.

17. Explain the following spool type director control valves :

(a) Two-way

(b) Four-way

18. What are the essential elements of pneumatic circuit? State their functions.

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