



C09-M-406

3506

BOARD DIPLOMA EXAMINATION, (C-09)

MARCH/APRIL—2014

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

1. Differentiate among gauge pressure, absolute pressure and atmospheric pressure.

2. What is a pitot tube? Write down the formula for finding the velocity of the flowing liquid.

3. State the condition for maximum power transmitted through a pipe. What is the corresponding maximum efficiency?

4. A jet of water 50 mm diameter strikes a flat stationary plate normally with a velocity of 30 m/s. Find the force exerted by the plate.

- * 5. State any three differences between Pelton wheel and Francis turbine.
6. State the functions of the following parts of the Pelton wheel :
(a) Casing
(b) Nozzle
7. What is the difference between positive displacement and rotodynamic pumps?
8. State the functions of the following components of hydraulic system :
(a) Pressure control
(b) Direction control
(c) Actuator
9. What is meant by pneumatic system? State any four applications of pneumatic power.
10. State the advantages of hydropneumatic system.

PART—B

10×5=50

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. (a) Define the following terms : 3
(i) Surface tension
(ii) Mass density

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(b) An oil film of thickness 2 mm is used for lubrication between a square plate of size 0.9 m × 0.9 m and an inclined plane having an angle of inclination 20°. The weight of square plate is 392 N and it slides down the plane with a uniform velocity of 0.25 m/s. Find the viscosity of oil.

7

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) 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 20 cm diameter jet of water strikes a curved vane with a velocity of 30 m/s. The inlet vane angle is zero and the outlet angle is 25°. Find the resultant force on the vane—

(a) when the vane is fixed;

(b) when the vane is moving with a velocity of 15 m/s in the direction of jet.

15. What is meant by governing? Explain the governing of reaction turbines with a line diagram.

16. A single-cylinder, single-acting reciprocating pump has the following specifications :

Plunger diameter 500 mm

Stroke 300 mm

Static lift 12 m

Speed 12 r.p.m.

Discharge 3357 lit/min

Determine the—

(a) coefficient of discharge;

(b) power required to drive the pump if efficiency is 85%.

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- * **17.** (a) What is a pressure intensifier? Explain its working principle with a neat sketch. 6
- (b) State any four uses of an accumulator. 4
- 18.** Explain the working principles of the following pneumatic clamps with neat sketches :
- (a) Lever clamp
- (b) Toggle clamp
- (c) Wedge clamp
