



C09-M-406

**3506**

**BOARD DIPLOMA EXAMINATION, (C-09)**

**MARCH/APRIL—2017**

**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. What is pitot tube? Draw the sketch.
3. Find the loss of head due to friction in a pipe of 1 meter diameter and 15 kilometer long. The velocity of water in the pipe is 1 m/s. Coefficient of friction is 0.005.
4. Derive the expression for the force exerted by the jet when it strikes at the centre of fixed curved vane.
5. Draw a neat sketch of a hydro-electric power plant and indicate the elements of the plant.
6. Draw a neat sketch of the Pelton wheel and name the various parts.
7. What are the advantages of a centrifugal pump over a reciprocating type?

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8. State the function of the following components of a hydraulic system :
- (a) Oil reservoir
  - (b) Filter
  - (c) Pump
9. What is meant by pneumatic system? State any four applications of pneumatic power.
10. What is the hydro-pneumatic system? State its advantages.

**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) A liquid of specific gravity 0.8 is flowing in a pipe with a pressure of 5 bar. A simple monometer is used to measure the pressure in the pipe shown in figure. Find the reading of monometer. 5
- (b) A closed tank contains 0.5 m of mercury, 2 m of water, 3 m of oil of density  $600 \text{ kg/m}^3$  and there is an air space above the oil. If the gauge pressure at bottom of tank is 200 kPa. What is the pressure of the air at the top of the tank? 5
- \* 12. (a) State the Bernoulli's theorem and write down the expression for it. 3
- (b) A pipe 300 m long has a slope of 1 in 100 tapers from 1 m diameter at higher end to 0.5 m at the lower end. The quantity of water flowing is 90 lit/sec. If the pressure at the higher end is 70 kPa, find the pressure at the lower end. 7
13. Water is to be supplied from a reservoir to a turbine. The turbine is situated 150 m below the reservoir level. The length of penstock is 1200 m. Determine the smallest diameter of

penstock to produce 500 kW of power with a turbine efficiency 90% take  $f = 0.025$ .

- 14.** A jet of oil 25 mm diameter is moving with a velocity of 30 m/sec, the specific gravity of oil is 0.8. Find the force exerted by the jet, if—
- (a) the plate is fixed;
  - (b) the plate is moving with a velocity of 12 m/s in the direction of jet.
- 15.** A Kaplan turbine operating under a net head of 20 m develops 36750 kW with an overall efficiency of 86%. The speed ratio is 2 and the flow ratio is 0.6. The hub diameter of the wheel is 0.35 times the outside diameter of wheel. Find the diameter and speed of turbine.
- 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—
- (a) coefficient of discharge;
  - (b) power required to drive the pump of efficiency is 85%.
- 17.** Explain the following spool type director control valves :
- (a) Two way
  - (b) Four way
- 18.** Explain the working principle of the following power operated holding devices with neat sketches :
- (a) Pneumatically operated vice
  - (b) Pneumatic collet chuck

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