3506

BOARD DIPLOMA EXAMINATION, (C–09)

MARCH/APRIL—2018

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 :　　　　　　　　　　　　　　　　　1+1+1

(a) Atmospheric pressure

(b) Gauge pressure

(c) Absolute pressure

2. What is a venturimeter? State its use.　　　　　　2+1

3. Explain graphically :　　　　　　　　　　1½+1½

(a) Hydraulic gradient line

(b) Total energy line

4. Derive the expression for force exerted by the jet when it exerts a fixed curved vane at one tim and leaving at the other.　　3

5. Explain the following terms in a hydraulic turbine :   1½+1½

    (a) Hydraulic efficiency

    (b) Mechanical efficiency

6. Why are the blades of Pelton wheel made as double hemi-spherical shape?   3

7. State the importance of priming in centrifugal pump.   3

8. State any six limitations of hydraulic control system.   3

9. What is the necessity of safety circuits in pneumatic systems?   3

10. Briefly explain air as cushion for hydraulic system.   3

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

11. *(a)* Define the terms—

       (i) surface tension;

      (ii) mass density.   3

    (b) The clearance between a 80-mm diameter shaft and its journal bearing is 0·75 mm. If the shaft rotates at 100 r.p.m., find the shear stress induced in the lubricant. Take 1 poise.   7

12. State Bernoulli's theorem. What are the assumptions made in Bernoulli's theorem?   5+5

13. Find the max power transmitted to a power station through a hydraulic pipe 3 km long and 20 cm diameters, when the pressure at the power station is 600 kN/m^2. Take f 0·0075.

14. A jet of water impinges on a moving vane with a velocity of 35 m/s with this force the plate moves with a velocity of 6 m/s. If the diameter of jet is 9·5 cm, find—

(a) force exerted on the plate;

(b) work done;

(c) power in kW. 4+3+3

15. Explain the working of a pelton wheel with a neat sketch. 5+5

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%. 5+5

17. Explain the working principle of hydraulic jack with a neat sketch. 5+5

18. Explain the working principle of following power operated holding devices with neat sketches : 5+5

(a) Pneumatically operated clamp

(b) Pneumatic collect chuck

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