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C09–M–406

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BOARD DIPLOMA EXAMINATION, (C–09)

APRIL/MAY—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 specific gravity and density. 1½+1½

2. State Bernoulli's theorem. Give any two practical applications of Bernoulli's theorem. 2+1

3. Write the equation for power transmission through pipes and mention what each letter stands for and state their units. 1+2

4. Derive the expression for the force exerted by the jet when it strikes at the centre of fixed curved vane. 3

5. State the function of the following parts of the Pelton wheel : 1½+1½

(a) Casing

(b) Nozzle

6. How do you classify water turbines based on direction of water flow? Give examples. 2+1

7. What is the difference between centrifugal pump and reciprocating pump? 3

8. List the essential components of a hydraulic system and state the function of any one component. 2+1

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

10. State the applications of hydro-pneumatic system. 3

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. Explain how pressure is measured at a point in a fluid flowing through a pipe using—
(a) U-tube manometer;
(b) inverted deferential manometer. 5+5

12. A venturi meter 200 mm×100 mm is used for measuring the flow of oil of specific gravity 0·8. The oil-mercury differential gauge shows a deflection of 250 mm. Find the discharge of oil if the coefficient of the meter is 0·98.

13. Explain *(a)* hydraulic gradient line and *(b)* total energy line.

14. A jet of 78·54 cm^2 area moving with a velocity of 12 m/s impinges on a series of vanes moving with a velocity of 8 m/s. Determine—
(a) force on the plate;
(b) work done per second;
(c) efficiency. 4+3+3

15. A Kaplan turbine produces 36 MW under a head of 20 m with an overall efficiency of 94%. Ratio of d/D is 1/3, flow ratio is 1/2 and speed ratio is 2. Estimate the diameter of turbine boss and turbine speed. 5+5

16. A double-acting reciprocating pump has piston diameter 50 mm, length of stroke is 400 mm and crank speed is 60 r.p.m. 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] 5+5

17. Explain the following with neat sketches : 5+5

(a) Hydraulic jack

(b) Hydraulic crane

18. *(a)* State the elements of pneumatic circuit. Write the functions of any two elements. 3+4

(b) State the areas of application of pneumatic power unit. 3

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