



C09-M-406

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BOARD DIPLOMA EXAMINATION, (C-09)

MARCH/APRIL—2016

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. What is the bulk modulus of elasticity of a liquid which is compressed in a cylinder from a volume of 0.0125 m^3 at 80 N/cm^2 pressure to a volume of 0.0124 m^3 at 150 N/cm^2 pressure?
2. State any three assumptions made in Bernoulli's equation.
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. State any three differences between impulse and reaction turbines.
6. Define the following terms used in hydraulic turbines :
 - (a) Hydraulic efficiency
 - (b) Overall efficiency

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7. Draw a neat sketch of a centrifugal pump and name the parts.
8. State the purposes of the following fluid reservoir elements :
- (a) Air vent
- (b) Baffles
9. Briefly explain the working principle of pneumatically operated wedge clamp.
10. Briefly explain the use of air as cushion for hydraulic 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. Explain a differential manometer with a neat sketch and derive the expression for pressure head.
12. (a) State the Bernoulli's theorem. 3
- (b) The diameter of a pipe changes from 200 mm at a section 5 m above datum to 50 mm at a section 3 m above datum. The pressure of water at first section is 0.5 N/m^2 . If the velocity of flow at the first section is 1 m/s, determine the intensity of pressure at the second section. 7
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. Derive an expression for work done and efficiency when the jet strikes of vanes fixed on the rim of a wheel.
15. The pitch diameter of Pelton wheel is 0.75 m and is running at 750 r.p.m. The net head on the Pelton wheel is 600 m. The angle of deflection of jet is 165° . The discharge through the nozzle is $0.1 \text{ m}^3/\text{s}$. Find—
- (a) power available at the nozzle;
 - (b) hydraulic efficiency of the turbine.
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 .
17. Explain the working of pressure gate valve with neat sketch.
18. (a) Give any five comparisons between pneumatic system and hydraulic system. 5
- (b) State any five applications of pneumatic power. 5
