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C16-M-402

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BOARD DIPLOMA EXAMINATION, (C-16)

JUNE/JULY—2022

DME - FOURTH SEMESTER EXAMINATION

HYDRAULICS AND FLUID POWER CONTROL SYSTEMS

Time : 3 hours ]

[ Total Marks : 80

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PART—A

- 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 terms : 1½+1½  
(a) Specific weight  
(b) Specific gravity
2. Define (a) steady flow, (b) uniform flow and (c) rotational flow. 1+1+1
3. Define (a) hydraulic gradient line and (b) total energy line. 1½+1½
4. A water jet of 50 mm diameter strikes a flat stationary plate normally with a velocity of 30 m/s. Find the force exerted by the jet on the plate. 3
5. How do you classify the hydraulic turbines? 3
6. Draw the neat sketch of centrifugal pump. 3
7. State the functions of the following valves in hydraulic system : 1½+1½  
(a) Directional control valve  
(b) Pressure control valve

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8. Write any six applications of hydraulic (fluid) power. 3
9. Write the classification of pneumatic actuators. 3
10. List out the various basic components of pneumatic circuit. 3

### PART—B

**Instructions :** (1) Answer *any five* questions.  
(2) Each question carries **ten** marks.  
(3) Answers should be comprehensive and criterion for valuation is the content but not the length of the answer.

11. (a) Find the absolute viscosity of the fluid of thickness 0.6 mm between two plates when the moving plate of velocity 5 m/s is subjected to shear stress of 100 N/mm<sup>2</sup>. 5
- (b) Explain the working principle of bourdon pressure gauge with a neat sketch. 5
12. A venturimeter having throat diameter 100 mm is used for measuring the flow rate of oil of specific gravity 0.8 in a pipe of diameter 200 mm. The oil-mercury differential gauge shows a deflection of 250 mm. Find the discharge of oil, if the coefficient of discharge of venturimeter is 0.98. 10
13. Water is supplied from a reservoir through a 300 mm diameter pipe 600 m long to a turbine which is situated 108 m below the free surface of water. Discharge through the pipe is 81 lit/sec. Find the head loss and the power transmitted by the pipe. Take friction factor  $f = 0.01$ . 5+5
14. A jet of water of 100 mm diameter moving with a velocity of 20 m/s, strikes a stationary plate. Find the normal force on the plate when
- (a) the plate is normal to the jet.
- (b) the angle between the jet and the plate is 45° 5+5

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- 15.** A Francis turbine working under a head of 130 m runs at 400 r.p.m. The diameter of the runner at inlet is 1.5 m and the flow area is 0.5 m<sup>2</sup>. The guide blade angle is 20° and the vane angle at inlet is 60°. Determine (a) the power developed and (b) hydraulic efficiency. The velocity of whirl at outlet is zero. 7+3
- 16.** Explain the working of single acting reciprocating pump with the help of neat sketch. 10
- 17.** Mention the Basic components of hydraulic circuits and state their functions with a neat sketch. 10
- 18.** (a) Compare the pneumatic system with a hydraulic system. 5  
(b) Explain the purpose of pneumatic actuators with a neat sketch. 5

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