



C09-M-406

3506

BOARD DIPLOMA EXAMINATION, (C-09)

OCT/NOV—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 properties and state their units : $1\frac{1}{2}+1\frac{1}{2}$
 - (a) Mass density
 - (b) Specific weight
2. Draw a neat sketch of venturi meter. State why the angle of divergency is to be maintained. $2+1$
3. State the condition for maximum power transmitted through a pipe. What is the corresponding maximum efficiency? 3
4. Derive an expression for the force exerted by the jet when it strikes at the centre of fixed curved vane. 3
5. Why are blades of Pelton wheel made as double hemispherical shape? 3
6. In a turbine, the relative velocity and velocity of flow at inlet are equal and in same direction. Under what conditions can this occur? 3

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7. What is meant by priming of a pump? 3
8. What are the functions of control valves? 3
9. Briefly explain the working principle of pneumatically operated collet chuck. 3
10. Briefly explain the use of air as cushion for hydraulic system. 3

PART—B

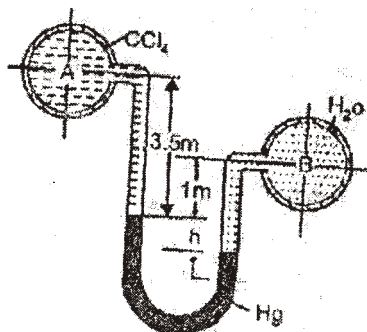
10×5=50

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. (a) Define pressure and state its units. 3
- (b) A differential manometer was connected to two pipes A and B as shown in the figure. The pipes contain carbon tetrachloride (sp. gr. 1.594) and the pipe B contains water. If the pressure difference in the two pipes is 60 kPa, find the difference of mercury levels. 7



12. Find the total energy of 3 kg of water flowing with a velocity of 5 m/s under a pressure of 4 bar at a height of 10 m above the ground level.

13. If a pipe of length 350 m and diameter 250 mm with $f = 0.018$ is to be replaced by 200 mm diameter pipe with $f = 0.02$ to carry the same discharge, for same loss of head, what length will have to be provided?
14. (a) A jet of water 60 mm diameter strikes a flat fixed plate inclined at 60° to the axis of the jet. If the velocity of jet is 30 m/s, find the normal force on the plate. Find also the force in the direction of the jet. 5
- (b) A jet of water moving with a velocity of 25 m/s strikes normally on a plate. The jet diameter is 60 mm. Determine the force on the plate when—
- (i) the plate is fix;
- (ii) the plate is moving in the direction of jet with a velocity of 5 m/s. 5
15. What is meant by governing? Explain the governing of reaction turbines with a line diagram. 2+8
16. The impeller of a centrifugal pump has outer diameter of 40 cm and inner diameter of 20 cm. The blade angle at outlet is 30° . The speed of the impeller is 1450 r.p.m. The velocity of flow at inlet and outlet is same at 2.2 m/s. If the manometric efficiency is 75%, find—
- (a) the head developed;
- (b) absolute velocity of outlet;
- (c) blade angle at inlet. 4+3+3
17. What are the merits and demerits of hydraulic control system? 5+5
18. Draw and explain a pneumatic safety circuit for protection against overload. 5+5
