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C09–M–406

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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 : 1½+1½

(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

7. What is meant by priming of a pump? 3

8. What are the functions of control values? 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

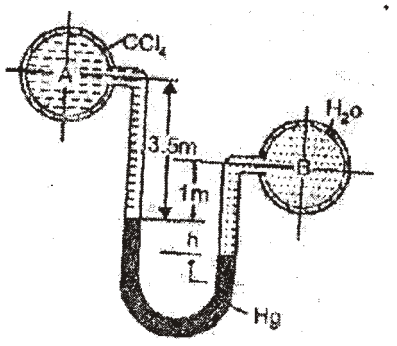
Instructions : (1) Answer *any* **five** questions.

(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 in 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 aganinst overload. 5+5

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