



C14-M-405

4481

BOARD DIPLOMA EXAMINATION, (C-14)

SEPTEMBER/OCTOBER - 2020

DME—FOURTH SEMESTER EXAMINATION

FLUID MECHANICS AND HYDRAULIC MACHINERY

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. Determine the mass density, specific volume, and specific weight of a fluid whose specific gravity is 0.75.
2. Define atmospheric pressure and gauge pressure.
3. Distinguish between uniform flow and non-uniform flow.
4. Define Reynolds number. What is its significance in fluid flow?
5. List the limitations of siphon.
6. Derive the condition for maximum power transmitted through a pipe.
7. A jet of water 25 mm diameter, discharging at $0.035 \text{ m}^3/\text{sec}$ impinges on a flat fixed vertical plate. Calculate the force exerted on the plate in kN.

- * 8. State the functions of draft tube.
9. Define the following terms used in hydraulic turbines :
(a) Hydraulic efficiency
(b) Overall efficiency
10. What is cavitation? Mention its effects.

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 simple U-tube manometer with neat sketch.
12. The pipe diameter changes from 30 cm at section 6 m above datum to 10 cm at section 3 m above datum. The pressure of water at first section is 5 bar. If the velocity of water at first section is 1.5 m/sec, find the intensity of pressure at second section.
13. Water flows through a pipe of 200 mm diameter and 60 m long with velocity of 2.5 m/sec. Find the loss of heat due to friction by using—
(a) Darcy's formula, $f = 0.005$;
(b) Chezy's formula, $C = 55$.
- * 14. A jet of water with 50 mm diameter impinges on a curved vane and is deflected through 135° . The vane moves in the same direction as that of jet with a velocity of 5 m/sec. If the rate of flow of water is 30 lt/sec, determine (a) force on the vane in the direction of motion, (b) work done per sec and (c) efficiency.

- * 15. Explain the working of Francis turbine with neat sketch.
16. Describe multistage pump with—
(a) impellers in parallel;
(b) impellers in series.
17. A single-acting reciprocating pump having a bore of 150 mm diameter and stroke of 300 mm discharges 200 litres of water per minute at 40 rpm. Neglecting losses, Find—
(a) theoretical discharge ;
(b) coefficient of discharge ;
(c) slip of the pump.
18. (a) Explain the governing of reaction turbines with line diagram. 5
(b) Derive an expression for the force exerted by the water jet on moving flat plate. 5
