



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.

/4481

1

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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

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