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BOARD DIPLOMA EXAMINATION, (C–14)
MARCH/APRIL—2018
DME–FOURTH SEMESTER EXAMINATION

FLUID MECHANICS & 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. Define mass density and surface tension.

2. Write the relation between intensity of pressure and pressure head, Derive the formula.

3. Define terms *(a)* steady flow, *(b)* laminar flow.

4. Define terms *(a)* non- uniform flow, *(b)* rotational flow.

5. Write down Darcy's formula for loss of head due to friction in a pipe flow *(a)* in terms of velocity of flow *(b)* in terms of discharge.

6. Write the equation for power transmission through pipes and mention what each letter stands for and state their units.

7. A jet of water of 75 mm diameter strikes normally on a fixed flat vertical plate. Determine the force exerted by the jet. When the jet strikes the plate with a velocity of 20m/sec.

8. Draw the layout of hydro-clectric power plant and indicate the elements of the plant.

9. What is draft tube? Why it is used in a reaction turbine?

10. What is priming and why it is necessary?

PART—B

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

(2) Each question carries **ten** marks.

(3) Answers should be comprehensive and the criteria for valuation are the content but not the length of the answer.

11. *(a)* Explain how pressure is measured at a point in a fluid flowing through a pipe with Simple U-Tube manometer.

(b) Define the term fluid. State any three differences between ideal fluid

12. A horizontal venturimeter 160mm × 180mm is used for measuring the flow of oil having specific gravity is 0.8. The oil is discharged at the rate of oil mercury gauge.

13. Explain *(a)* hydraulic gradient line, *(b)* total energy line, with neat sketch.

14. A jet of water moving with a velocity of 50 m/sec impinged on a series of vanes moving with a velocity of 20 m/sec. The jet makes an angle of 45° to the direction of motion of vanes when entering and leaves at angles of 120°: Draw the velocity triangles at inlet and outlet . Find *(a)* vane angles, so that water enters and leaves without shock *(b)* work done per kg of water *(c)* Efficiency of the jet.

15. *(a)* Derive the Expression for the froce exerted on a stationary curved plate strikes at centre.

(b) Explain the governing of Pelton wheel with a neat sketch.

16. A Francis turbine running at 200 rpm has inlet diameter 900mm and width of vane 150 mm. The constant flow velocity through the runner is 3 m/sec. If the inlet tips of runner vanes are radial and discharge is also radial, determine *(a)* work done per kg of water *(b)* power developed by runner *(c)* head available. *(d)* hydraulic efficiency.

17. A centrifugal pump running at 1000 rpm works against a total head at 45 m. The external and internal diameter of the impeller are 480 mm and 240 mm respectively, the width at outlet is 50 mm. The velocity of flow through the impeller is constant at 2.6 m/sec. If the blade angle at outlet is 30°, determine *(a)* vane angle at inlet *(b)* work done by the impeller and *(c)* manometric efficiency.

18. Explain the working of single acting reciprocating pump with a neat sketch.

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