* 4451 *

C14–M–405

4451

BOARD DIPLOMA EXAMINATION, (C–14)

MARCH/APRIL—2018

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. Define *(a)* compressibility and *(b)* surface tension.

2. Convert pressure head of 100 m of water to *(a)* oil of specific gravity of 0·75 and *(b)* carbon tetrachloride of specific gravity 1·6.

3. State the equation of continuity of flow.

4. State Bernoulli's theorem and express in in equation form.

5. Write Darcy-Weisbach equation for head lost due to friction and name the various parameters in it.

6. What is Siphon? Where is it used?

7. Write the expression for normal force exerted by a jet on *(a)* fixed vertical flat plate and *(b)* fixed inclined flat plate.

8. What is draft tube? Write its purpose.

9. A turbine develops 600 kW power. The net head available is 40 m. If overall efficiency of turbine is 0·8. What is the discharge through the pipe?

10. What is cavitation? Write the effects of cavitation.

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. Two horizontal flat plates are placed 0·15 mm apart and the space between them is filled with an oil of viscosity 1 poise. The upper plate of area 1·5 m^2 is required to move with a speed of 0·5 m/s relative to lower plate. Determine necessary force and power required to maintain its speed.

12. A Venturimeter is installed in a horizontal pipe line 300 mm in diameter in which maximum flow is 200 lit/sec. When pressure difference between entrance and the throat is 6·5 m of water, if diameter of throat is 150 mm, determine coefficient of Venturimeter.

13. *(a)* What are the compound pipe and equivalent pipe?

(b) A compound pipe consists of three pipes of 600 m, 1200 m and 1800 m with diameter of 0·3 m, 0·4 m and 0·5 m respectively. Determine *(i)* equivalent length of 0·4 m diameter and *(ii)* equivalent diameter of pipe if total length remains same.

14. A jet of water having a velocity of 50 m/s impinges on a series of vanes moving with a velocity 25 m/s. The jet makes an angle of 30° to direction of motion of the vanes when entering and leaving at an angle of 120°. Draw the velocity triangles for inlet and outlet. Determine angle of vane tips.

15. *(a)* Derive the expression for force exerted by a jet when it strikes at the centre of a fixed curved vane.

(b) State any five differences between Francis turbine and Kaplan turbine.

16. Explain the working principle and construction of Pelton wheel with the help of neat sketch.

17. *(a)* A single acting reciprocating pump has its piston diameter 200 mm and length of stroke is 300 mm. Speed of the crank is 60 r.p.m. The suction and delivery heads are 5 m and 20 m respectively. Determine *(i)* discharge and *(ii)* theoretical power required to drive the pump if its efficiency is 80%.

(b) Explain the working principle of jet pump.

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

★ ★ ★