4451

BOARD DIPLOMA EXAMINATION, (C-14)

MARCH / APRIL - 2019

DME - IV 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) Answer should be brief and straight to the point and shall not exceed five simple sentences.

1   Define : (a) Specific weight (b) Specific gravity

2   Calcualte the pressure at a depth of 2m below the free surface of oil of specific gravity 0.8.

3   State the equation of continuity of flow.

4   Define the following and give one practical example of each :
(i) Steady flow, (ii) Uniform flow

5   What is Syphon ? Mention any two uses of syphon.

6   Mention various major and minor losses inside the pipe flow.

7   A jet of water 20 mm diameter discharging 30 lt/s strikes normally on a fixed flat vertical plate. Determine the force exerted on the plate.

8   What is meant by governing of hydraulic turbines ?

9   Define : (i) hydraulic efficiency (ii) Mechanical efficiency of turbines.

10   Write a short note on priming of centrifugal pump.

PART - B   **10×5=50**

Instructions :   *(1) Answer any **FIVE** questions.*
                           *(2) Each question carries **TEN** marks.*
                           (3) Answer should be comprehensive and the criterion
                           *   for valuation is the content but not the length of*
                           *   the answer.*

11 (a) Two plates are placed at a distance of 0.15 mm apart. The   7
         lower plate is fixed while the upper plate having surface
         area 1m^2 is pulled at 0.3 m/s. Find the force and power
         required to maintain this speed, if the fluid separating them
         is having viscosity 1.5 poise.

    (b) Determine the specific gravity of a fluid having viscosity   3
         0.05 poise and kinematic viscosity 0.035 stokes.

12 A pipe 200 m long slopes down 1 in 100 and tapers from 600 mm
    diameter at the higher end to 300 mm diameter at the lower end, and
    carries 100 lt/s of oil specific gravity 0.8. If the pressure gauge at the
    higher end reads 60 kN/m^2, determine :
    (i)   Velocities at two ends
    (ii) Pressure at two ends.

13 (a) Expain with the help of neat sketch   5
         (i) Hydraulic gradient line (ii) Total energy line
    (b) In a pipe of 300 mm diameter and 0.8 km length and oil   5
         is flowing at the rate of 2700 lt/min. Find the head lost due
         to friction, if f = 0.00498.

14 A jet of water 50 mm in diameter is moving with a velocity 15 m/s
    impinges on a series of vanes moving with a velocity of 6 m/s. Find
    (i)   Force exerted by the jet
    (ii) Work done by the jet
    (iii) Efficiency of the jet.

15 (a) Derive the expression for the force exerted by the jet   **5**
 when it strikes at the center of a fixed curve vane.

     (b) Draw a neat sketch of a hydro-electric power plant and   **5**
 label the main elements.

16 Draw a neat sketch of francis turbine and explain its working process, with expressions for power and efficiency.

17 A double acting reciprocating pump running at 50 rpm is discharging 900 liters of water per minute. The pump has a stroke of 400 mm. The diameter of piston is 250 mm, the delivery and suction heads are 25 m and 4 m respectively. Find the (i) theoretical discharge (ii) Slip (iii) power required to drive the pump (iv) C_d.

18 (a) With a neat sketch, explain the principle and working   **5+5**
 of a centrifugal pump.

     (b) Explain the principle and working of centrifugal pump with a legible sketch.

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