Reg. No. :

Question Paper Code: 53704

B.E. / B.Tech. DEGREE EXAMINATION, DEC 2020

Third Semester

Mechanical Engineering

15UME304 - FLUID MECHANICS AND MACHINERY

(Regulation 2015)

Duration: 1.15 hrs   Maximum: 30 Marks

PART A - (6 x 1 = 6 Marks)

(Answer any six of the following questions)

1. The property of a liquid which offers resistance to the movement of   CO1- R
    one layer of liquid over another adjacent layer of liquid, is called

    (a) Surface tension   (b) Compressibility   (c) Capillarity   (d) Viscosity

2. A flow in which the quantity of liquid flowing per second is constant,   CO1- R
    is called

    (a) Steady flow   (b) Streamline flow   (c) Turbulent flow   (d) Unsteady flow

3. The hydraulic mean depth for a circular pipe of diameter(d) is   CO2- R

    (a) d/6   (b) d/4   (c) d/2   (d) d

4. The total energy line lies over the hydraulic gradient line by an amount   CO2- R
    equal to the

    (a) Pressure head   (b) Velocity head

    (c) Pressure head + velocity head   (d) Pressure head-velocity head

5. The square root of the inertia force of a flowing fluid to the elastic   CO3- R
    force called

    (a) Mach number   (b) Reynolds number

    (c) Weber number   (d) Froude number

6. The dimension of velocity is   CO3- R

    (a) LT^{-1} (b) T^{-1} (c) LT^{-2} (d) $L^{3}T^{-1}$

7. A pelton wheel is   CO4- R

    (a) Tangential flow impulse turbine   (b) Inward flow impulse turbine

    (c) Outward flow impulse turbine   (d) Inward flow reaction turbine

8. Multi-stage centrifugal pumps are used to   CO4- R

    (a) Give high discharge   (b) Produce high heads

    (c) Pump viscous fluids   (d) All of the above

9. If the net positive suction head requirement for the pump is not   CO5- R
    satisfied, then

    (a) No flow will take place   (b) Cavitation will be formed

    (c) Efficiency will be low   (d) Excessive power will be consumed

10. Which of the following pump is preferred for flood control and   CO5- R
    irrigation applications?

    (a) Centrifugal pump   (b) Axial flow pump

    (c) Mixed flow pump   (d) Reciprocating pump

PART – B (3 x 8= 24 Marks)

(Answer any three of the following questions)

11. Determine the viscous drag torque and power observed one surface of   CO1- App   (8)
    a collar bearing half 0.2 m ID and 0.3 m OD with an oil film thickness
    of 1 mm and a viscosity of 30centi-poise if it rotates at 500 rpm.

12. Calculate the discharge through a pipe of diameter 200 mm when the   CO2- App   (8)
    difference of pressure head between the two ends of pipe   500 m
    apart is 4 m of water. Take value of f = 0.009 and $h_f = 4fLV^2 /$
    2gd.

13. Find an expression for the drag force on smooth sphere of diameter D   CO3- Ana   (8)
    moving with uniform velocity v in fluid density ρ and dynamic
    viscosity μ.

14. A francis turbine has an inlet diameter of 2 m and an outlet diameter of   CO4- App   (8)
    1.2 m. The breath of the blades is constant at 0.2m. The runner rotates
    at a speed of 250 rpm with a discharge of 8 m^3 per sec. The vanes are
    radial at the inlet and the discharge is radially outwards at the outlet.
    Calculate the angle of guide vane at the inlet and blade at the outlet.

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15. A double acting reciprocating pump, running at 50 rpm is discharging CO5- App (8) 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 slip of the pump and power required to drive the pump.

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