Code: 13A01409

B.Tech II Year II Semester (R13) Regular & Supplementary Examinations May/June 2016
FLUID MECHANICS & STRENGHT OF MATERIALS
(Electronics & Instrumentation Engineering)

Time: 3 hours   Max. Marks: 70

PART - A
(Compulsory Question)
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1   Answer the following: (10 X 02 = 20 Marks)
   (a)   Explain in brief the izod impact test.
   (b)   Define: (i) Shear force.
                  (ii) Bending moment.
   (c)   Differentiate between open coiled and close coiled helical.
   (d)   Define strain energy.
   (e)   Define: (i) Hydraulics.
                  (ii) Fluid mechanics.
   (f)   State the Bernoulli's equation.
   (g)   Define: (i) Hydro kinematics.
                  (ii) Hydrokinetic.
   (h)   Name the various efficiencies a centrifugal pump.
   (i)   Explain plane stress condition.
   (j)   Define: (i) Kinematics.
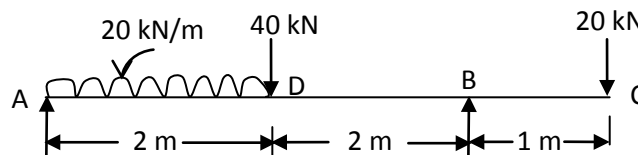   (ii) Dynamics.

PART - B
(Answer all five units, 5 X 10 = 50 Marks)

UNIT - I

2   Draw the bending moment and shear force diagram for the cantilever beam shown in figure below.
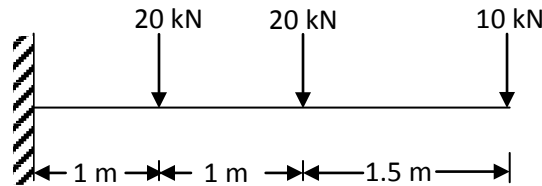
OR

3   Draw the bending moment and shear force diagram for the overhanging beam shown in figure below.

UNIT - II

4   Derive the strain energy equation for torsion.

OR

5   A shaft is required to transmit 45 kW power at 240 rpm. The maximum torque may be 1.5 times the mean torque. The shear stress in the shaft should not exceed 40 N/mm^2 and twist per meter length. Determine the diameter required at:
   (a)   The shaft is solid.
   (b)   The shaft is hollow with external diameter is twice the internal diameter.

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UNIT - III

6   Define the following:
- (a)   Density or mass density.
- (b)   Specific weight.
- (c)   Specific gravity.
- (d)   Viscosity.
- (e)   Unit of viscosity.

OR

7   (a)   If the velocity distribution over a plate is given by u = $\left(\frac{2}{3}\right)$y-y^2 in which u is the velocity in meter per second at a distance y meter above the Platte. Determine the shear stress at y = 0 and y = 0.15. Take dynamic viscosity of fluid as 8.63 poises.

    (b)   A hydraulic press has a ram of 20 cm diameter and a plunger of 3 cm diameter. If it is used for lifting a weight of 30 kN. Find the force required at the plunger.

UNIT - IV

8   Define the venturimeter. Derive the equation of venturimeter of rate flow.

OR

9   Crude oil specific gravity 0.85 flows upwards at a volume rate of flow of 60 liters per second through a vertical venturimeter with an inlet diameter of 200 mm and a throat diameter of 100 mm. The coefficient of discharge of the venturimeter is 0.98. The vertical distance between the pressure toppings is 300 mm.

    (a)   If two pressure gauges are connected at the toppings such that they are positioned at the levels of their corresponding topping points, determine the difference of reading in N/cm^2 of the two pressure gauges

    (b)   If a mercury differential manometer is connected, in a place of pressure gauges to the toppings such that connecting tube up to mercury is filled with oil, determine the difference in level of the mercury column.

UNIT - V

10   Give comparison between impulse turbine and reaction turbine.

OR

11   A centrifugal pump impeller runs at 80 rpm and has outlet angle of 60°. The velocity of flow is 2.5 m/s throughout. The diameter of the impeller at exit is twice that at inlet. If the manometric head is 20 m and the manometric efficiency is 75 percent.
Determine:
- (a)   The diameter of the impeller at the exit.
- (b)   Inlet vane angle.

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