Code: 13A01409 **R13**

B.Tech II Year II Semester (R13) Supplementary Examinations May/June 2017

FLUID MECHANICS & STRENGTH 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) Draw shear stress and shear strain diagram.

(b) State the relation between BM and SF.

(c) Give the relation between power of the shaft and torque and also express the formula.

(d) What is stiffness, how can you calculate the stiffness of spring (close coiled helical spring)?

(e) What are the differences between laminar and turbulent flows?

(f) Provide continuity equation for three dimensional flow.

(g) What the assumptions in Bernoulli's equation?

(h) Give the formula to estimate the major head loss in pipes.

(i) What are the primary differences between fans, blowers and pumps?

(j) How pelton wheel turbine differs with centrifugal pump? Explain it with respect to velocity triangles.

PART - B

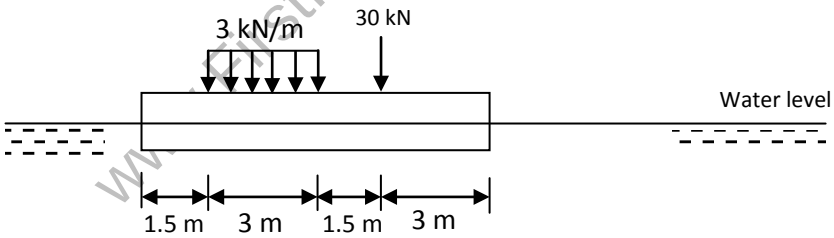
(Answer all five units, 5 X 10 = 50 Marks)

UNIT - I

2 A 5 kg mass moves in a horizontal circle at the end of a 1.5 m steel with such an angular velocity that the wire makes an angle 30° with the vertical. What is the proper diameter of wire if the allowable tensile stress for high strength steel is 300 MPa? How much will the wire extending during whiriling. Take E = 200 GPa.

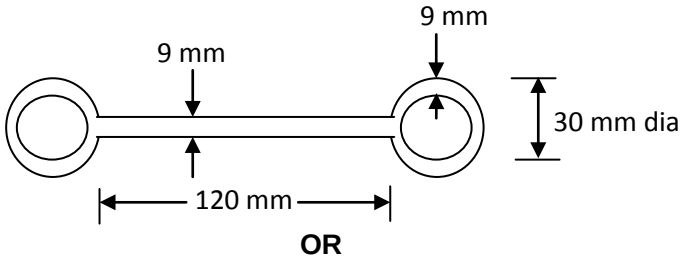
OR

3 A small narrow barge is loaded as shown in figure below. Plot SF and BM diagrams.



UNIT - II

4 A torsion member has the cross-section as shown in figure below. Estimate torsional constant i.e $\mathbf{I_{peak\ equivalent}}$.



OR

5 Derive the relation for closed coiled helical spring as stiffness (s) = $\frac{Cd^4}{64R^3n}$.

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UNIT - III

6 The basic barometer can be used to measure the height of a building. If the barometric readings at the top and bottom of a building are 740 and 825 mm Hg respectively. Determine the height of the building. Assume average air density as 1.18 kg/m^3.

OR

7 A student siphons water over a 8.5 m high wall at sea level. The same student climbs to the summit of mount (elevation 4400 m; P_{atm} = 58.5 KPa) and attempts the same experiment. Compare the student prospects for success.

UNIT - IV

8 Explain how flow rate is measured with observation type flow meters. Compare orifice meter and venturimeter with respect to cost, size, head loss and accuracy.

OR

9 (a) Explain why the friction factor is independent of the Reynolds number at very large Reynolds number.

(b) How is head loss related to pressure loss, explain it?

UNIT - V

10 (a) Briefly discuss the main difference in the way that dynamic pumps and reaction turbines are classified as centrifugal (radial), mixed flow or axial.

(b) For pumps, discuss the difference between brake horsepower and water horse power and also define pump efficiency in terms of these quantities.

OR

11 (a) A centrifugal pump with impeller of outer diameter 45 cm and inner diameter 25 cm is required to develop a net head of 20 m. Find the lowest speed to start pumping.

(b) Explain the principle behind a centrifugal pump.

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