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Code No: 154SK

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year II Semester Examinations, November/December - 2020
MECHANICS OF SOLIDS AND MECHANICS OF FLUIDS
(Metallurgy and Materials Engineering)

Time: 2 hours **Max. Marks: 75**

Answer any five questions
All questions carry equal marks
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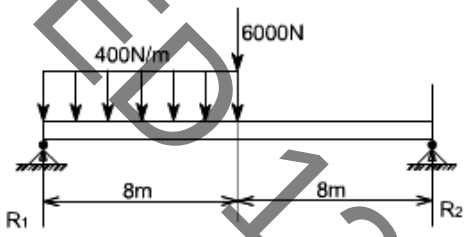
1.a) Draw stress-strain curve for a mild steel rod subjected to tension and explain about the salient points on it.
b) Explain the concept of factor of safety and its significance in the design of machine components? What is working stress of a material? [8+7]

2.a) From fundamentals derive the relationship between three moduli of elasticity.
b) What do you mean by Temperature stresses? Explain. [8+7]

3.a) Draw shear force and bending moment for the simply supported beam shown in Figure below.



b) Derive the relationship between shear force, Bending Moment and rate of loading at a Section of the beam. [8+7]

4.a) State the assumptions made in the theory of simple bending.
b) Derive the Bending equation using the usual notation. [8+7]

5.a) Derive the relationship for torsion equation of shafts.
b) A solid steel shaft transmits 100 kW at 150 rpm. Determine the suitable diameter of the shaft if the maximum torque transmitted exceeds the mean by 20% in each revolution. The shear stress is not to exceed 60MPa. Also find the maximum angle of twist in a length of 4 m of the shaft. G = 80GPa. [8+7]

6. A cantilever beam, 60 mm wide by 200 mm high and 6 m long, carries a load that varies uniformly from zero at the free end to 1000 N/m at the wall. a) Compute the magnitude and location of the maximum flexural stress. b) Determine the type and magnitude of the stress in a fiber 40 mm from the top of the beam at a section 3 m from the free end. [15]

7.a) Define and explain Newton's Law of Viscosity.
b) Derive the expression for capillary rise of liquid when a glass tube is inserted in it. [8+7]

8. Define and illustrate the following terms.
a) Stream line b) streak line c) path line
d) irrotational flow e) laminar flow. [15]

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