Code No. 6049 / M

FACULTY OF ENGINEERING

B.E. 2/4 (EE/Inst.) II - Semester (Main) Examination, June 2014

Subject : Solid Mechanics

Time : 3 Hours **Max. Marks: 75**

Note: Answer all questions of Part - A and answer any five questions from Part-B.

PART – A (25 Marks)

1 Define Poisson's ratio and Bulk modulus. (2)

2 Define point of contraflexure. In what types of beams does it occur. (2)

3 What is the ratio of max. shear stress to average shear stress in a solid triangle of size bxh. (2)

4 Define the term Equivalent B.M. and Equivalent Torque. (2)

5 Explain the terms strain energy and proof resilience. (2)

6 Draw the stress-strain curve for Ductile materials and mark the salient points. (3)

7 A cantilever beam of span 3m is subjected to a point load of 2kN at end. Find SF & BM. (3)

8 Define section modulus, flexural rigidity and moment of resistance. (3)

9 A square beam of 100mm side is used to carry UDL of 1 kN/m over a span of 5m. Find the maximum stress developed in the beam. (3)

10 State the maximum slope and deflection for a simply supported beam carrying UDL throughout the span. (3)

PART – B (50 Marks)

11 A steel bolt 12mm diameter passes through a brass tube of 16mm internal diameter, 250mm long and 20mm external dia. The bolt is tightened by a nut at 15°C, so as to exert a compressive force of 20kN on the tube. Calculate the stresses in each when the temperature of the bolt and tube is raised by 100°C.

Take E_s=200 GPa α_s =12x10^{-6}/°C

E_b=100 GPa α_b = 19x10^{-6}/°C

12 Draw SFD and BMD for the beam shown in figure.

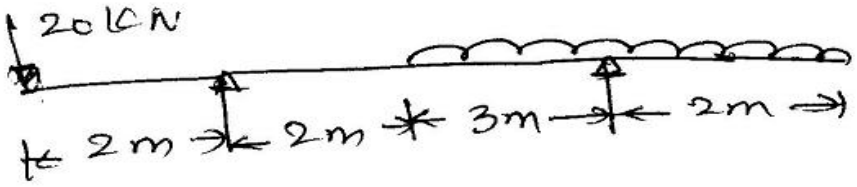

Figure 1

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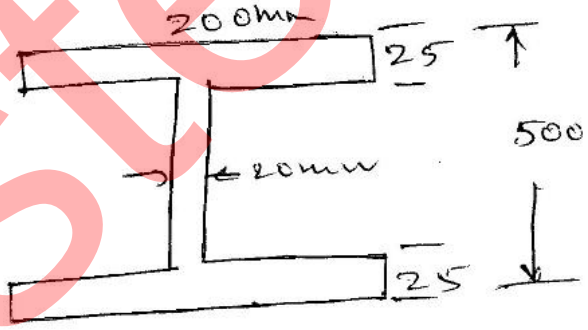
13 A steel beam of hallow square section of 60mm outside and 50mm inner side dimensions is simply supported on a span of 4m. Find the maximum uniformly distributed load the beam can carry throughout the span, if the bending stress is not to exceed 120MPa.

14 A simply supported beam of span 6m carries 2 point loads of 10kN and 20kN at 2m and 4m from left end respectively. Find the slope at supports and deflection under point loads (EI = constant).

15 A wagon weighing 25kN is moving at a speed of 5kmph. How many springs each of 24 coils will be required in a buffer to absorb the energy?

16 A solid circular shaft is used to transmit a power of 500 HP at 300 rpm. The max. shear stress should not exceed 80 MPa and angle of twist is 2m length of the shaft should not exceed 4^{o}. Determine its diameter.

17 The symmetric I - section shown in figure - 2 is used as a beam. In this is subjected to a shear force 'F', find what % of shear is resisted by web.



(Dimension in mm)

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