Third Semester B.Tech. Degree Examination, January 2015
(2008 Scheme)
08.304 : MECHANICS OF SOLIDS (MPUS)

Time : 3 Hours Max. Marks : 100

Instructions : *Answer **all** questions from Part **A** and **any one** question from each Module in Part **B**. **Each full** question in Part **B** carries **20** marks.*

PART – A

1. Explain :
   i) Constitutive relation
   ii) Principle of super position.
2. Discuss Saint-Venant's principle.
3. Explain Mohr's circle and its significance.
4. Draw SFD and BMD for a simply supported beam subjected to a concentrated load at quarter span from left support.
5. Calculate the maximum bending stress in a cantilever beam of span 2 m subjected to a u.d.l of 1 KN/m over full length. Cross section of the beam is 100 × 150 mm.
6. Derive the relation between bending moment and shear force at a cross section of a beam.
7. Explain :
   i) Equivalent length
   ii) Core of a section.
8. Explain pin jointed plane frame with suitable example. What are the assumptions made in the analysis of pin jointed plane frames and list different methods of analysis.

(8×5=40 Marks)

P.T.O.

PART – B

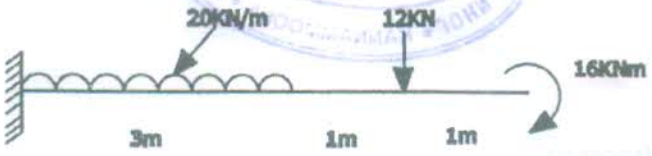
Module – I

9. A load of 25 kN rests on three vertical short struts, each 12 mm in diameter and equi-spaced in a vertical plane. The central pillar is copper and the other two outer ones are steel. The pillars are so adjusted that, at atmospheric temperature, each carries one-third the total load. The temperature is then raised through 28° C. Calculate the stress in each pillar before and after the rise of temperature. $E_c = 110$ kN/mm^2, $E_s = 200$ kN/mm^2, $\alpha_c = 16 \times 10^{-6}$ per ° C and $\alpha_s = 10 \times 10^{-6}$ per ° C.

10. A bar of steel is under a tensile stress of 60 N/mm^2, and at the same time it is subjected to a shear stress of 22.5 N/mm^2. Find the principal planes and principal stresses. If m = 4, find the stress which, acting alone, would produce the same maximum strain.

Module – II

11. Draw shear force and bending moment diagram for the beam shown and mark the salient values.



12. A simply supported beam of span 5 m carries a uniformly distributed load of 5 KN/m over its right half span along with a point load of 15 KN at 1.5 m from left support. Calculate slope at supports and deflection at mid span. Take flexural rigidity as 3×10^4 KN-m^2.

Module – III

13. The angle of twist of a 4 metre length of shaft whose diameter is 100 mm is observed to be 0.05 radian when the shaft is revolving at 250 rev/min. If the modulus of rigidity is 80 GN/m^2, find the power transmitted and the maximum shear stress induced.

14. Analyse the frame given by method of joints.