SATHYABAMA UNIVERSITY
(Established under section 3 of UGC Act, 1956)

Course & Branch: B.E - CIVIL
Title of the paper: Mechanics of Solids - I
Semester: III   Max. Marks: 80
Sub.Code: 6C0081(2006/2007)   Time: 3 Hours
Date: 10-11-2008   Session: FN

PART – A   (10 x 2 = 20)
Answer All the Questions

1. Define stress and strain.

2. If $E = 2 \times 10^5 \text{N/mm}^2$, and $G = 0.8 \times 10^5 \text{ N/mm}^2$ for a material, find the value of Poisson's ratio.

3. Draw BMD for a cantilever beam of span L with a clockwise moment 'M' acting at free end.

4. Define Bending moment and shear force.

5. Find the section modulus of a circular section of diameter 'd'.

6. Sketch the shear stress distribution for an equal I-section.

7. What is spring Index and stiffness of the spring?

8. For a solid circular shaft subjected to torque 'T' sketch the stress distribution.

9. What is a redundant tress?

10. What is proof resilience and modulus of Resilience?

PART – B   (5 x 12 = 60)
Answer All the Questions

11. A brass plate of uniform thickness 6mm varies in width from 80mm to 160mm and is subjected to a load of 3 kN tensile. The

length of the plate is 500mm. Find the elongation of the plate if $E_b = 820$ Pa from the first principles.

(or)

12. (a) Explain stress-strain diagram for mild steel.

(b) A steel bar 25mm x 15mm in cross section is 400mm long and in subjected to a tensile force of 50 kN. Find the change in length, width and volume.

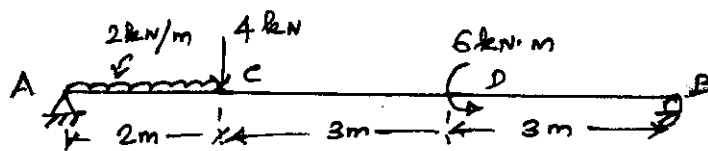13. Draw BMD and SFD for the beam shown in figure. 1

Fig 1

(or)

14. (a) Explain the relationship between load, shear force and Bending moment. (4)
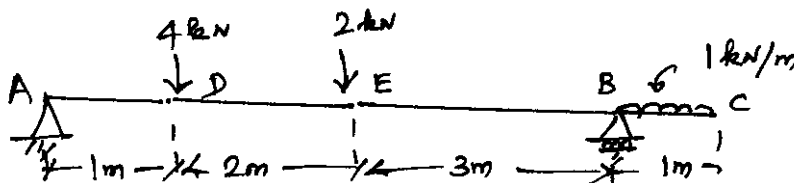
(b) For the beam shown in figure 2 draw BMD. (8)

Fig 2.

15. A beam AB is simply supported. The cross section of the beam is 'T' having flange width 125mm, thickness 25mm, web thickness 25mm and overall depth 200mm. Calculate the maximum shear stress in the beam and sketch the shear stress distribution. Shear force at the section is 200kN.

(or)

16. (a) A rectangular section 200mm wide and 400mm deep is used as beam of span 6m for the loading shown in figure. 3. Find the maximum value of 'W' if the permissible stress is 50 MPa. (6)
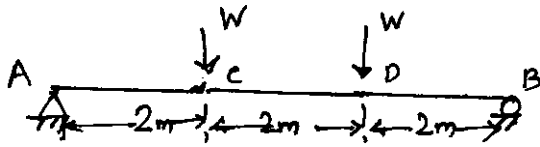
Fig 3

(b) What is beam of uniform strength? (3)
(c) What is core of a section? (3)

17. Derive the torsion equation for a circular shaft subjected to a Torque 'T'.

(or)

18. A weight of 350N is dropped through a height of 500mm on a close coil helical spring. Due to impact it compresses by an amount 130mm instantaneously. The mean diameter of the coil and the diameter of the wire are 200mm and 20mm respectively. What is the instantaneous stress developed in the wire and the number of coils of wire $G = 84 \times 10^9$ N/m^2.

19. For the beam shown in figure 4 find the total strain energy stored. EI constant.
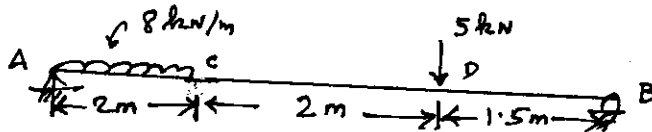

Fig 4

(or)

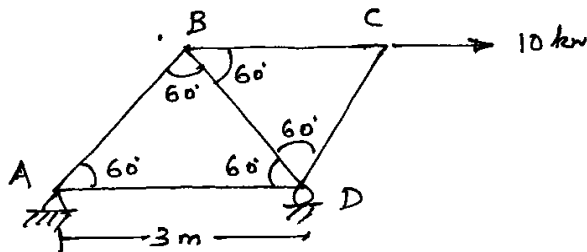20. For the truss shown in figure 5 find the forces in all the members by method of joint.

Fig 5