Code No. : **5420/N**

FACULTY OF ENGINEERING

B.E. 2/4 (EE/Inst.) II Semester (New) (Main) Examination, May/June 2012

SOLID MECHANICS

Time : 3 Hours] [Max. Marks : 75

Note : *Answer **all** questions from Part **A**, answer **any five** Questions from Part **B**.*

PART – A **(25 Marks)**

1. Define the principle of superposition. What is its utility ? **2**

2. Plot a tensile test diagram for steel. Explain its salient features. **3**

3. Rate of change of shear force is equal to _____
   Rate of change of bending moment is equal to _____ **2**

4. What is a point of contraflexure ? Show giving an appropriate example. **3**

5. A beam is said to be loaded in pure bending if **2**
   a) Shear force and bending moment are uniform throughout.
   b) Shear force is zero and bending moment is uniform throughout.
   c) Shear force can vary but bending moment is uniform throughout.
   d) Binding moment can vary but shear force is uniform throughout.

6. Draw the bending stress and shear stress distribution across a rectangular section. **3**

7. Governing differential equation of a beam under the action of bending moment is ___ **2**

8. Differentiate resilience and proof resilience. **3**

9. What do you mean by equivalent torque ? **2**

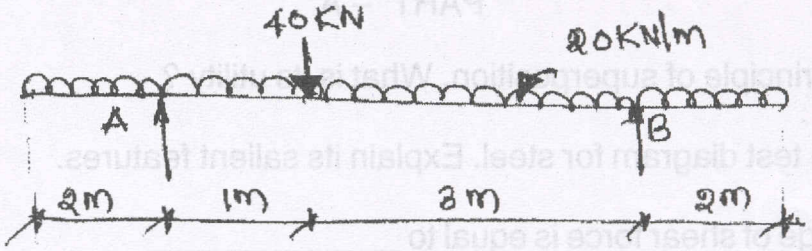
10. A close coiled helical spring carries a load of 400 N. Its mean coil diameter is 10 times the wire diameter. Determine these diameters if the maximum value of shear stress in the spring is not to exceed 80 MPa. **3**

PART – B (50 Marks)

11. a) Write a short note on temperature stresses. 4

b) An axial load of 60 KN is applied to a bar of 36 mm diameter and 1.0 m. length. The extension of the bar is measured to be 0.265 mm where as the reduction is diameter is 0.003 mm. Calculate the Poisson's ratio and the values of the three module. 6

12. Draw the SF and BM diagram for the following beam . 10



13. a) What are the various assumptions made in the theory of simple bending ? 3

b) Compare the moment of resistance of a beam of square section placed with two sides horizontal to that with a diagonal horizontal for the same stress in each case. 7

14. Find the maximum shear stress developed in a circular section. Also draw the shear stress distribution across it. 10

15. Derive the governing differential equation of the beam ie $M = \frac{d^2y}{dx^2}$. 10

16. Two shafts are made of the same material. Each shaft transmits the same power. The first shaft rotates at 50 rpm while the second at 5000 rpm. Determine the ratio of diameters of the two shafts for the same maximum shear stress in each shaft. 10

17. Write a short note on : 10

a) Strain energy in springs

b) Strain energy developed due to various types of loads.