B.E./B.Tech.(Full Time) DEGREE END SEMESTER EXAMINATIONS, NOV / DEC 2011

MATERIAL SCIENCE AND ENGINEERING BRANCH

THIRD SEMESTER

ML 9203 – STRENGTH AND TESTING OF MATERIALS

(REGULATIONS 2008)

Time : 3 hrs Max Marks : 100

Instructions: 1. Assume any relevant data if found necessary

Answer ALL Questions

Part – A (10 x 2 = 20 Marks)

1. State the Hooke's law
2. What is modulus of resilience?
3. Give the flexural formula.
4. Find the section modulus of a hollow circular section.
5. How are the properties of metals modified?
6. What is mechanical fibering?
7. Give the advantages of Rockwell hardness test?
8. What are the factors that contribute to brittle cleavage type of fracture?
9. State the principle of complementary shear stresses.
10. Differentiate the behaviour of a leaf spring and helical spring.

Part – B (5 x 16 = 80 Marks)

11. Calculate the modulus of rigidity and bulk modulus of a cylindrical bar of diameter 30mm and of length 1.5m if the longitudinal strain in a bar during a tensile test is four times the lateral strain. Find the change in volume, when the bar is subjected to a hydrostatic pressure of 100 N/mm^2 .Take modulus of elasticity E= $1x10^5$ N/mm^2.

12. a. A beam AB of span 8m is simply supported at the ends. It carries a uniformly distributed load of 30kN/m over its entire length and a concentrated load of 60kN at 3 m from left support. Determine the maximum deflection in the beam and the location where the deflection occurs. Also find the deflection under the point load. Take Modulus of Elasticity E= $200x10^6$ kN/m^2 and moment of inertia I= $80x10^{-4}$ m^4 .

(OR)

b. A simply supported beam of span 10m is loaded as shown in figure. Draw the shear force and bending moment diagram indicating the salient points. Find the position and magnitude of the maximum B.M in the beam.

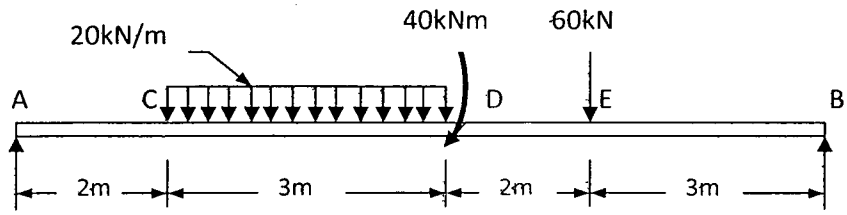

Figure 12b

13.a.(i) Discuss the stress distribution at the neck region of the tensile test specimen and explain how it will affect the flow curve. (8)

(ii) Explain the ductility measurement in tension test (8)

(OR)

b. Compare the engineering and true stress strain curves of mild steel. Also derive the expression for the true stress and strain.

14. a. (i) Give a detailed account about the notched bar impact tests? (12)

(ii) How will the section thickness affect the transition curves in Charpy test? (4)

(OR)

b. Find the greatest length for which a mild steel strut of T-shaped cross section, as shown in figure may be used with one end fixed and the entirely free in order to carry a working load of 70 MN/m^2 of the section, the working load being one-fourth the crippling load. Rankine's constant for mild steel are: a=1/7500 and σ_c =330MN/m^2.

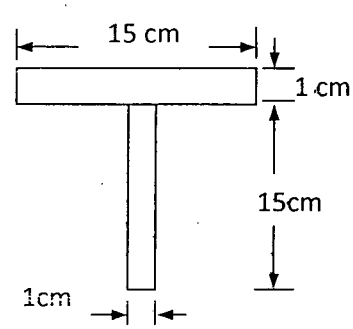

Figure 14 b

15.a.Give the assumptions in theory of pure torsion and derive the expression for torsion equation

(OR)

b. (i) what percentage of strength of a solid circular steel shaft 100mm diameter is lost by boring 50mm axial hole in it? Compare the strength and weight ratio of the two cases.