



B.E./B.Tech.(Full Time) DEGREE END SEMESTER EXAMINATIONS, NOV / DEC 2012

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. What is bearing stresses?
2. Give the relationship between Young's modulus, Bulk modulus and Rigidity modulus.
3. What is the neutral axis?
4. Draw the shear force diagram of a simply supported beam of length 'L' m subjected to an anticlockwise moment of 'M' kNm at its mid span.
5. Define local necking strain.
6. Give the significance of ductility in metals?
7. What is dynamic hardness?
8. What are the consequences of hydrogen embrittlement?
9. Define polar section modulus.
10. Differentiate between a close and open coiled helical spring.

Part – B ( 5 x 16 = 80 Marks )

11. Three parallel wires in the same vertical plane jointly support a load of 15 kN. The middle wire is of steel and is 1 m long, while the outer ones of brass, the length of each being 1.05 m. The area of cross section of each wire is 200 mm<sup>2</sup>. After the wires have been so adjusted as to carry one-third of the load, a further load of 35 kN is added. Find the stresses in each wire and the fraction of the whole load carried by the steel wire. Take Young's Modulus of steel and brass as 200 GN/m<sup>2</sup> and 80 GN/m<sup>2</sup> respectively. (16)
12. (a). (i) Derive the Euler's critical load for the column when one end is hinged and other end is fixed. (12)
- (ii) What are the limitations of Euler's formula? (4)

(OR)

- (b) Draw the shear force and bending moment diagram for the beam shown in Figure. Find the position and magnitude of the maximum B.M in the beam. (16)

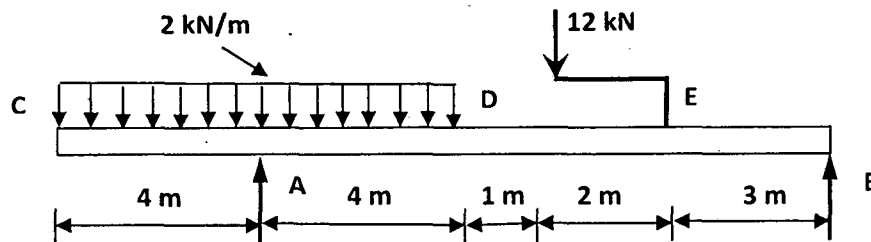


Fig Q.12.b

13. (a) (i) Discuss influence of testing machine on flow properties. (8)  
(ii) Describe about the notch tensile test. (8)

(OR)

- (b) Explain the significance of ductility, modulus of elasticity, toughness and resilience in a material. (16)

14. (a) (i) Differentiate between Izod and Charpy impact tests. (6)  
(ii) Explain drop weight test, explosion cracker test, crack arrest test and dynamic tear test. (10)

(OR)

- (b) Describe in detail the types of hardness and the tests adopted to find these hardness. (16)

15. (a) A hollow circular shaft 20 mm thick transmits 294 kW power at a speed of 200 r.p.m. . Determine the diameters of the shaft if the shear strain due to torsion is not to exceed  $8.6 \times 10^{-4}$ . Take Modulus of rigidity as  $80 \text{ GN/m}^2$ . (16)

(OR)

- (b) The mean coil diameter of a helical spring is 8 times the wire diameter. It is made to absorb 200 Nm of energy with a deflection of 100 mm. If the maximum shear stress is not to exceed 125 MPa, find the mean diameter of the coils, wire diameter and the number of turns. Take Modulus of rigidity as 77 GPa. (16)