

E.E (FULL TIME) DEGREE END SEMESTER EXAMINATIONS, APR/MAY 2012
MATERIALS SCIENCE AND ENGINEERING
FIFTH SEMESTER
ML9203 STRENGTH AND TESTING OF MATERIALS

TIME: 3 Hrs.

Max. Marks: 100

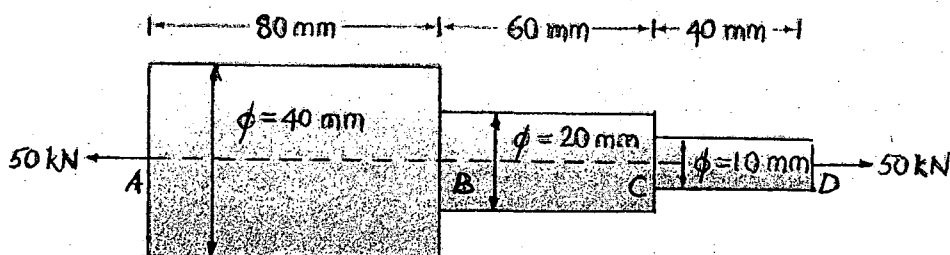
Answer all questions

Part-A (10 x 2 = 20 marks)

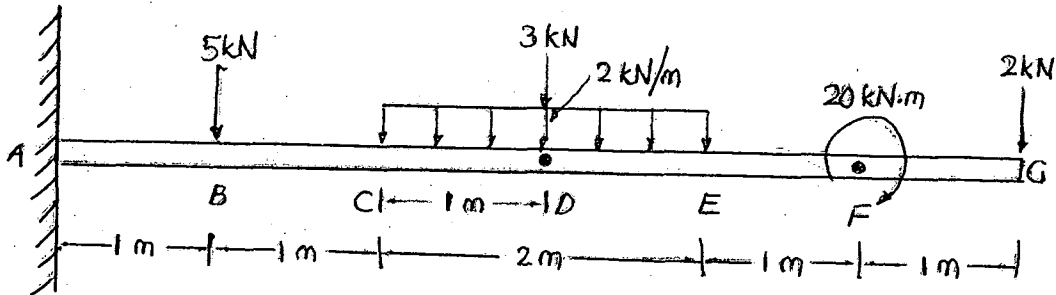
1. Mention the various elastic constants and its relation.
2. Define "Poisson's Ratio"
3. What do you understand by point of contra flexure/inflexion?
4. What do you mean by slenderness ratio?
5. Define 'Resilience'.
6. Distinguish Diffuse and localized necking.
7. Mention the types of hardness measurements based on the manner in which the test is performed.
8. Mention the testing method for measuring dynamic fracture toughness value.
9. What do you meant by spring index?
10. What do you understand by torsional stiffness?

Part - B (5x 16 = 80 marks)

11. A composite bar is fixed between two supports as shown in the figure below. If the temperature of the bar is raised from 25°C to 75°C, find the stress induced in each rod by assuming (i) The supports do not yield and (ii) The supports yield by 0.25mm.



12. (a) A cantilever beam is loaded as shown in the fig below. Draw the shear force and bending moment diagrams. Also determine the magnitude and location of maximum bending moment. Is there any inflexion?



(OR)

(b) Two point loads of 5kN and 15kN are acting on a simply supported beam of span length 5 m at 1 m and 2m respectively from the left end. Find (i) slope at the two ends, (ii) deflections under the applied loads and (iii) position and magnitude of maximum deflection using Macaulay's method. (Take $E=90 \text{ GPA}$, $I=18 \times 10^6 \text{ mm}^4$) (4+4+8)

13. (a). Sketch the dimensions of standard tensile test specimen with circular cross section. Also explain the procedure for conducting tensile test with various parameters used to describe stress-strain curve.

(OR)

(b). (i) what do you understand by true stress and true strain? Obtain the relationship between True and Engineering stress, strains. (8)

(ii) Discuss briefly about Notch tensile test. (8)

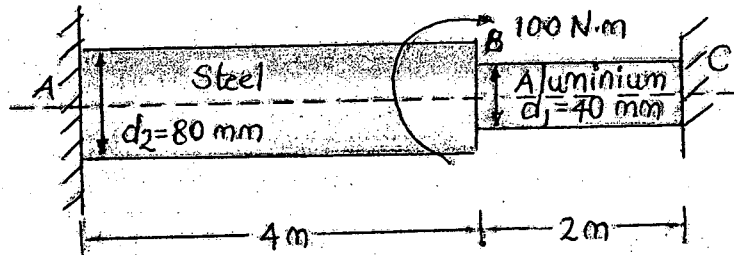
14. (a) Write a brief note on (i) Vickers Hardness test and (ii) Micro-Hardness tests. (8+8)

(OR)

14. (b) Explain in detail about Notched-Bar impact test with a sketch showing the method of loading in Charpy and Izod impact tests.

15. (a) A composite shaft made of steel and aluminium is fixed at A and C. A torque of 100N.m is applied at a point B as shown in the figure below. Determine (i) resisting torques induced at the supports and (ii) Maximum shear stress induced in each shaft. (Take $G_s=80\text{GPa}$, $G_{al}= 30\text{GPa}$)

(8+8)



(OR)

15. (b) A close coiled helical spring of circular cross section having a mean coil diameter of 60 mm is subjected to an axial load of 80 N applied at the end of spring producing a shear stress of 100 N/mm^2 and a deflection of 50 mm. Find the diameter, the number of coils, the length of the spring wire and strain energy store in the spring. (Take $G = 80\text{kN/mm}^2$)