Code No. : 5075/O

FACULTY OF ENGINEERING
B.E. 2/4 (EE/Inst.) (II Semester) (Old) 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. Draw the stress-strain curve for mild steel and explain the important points on it. 3
2. Define the volumetric strain with example. 2
3. Give the relationship between shear force and bending moment. 3
4. Explain how a point of contraflexure is obtained. 2
5. What is axial and flexural rigidity explain their significances ? 3
6. Draw the shear stress distribution for 'T' section. 2
7. The maximum deflection of a cantilever due to moment 'M' applied at free end is equal to 3

   a) $\frac{ML^2}{3EI}$ b) $\frac{ML^2}{2EI}$ c) $\frac{ML^2}{4EI}$ d) $\frac{ML^2}{8EI}$

8. Differentiate between resilience and proof resilience. 2
9. Define rigidity modulus and obtain - expression for the same. 3
10. Define helix. 2

PART – B (50 Marks)

11. a) Obtain the expressions for obtaining compound and temperature stresses. 5

    b) Obtain the relationship between three elastic constants (E, N, K). 5

12. Draw the shearforce and bending moment diagrams for the fig. 1 and indicate the values on the same. 10

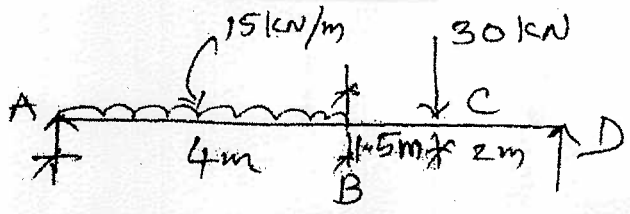

Fig.1

(This paper contains 2 pages)

P.T.O.

13. a) List out the assumptions made in theory of simple bending. 4

    b) Obtain the equation for theory of simple bending. 6

14. a) Derive the expression for strain energy on a bar due to gradually applied load. 5

    b) Derive the expression of stress in a bar due to load applied through height 'h' with impact. 5

15. Determine the maximum deflection of the fig. 2 and state where it occurs.

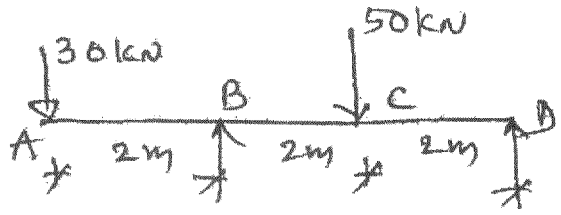

Fig. 2

Take

$E = 200 \times 10^6$ kN/m^2

$I = 120 \times 10^{-6}$ m^4

16. A hollow circular shaft 20 mm thick transmits 294 kW at 200 r.p.m. Determine the diameters of the shaft if shear strain due to torsion is not to exceed 8.6×10^{-4}. Take modulus of rigidity as 80 GN/m^2. 10

17. A helical spring is made of 12 mm diameter steel wire wound on a 120 mm diameter mandrel. If there are 10 active coils, what is spring constant ? Take C = 82 GN/m^2, what force must be applied to the spring to elongate it by 40 mm ? 10