Code No.: 3265

FACULTY OF ENGINEERING

B.E. II/IV Year (EE/Inst.) II Semester (Main) Examination, May/June 2011

SOLID MECHANICS

Time : 3 Hours] [Max. Marks : 75

Answer **all** *questions from Part A.*
Answer any **five** *questions from Part B.*

Part A – (Marks: 25)

1. Define the proportionality limit and explain the significance of its behaviour. 3
2. What is the relationship between Young's modulus, rigidity modulus and Poisons ratio. 2
3. Give the relationship between shearforce, bending moment and rate of loading. 3
4. Define the point of centraflexnne with suitable example. 2
5. Obtain the minimum eccentricity equation. 3
6. Draw the shear stress distribution for circular section. 2
7. The maximum deflection of a cantilever beam of length L with a point load 'W' at the free end is

   (a) $\frac{Wl^3}{3EI}$ (b) $\frac{Wl^3}{8EI}$ (c) $\frac{Wl^3}{16EI}$ (d) $\frac{Wl^3}{48EI}$ 3

8. Proof resilience is the greatest stored energy at

   (a) Elastic limit (b) Plastic Limit

   (c) Limit of proportionality (d) above all 2

9. Define Torsional rigidity and explain its importances. 3
10. The maximum shearing stress in a solid circular shaft due to torsion 'T' is given by 2

    (a) $\frac{16T}{\pi d^3}$ (b) $\frac{16\pi}{T.d^3}$ (c) $\frac{16d^3}{\pi t}$ (d) $\frac{\pi T}{16d^3}$

Part B – (Marks: 50)

11. (a) Explain the Hook's Law and sketch the stress-strain curve and also explain the important points on it. 3

    (b) Obtain the relationship between three elastic constants. 7

12. (a) Draw the shear force and bending moment diagrams for the fig.1 and write the values on the same with suitable calculations. 10

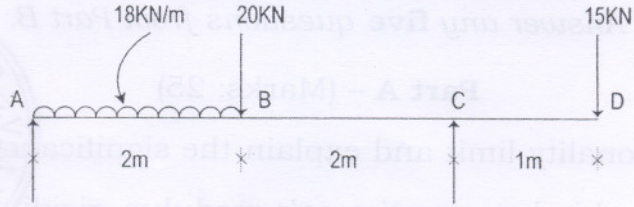

Fig 1

13. Write the assumptions made in simple bending theory and obtain the equation for the same. 10

14. (a) Arrive at an equation for distribution of shear stress across a circular section. 5

    (b) A T-section beam with 10 cm × 1.5cm flange and 15cm × 1.5cm web is subjected to a shearing force of 100kN at a section. Draw the variation of shear stress across the depth of the beam and obtain the maximum shear stress at the section.

15. Find the maximum deflection and the maximum slope for the beam loaded as shown in fig.2 take EI = 12×10^{9}kN-mm^{2}. 10

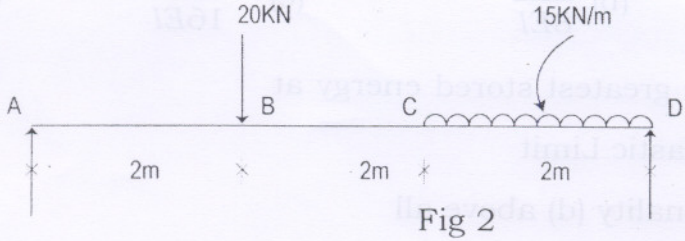

Fig 2

16. A hollow shaft is subjected to a torque of 400 kNm and a B.M. of 200kNm. The internal diameter of the shaft is one half of the external diameter. Find the diameter of the shaft. 10

17. (a) Define the strain energy, obtain the equation for impact load. 3

    (b) A closely coiled helical spring is made of steel wire 12mm diameter. The no. of coils is 20 and the mean radius of each coil is 75mm. Calculate the stiffness of the spring, G = 0.84×10^{5}N/mm^{2}. 7