FACULTY OF ENGINEERING

B.E. 2/4 (Civil) I – Semester (Main) Examination, November 2013

Subject : Strength of Materials – I

**Time : 3 hours**   **Max. Marks : 75**

Note: Answer all questions from Part-A. Answer any FIVE questions from Part-B.
Assume suitable data, if required.

PART – A (25 Marks)

1. Define Poisson's ratio.   (2)

2. What is the relation between E, C and K.   (2)

3. Draw bending moment diagram for cantilever beam subjected to a clockwise couple 'M' at its free end.   (2)

4. Write flexure formula and explain the parameters of it.   (2)

5. What is the relation between the number of members and joints for a perfect truss?   (2)

6. What is meant by polar diagram?   (3)

7. Sketch the radial pressure and hoop stress distribution across the section of a thick cylinder.   (3)

8. A rectangular section 120 mm wide and 300 mm deep is subjected to shear force of 80 kN. Calculate the maximum shear stress and sketch the shear stress distribution across the section.   (3)

9. What is a compound cylinder? Explain the principle used in it.   (3)

10. Define core of a section and sketch the core of a circular section.   (3)

PART – B (50 Marks)

11. A steel tube of 30mm external diameter and 25mm interval diameter encloses a gun metal rod of 20mm diameter to which it is rigidly joined at each end. The temperature of the assembly is raised by 1000C. Find the stresses in the rod and the tube. Take $E_s = 2 \times 10^5$ N/mm^2, $E_g = 1 \times 10^5$ N/mm^2, $\alpha_s = 12 \times 10^{-6}$ / ^{0}C and $\alpha_g = 20 \times 10^{-6}$ /^{0}C.

12. Sketch SFD and BMD for the simply supported beam shown in fig.
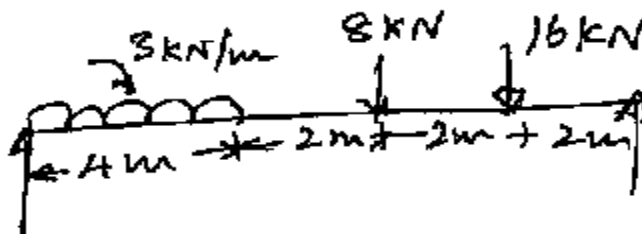
13. A rectangular beam 150 mm wide and 300 mm deep is simply supported over a span of 4m and carries a central point load 'W'. Determine the magnitude of load 'W' if the permissible bending stress is 9 N/mm^2.

14. A T-section beam of flange 150 mm x 12 mm and web 200 mm x 12 mm is subjected to a shear force of 120 kN. Calculate the max shear stress and sketch the shear stress distribution across the section.

15. A thin cylinder of 800 mm internal diameter, 3m long and 10mm thick, subjected to an internal pressure of 3 N/mm^2. Find the circumferential stress, longitudinal stress and the change in diameter of cylinder. Also, if a think spherical shell of same diameter and thickness is subjected to the same pressure, calculate the change in diameter and the hoop stress in it.

16. Find the forces in all the members of the truss shown in fig.1 by analytical 'or' graphical method.

17. A hollow circular column of external diameter 400 mm and internal diameter 200 mm carries an eccentric load of 80 kN. Find the greatest eccentricity which the load can have so as to avoid tension at the base of the section.
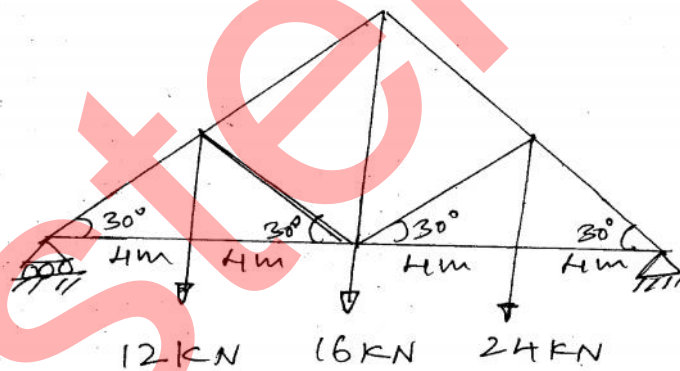

Fig 1

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