Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 25045

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2018.

Third Semester

Civil Engineering

CE 8301 — STRENGTH OF MATERIALS – I

(Regulations 2017)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Define factor of safety.
2. What does the radius of Mohr's circle refer to?
3. Define shear force.
4. What is meant by section modulus?
5. What is the deflection at free end of a cantilever carrying central point load 'W'?
6. Draw conjugate beam for the beam given in Question 5.
7. Define stiffness of a spring.
8. Derive a relation for twisting moment carrying capacity of a solid circular shaft.
9. What is a redundant frame?
10. Define tension coefficient.

PART B — (5 × 13 = 65 marks)

11. (a) (i) Derive relationship between shear modulus and Young's Modulus. (6)

(ii) Derive a relation for change in length of a bar hanging freely under own weight. (7)

Or

(b) A tensile load of 40 kN is acting on a rod of diameter 40 mm and of length 4 m. A bore of diameter 20 mm is made centrally on the rod. To what length the rod should be based so that the total extension will increase 30% under the same tensile load. Take $E = 2 \times 10^5$ N/mm^2.

12. (a) Derive bending formula.

Or

(b) Draw SFD, BMD and find maximum bending moment of the beam given in Fig. Q.12(b).

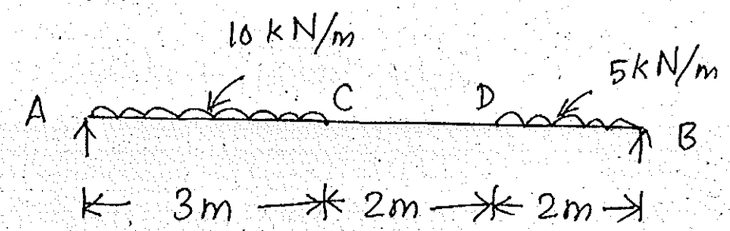

Fig. Q.12(b)

13. (a) Using double integration method derive relation for slope at the supports and maximum deflection of a simply supported beam carrying UDL of intensity w/unit length throughout the span.

Or

(b) Determine the deflection at the point 'C' and maximum deflection for the beam given in Fig. Q.13(b) $E = 2 \times 10^5$ N/mm^2, $I = 2 \times 10^8$ mm^4.

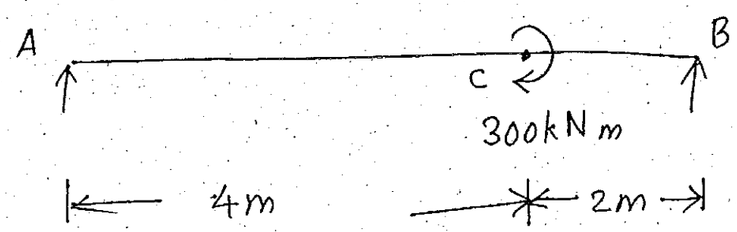

Fig. Q.13(b)

14. (a) Derive torsional formula.

Or

(b) A solid shaft of diameter 80 mm is subjected to a twisting moment of 8 MN mm and a bending moment of 5 MN mm at a point. Determine (i) principal stresses and (ii) position of the plane on which they act.

15. (a) Determine the forces in the members of using method of joints. The truss is given in Fig. Q.15(a).

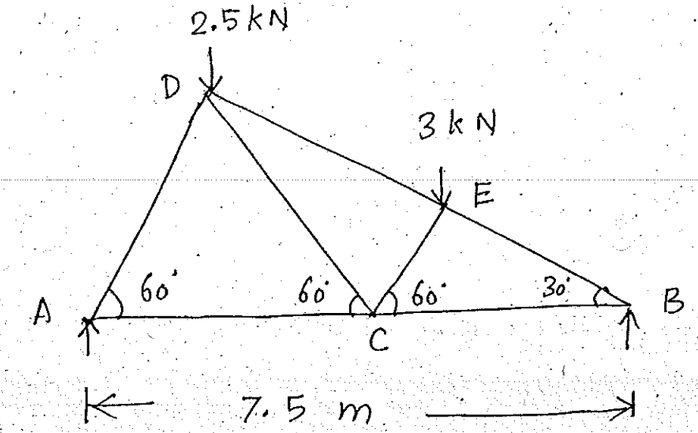

Fig. Q.15(a)

Or

(b) Analyse the frame given in Fig. Q.15(a) by method of sections.

PART C — (1 × 15 = 15 marks)

16. (a) The cross section of a T-section is as follows. Top flange 200 mm × 50 mm, bottom flange 130 mm × 50 mm, web 200 mm × 50 mm. If a shear force of 50 kN acts at the section, sketch the shear stress distribution.

Or

(b) Determine the slope and deflection at the free end of cantilever given in Fig. Q.16 (b). Use conjugate beam method. $E = 2 \times 10^8$ kN/m^2 and $I = 10^8$ mm^4.

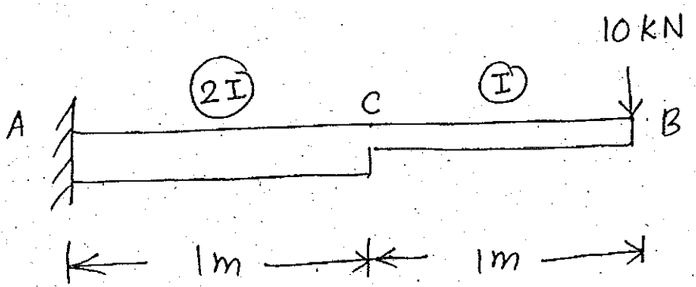

Fig. Q.16 (b)