Code No. 3023

FACULTY OF ENGINEERING

B.E. 3/4 (Civil) I-Semester (Supplementary) Examination, June/July, 2011

THEORY OF STRUCTURES—I

Time : Three Hours] [Maximum Marks : 75

Answer **ALL** questions from Part A. Answer any **FIVE** questions from Part B.
Assume missing data, if any, suitably.

PART—A (Marks : 25)

1. State Castigliano's theorem—I. 2
2. What is internal redundancy ? Give an example of such type of truss. 2
3. Define shear centre. 2
4. Differentiate between symmetrical bending and unsymmetrical bending with an example. 2
5. Draw the neat sketch of a knee-braced truss. What are the functions of knee-braces ? 2
6. Define stiffness of a beam. Develop an expression for the stiffness of a beam AB which is simply supported at A while the other far end B is fixed. Use standard notations. 3
7. Determine the vertical deflection of the loaded truss shown in Fig. 1 at joint C. Take $E = 2 \times 10^5$ N/mm^2 and A = 100 mm^2 for all the members. 3

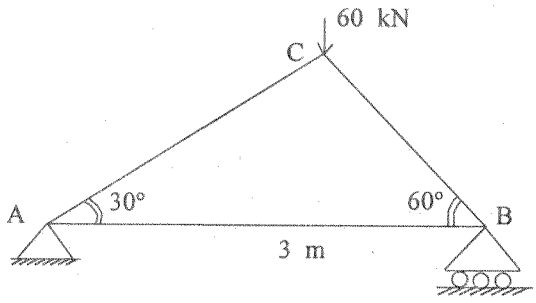

Fig. 1

8. Analyse the continuous beam shown in Fig. 2 using slope-deflection method. Draw BMD. 3

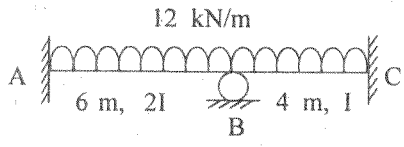

Fig. 2

9. Define rotation factor in Kani's method. What is the total value of rotation factor at a joint in a beam ? 3

10. What is Mohr's correction ? Explain briefly. 3

PART—B (Marks : 5×10=50)

11. Analyse the portal frame, shown in Fig. 3, using slope-deflection method. Draw BMD.

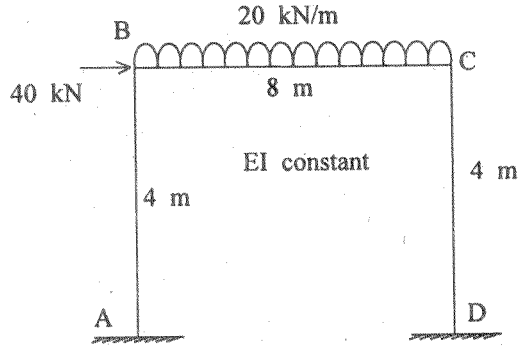

Fig. 3

12. Analyse the continuous beam, shown in Fig. 4, using moment distribution method. Also draw the bending moment and shear force diagrams. EI is uniform.

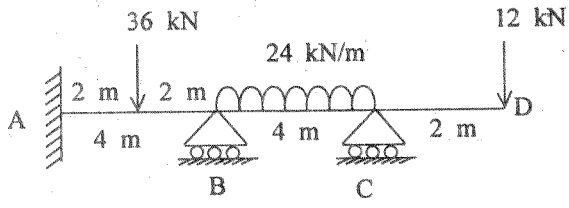

Fig. 4

13. Using Kani's method, analyse and draw BMD for the continuous beam shown in Fig. 5.

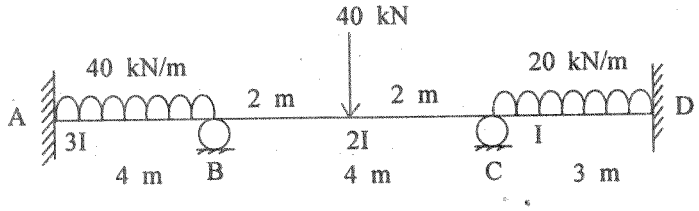

Fig. 5

14. For the redundant truss, shown in Fig. 6, determine the forces in all the members if BC is short in length by 6 mm and is forced into the position. Take A = 100 mm^2 and E = 2×10^5 N/mm^2 for all the members.

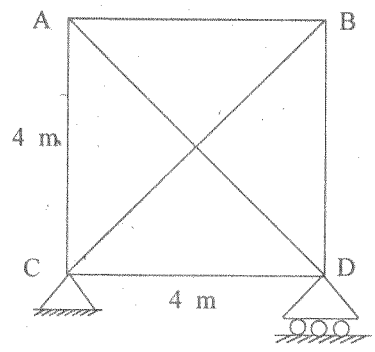

Fig. 6

15. (a) What is shear flow ? Explain briefly.

    (b) Locate the shear centre for a channel section having a vertical web 400 mm × 16 mm and flanges 100 mm × 16 mm, as shown in Fig. 7.

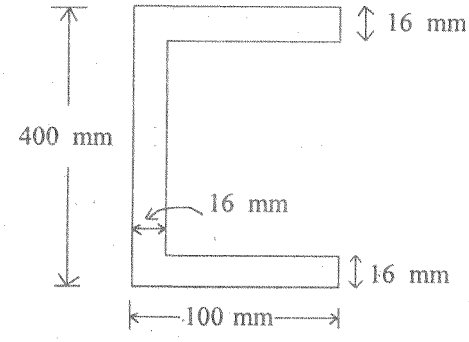

Fig. 7

16. Analyse the portal frame, shown in Fig. 8, using Kani's method. Draw BMD.

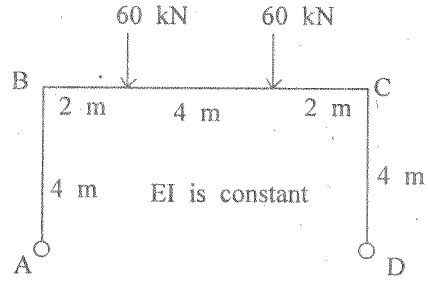

Fig. 8

17. Determine graphically the horizontal displacement of the roller support for the truss shown in Fig. 9. The deformations in mm are marked against each member, positive sign indicating elongation.

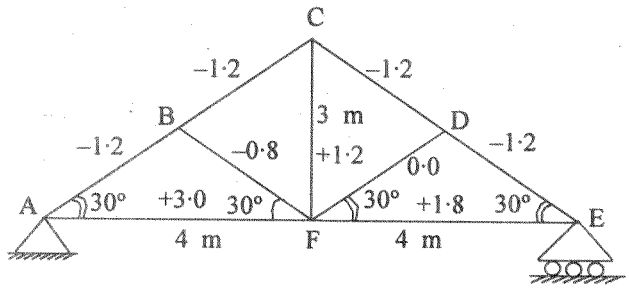

Fig. 9