Code No. : 5031

FACULTY OF ENGINEERING

B.E. 3/4 (Civil) I Semester (Main) Examination, December 2011

THEORY OF STRUCTURES – I

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. The kinematic indeterminacy of a fixed beam is _____ **2**

2. For the beam shown in fig. 1, find the slope at end B. Assume uniform EI. **3**

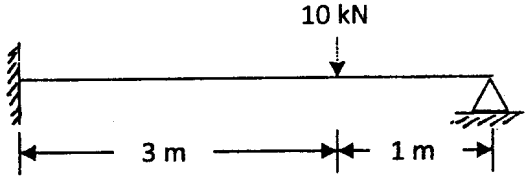

Fig. 1.

3. The distribution factors for two of the three members meeting at a rigid joint are 0.1 and 0.6. Find the distribution factor for the third member. **2**

4. For the portal frame shown fig. 2, find the ratio of sway moments. **3**

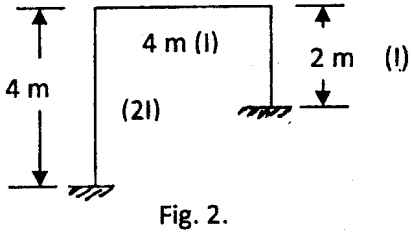

Fig. 2.

5. The theory of Kani's method is an extension of _____ **2**

   a) Slope-deflection method
   b) Column analogy method
   c) Strain energy method
   d) Moment distribution method

6. For the frame shown in fig. 2, calculate the displacement factors. 3

7. What are secondary stresses ? Explain. 2

8. Explain external and internal indeterminacy of pin-jointed plane truss with an example. 3

9. Define shear centre. 2

10. Draw the shear flow diagram for a T-section and show the shear center. 3

PART – B (50 Marks)

11. Analyse the frame shown in Fig. 3, using slope deflection method and draw the bending moment diagram.

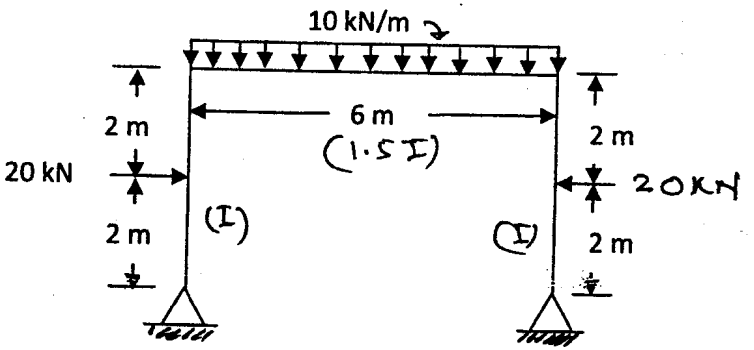

Fig. 3.

12. Analyse the continuous beam shown in fig. 4, using moment distribution method and draw the shear force diagram, if the support "B" sinks by 10 mm. Assume EI = 2×10^4 kN-m^2.

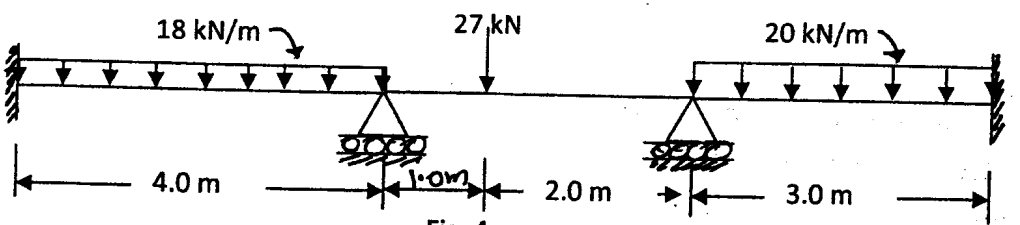

Fig. 4.

13. Analyse the frame shown in fig. 5, using Kani's method and draw the bending moment.

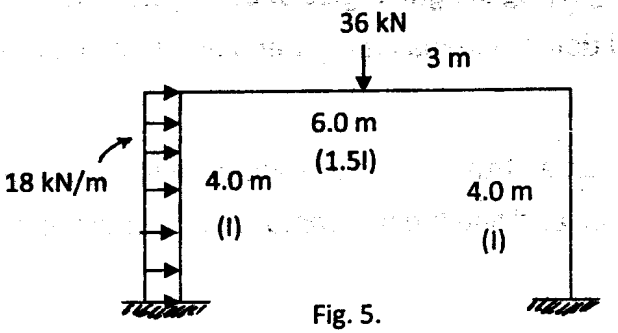

Fig. 5.

14. Find the forces in the members of the pin-jointed truss shown in fig. 6. Assume AE is same for all the members.

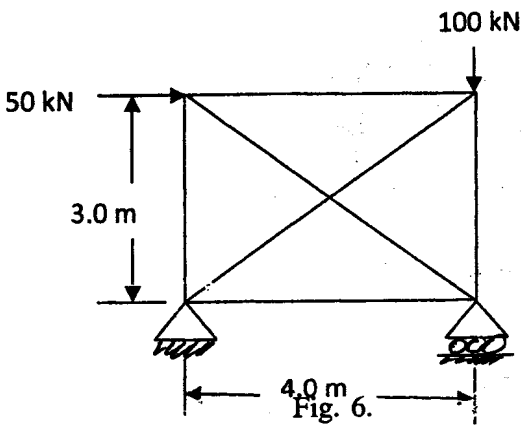

Fig. 6.

15. Locate the shear centre for the cross-section shown in fig. 7.

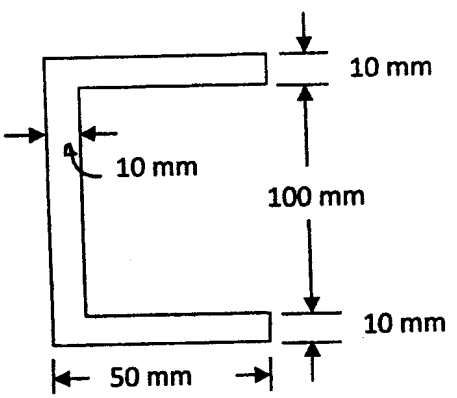

Fig. 7.

16. A beam of rectangular section 75 mm x 100 mm deep is subjected to bending moment of 10 kN m. The trace of the plane of loading being at right angles to one of the diagonals. Locate the neutral axis of the section and determine maximum bending stress induced in the section.

17. The changes in lengths of members of a Warren truss in mm are shown in fig. 8, against the members. Draw the Willot-Mohr diagram and find the horizontal displacement of the roller end D.

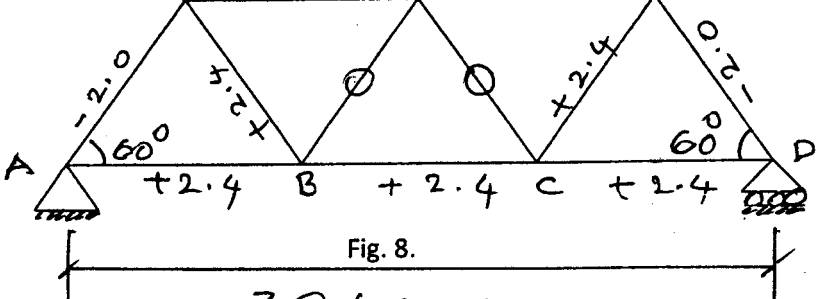

Fig. 8.