



(Following Paper ID and Roll No. to be filled in your Answer Book)

**PAPER ID : 100409**

Roll No.

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**B. Tech.**

(SEM. IV) THEORY EXAMINATION, 2014-15  
**STRUCTURAL ANALYSIS - I**

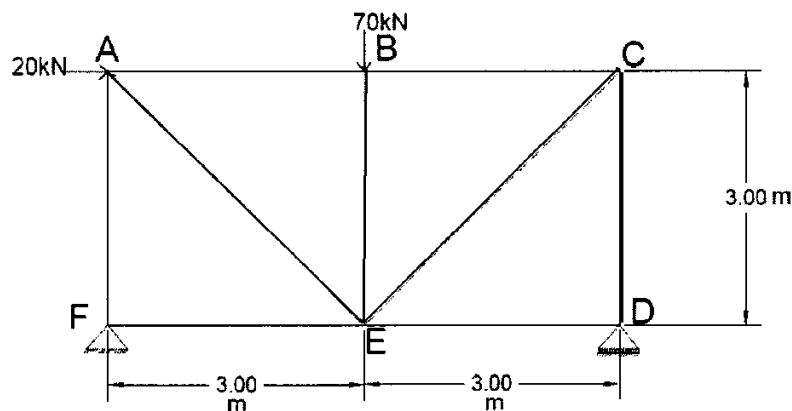
Time : 3 Hours]

[Total Marks : 100

**Note:** Attempt all questions

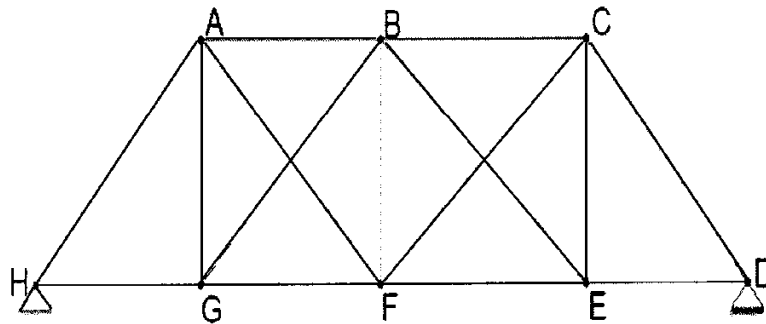
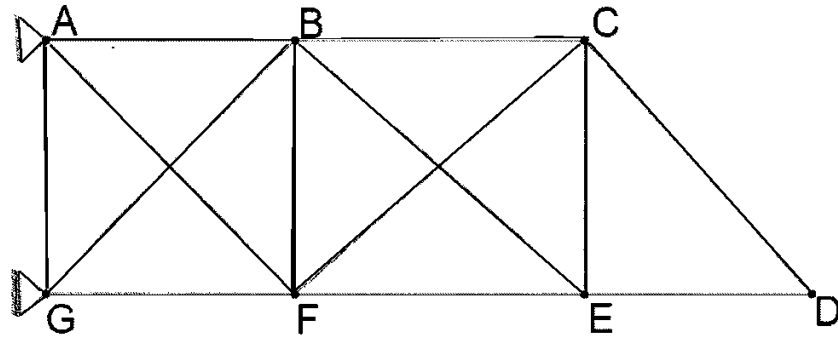
1 Attempt any four of the following:

- (a) What are the different methods of analysis of trusses? Explain any one with example.
- (b) Find the member forces in the trusses :-



- (c) What is the difference between statically determinate and statically indeterminate structure?

- (d) Find the external and internal degree of redundancy of the structures as shown in fig:



- (e) Enumerate the different types of pinned jointed determinate truss with suitable example and sketches.
- (f) Define the term tension coefficient method for plane truss with example.

2 Attempt any two of the following:

- (a) State the Muller-Breslau's principle of influence line. Draw ILD for shear at point C, support reactions for following given simply supported beam
- (b) Three wheel loads 20kN, 80kN, 80kN spaced 4m apart from each other, with the 20kN in the lead, pass over a simply supported beam of span 20m. Determine the absolute maximum shear force and moment. Consider that loading can move in either direction.

- (c) A single load of 100kN moves on a girder of span 20m. Construct the influence line for shear force and bending moment for a section 5m from the left support.

3 Attempt any two of the following:

- (a) A three hinged parabolic arch has a span 40m and rise of 10m. Draw influence line diagram for the following: horizontal thrust, B M at 8m from the left support, Normal thrust at the above section, radial shear at the above section
- (b) A three hinged semicircular arch of radius R carries a udl of  $w$  per run over the whole span. Find
- Horizontal thrust.
  - Location and magnitude of max. Bending moment.
- (c) A three hinged parabolic arch of span 50m and rise 9m carries a load whose intensity varies 25kN/m at the crown to 50kN/m at the ends. Find the following at a section D, 10m from left end
- BM
  - NORMAL THRUST
  - RADIAL SHEAR

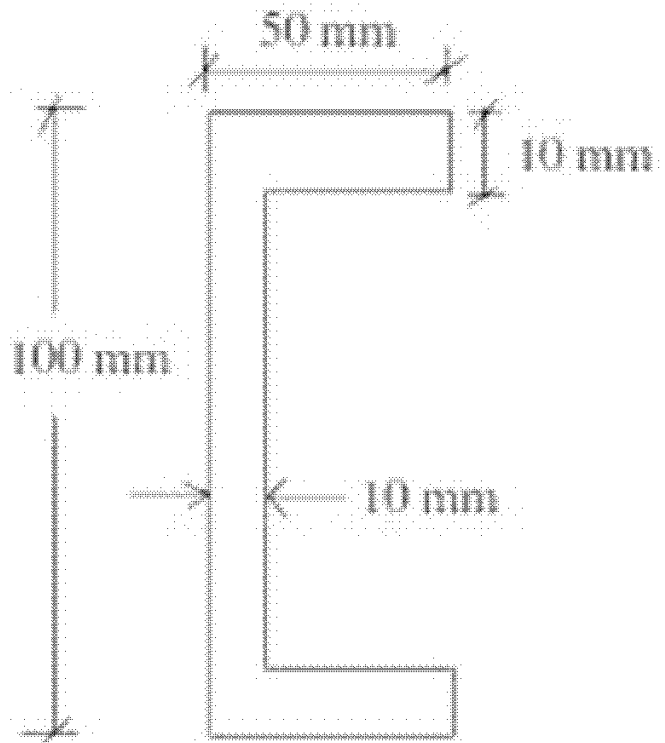
4 Attempt any two of the following:

Write statement of Castigliano's first theorem and Maxwell's reciprocal theorem. Prove Maxwell's theorem.

- (a) Determine the deflection at free end of a cantiliver beam.
- (b) Using conjugate beam method find the deflection of a simply supported beam at point C, AB of length 10m, loaded by an udl of intensity 20kN per unit run.

5 Attempt any four of the following:

- (a) A 60mmx40mmx6mm unequal angle is placed with the longer leg vertical and is used as a simply supported at the ends, over a span of 2m. if it is carries udl of such magnitude as to produce the maximum bending moment of 0.12kN-m. Determine the maximum deflection of the beam. Take  $E=2.1 \times 10^5 \text{ N/mm}^2$ .
- (b) Locate the position of the shear centre for the channel section shown in fig.



- (c) What do you mean by bending of curved bars? Derive the relevant expression for the bending of curved basis with small initial curvature.
- (d) Define shear centre. Write down the principle of second moments of area with proof .
- (e) "Discuss about the Mohr's circle with respect to unsymmetrical bending."
- (f) Explain WINKLER-BACH theory.