

Seat No.	
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T.E. (Civil) (Semester - VI) Examination, Nov. - 2014

STRUCTURAL MECHANICS - III

Sub. Code : 45542

Day and Date : Wednesday, 26 - 11 - 2014

Total Marks : 100

Time : 2.30 p.m. to 5.30 p.m.

- Instructions :
- 1) Attempt any THREE Questions from Section I & any THREE Questions from Section - II.
 - 2) Figures to the right indicate full marks.
 - 3) Use of non-programmable calculator is allowed.
 - 4) Assume any suitable data, if required and state it clearly.

SECTION - I

Q1) a) Find Static and Kinematic indeterminacies of the following structures. [6]

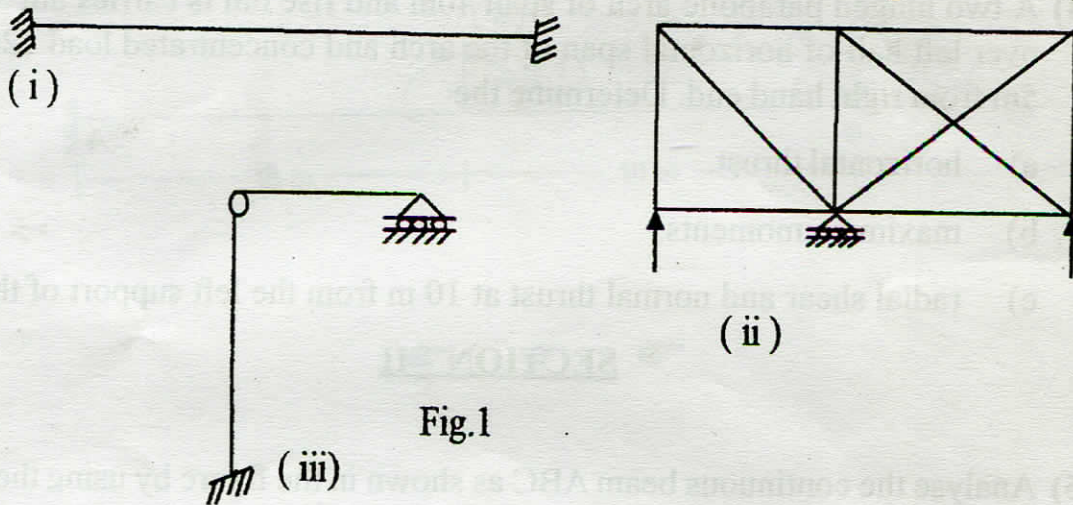


Fig.1

- b) Determine the reactions of propped cantilever beam AB of span 6m, fixed at A and propped at B. It carries point load of 10 kN at 2m from Prop. Beam is propped at B by using spring with spring constant 800kN/m. Take $EI = 3 \times 10^{10}$ kN-mm². [10]

Q2) Analyse fixed beam loaded shown in figure 2 and draw SFD and BMD. [16]

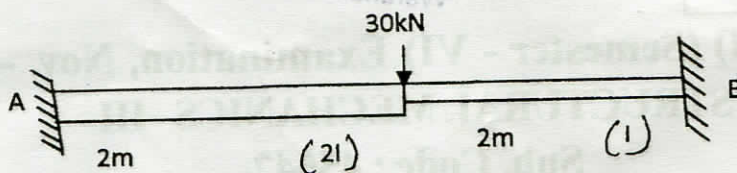


Fig.2

Q3) Using Clayperons theorem, analyse the continuous beam loaded and supported as shown in figure 3. Draw SFD and BMD. [17]

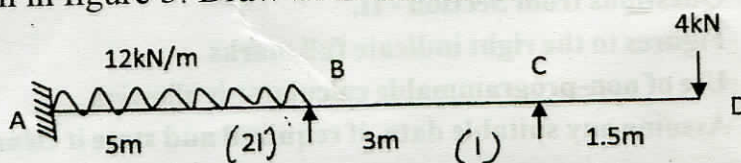


Fig.3

Q4) A two hinged parabolic arch of span 40m and rise 6m is carries udl 30kN/m over left half of horizontal span of the arch and concentrated load 120 kN at 5m from right hand end. Determine the [17]

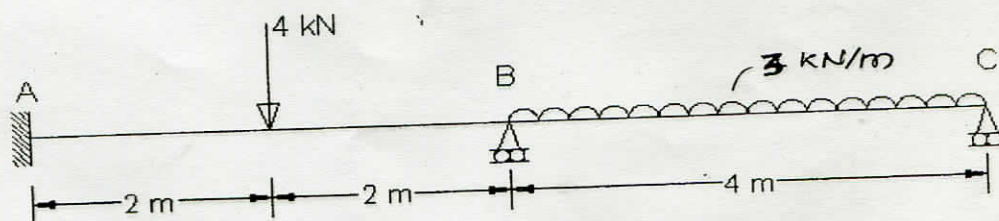
- horizontal thrust.
- maximum moments.
- radial shear and normal thrust at 10 m from the left support of the arch.

SECTION - II

Q5) Analyse the continuous beam ABC as shown in the figure by using the Slope-Deflection method and draw its BMD. The uniformly distributed load on member BC has an intensity of 3 kN/m. The supports B and C settle by 5mm and 2mm respectively from their initial position which is in level of A. Assume EI to be constant for all members.

Take value of $E = 200 \text{ GPa}$, $I = 8 \times 10^6 \text{ mm}^4$.

[18]



Q6) A Portal frame ABCD has its members AB and CD vertical, whereas member BC is horizontal. The frame is fixed at A and D. Member AB of length 5m and inertia $5I$ is subjected to a horizontal load of 60 kN acting towards the right at location 2 metres below the joint B. The member BC of length 4m and inertia $3I$ is subjected to a udl of 21kN/m. Member CD of length 4m and inertia $4I$ is free of any loads. The sway of frame is prevented by a lateral force at joint C. Analyse the frame by moment distribution method and determine the lateral force at C. Draw BMD for the frame. [16]

Q7) Find the end moments of a fixed beam 6 metres in length carrying a point load of 45 kN at 2 metres from the left end of the beam. Hence Draw BMD for the beam. [16]

Q8) Develop the Stiffness matrix for the beam AB with reference to co-ordinates shown in Fig. [16]

