P P SAVANI UNIVERSITY

Fourth Semester of B. Tech. Examination

May 2022

SECV2051 Determinate structural analysis

20.05.2022, Friday **Time: 09:00 a.m . To 11:30 a.m.** **Maximum Marks: 60**

Instructions:

1. The question paper comprises of two sections.
2. Section I and II must be attempted in separate answer sheets.
3. Make suitable assumptions and draw neat figures wherever required.
4. Use of scientific calculator is allowed.

SECTION – I

Q - 1 Answer the Following: (MCQ/Short Question/Fill in the Blanks) **[05]**

(i) The minimum number of over all equilibrium equations for plane truss analysis must be equal to

a) Unlimited number c) 03

b) 06 d) 02

(ii) Influence line diagram helps to study the effect of _____ load on the structures. (Moving load, Static Load, Vibrating Load)

(iii) Significant deformations in plane frame are _____ and _____. (positive & Negative, Axial & flexural, Torsional & Flexural)

(iv) Point of Contra flexure is the point when _____change its sign from Positive to negative or vice versa. (Bending Moment, shear force, Deformation)

(v) Write definition of degree of kinematic indeterminacy.

(vi) Write equation for S.I & K.I of Beam.

(vii) Write two methods of analysis of Indeterminate structures.

Q - 2 (a) Explain conjugate Beam Method in Detail with figure. **[05]**

Q - 2 (b) Determine slope & Deflection at the free end of a cantilever beam shown in figure 1 using moment area method. Ixx= 6×10^7 mm^4 E= 2×10^5 N/mm^2 **[05]**

OR

Q - 2 (a) Write short note on Moment Area Method. **[05]**

Q - 2 (b) Explain difference between Truss & Frame. **[05]**

Q - 3 (a) Draw Shear force & Bending Moment diagram for a frame shown in figure 2. **[05]**

Q - 3 (b) Find θ_B θc y_B yc for a beam shown in figure 3 using conjugate beam method. **[05]**
I= 3×10^8 mm^4 E= 2×10^5 N/mm^2

OR

Q - 3 (a) Two wheel loads 12 kN and 20 kN with fixed distance 2m between them an 12 kN load leading, crosses a beam of span 8 m from left to right. Draw influence line diagram for shear force and bending moment for a point 3m from left support and find maximum values of shear force and bending moment. **[05]**

Q - 3 (b) Draw influence line diagram for the force in in the top chord & bottom chord of a Pratt truss having 6 panels each 3m square as shown in figure 4. [05]

Q - 4 Attempt any one/two. [05]

(i) Write short note on influence line diagram & its importance.

(ii) Draw influence lines for reaction in simply supported beam AB of Span L.

Section II

Q-1 Determine the deflection at C slope at A and maximum deflection. E = $2*10^5$ N/mm² I = 2000 cm⁴. Figure 5 use Macaulay's method. **10**

Q-2 Find deflection under the load and slope at A. for example shown in Figure 6. **10**

Q-3 Calculate maximum positive and negative bending moments and their positions. Figure 7. **10**

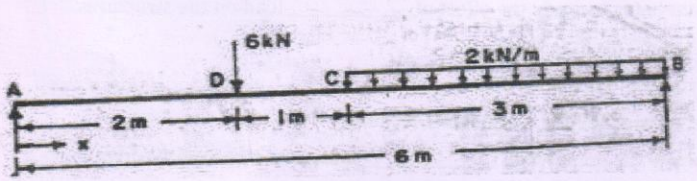

Fig. 5

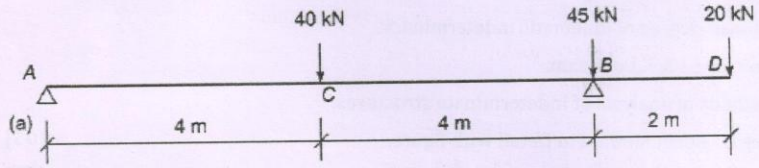

Fig. 6

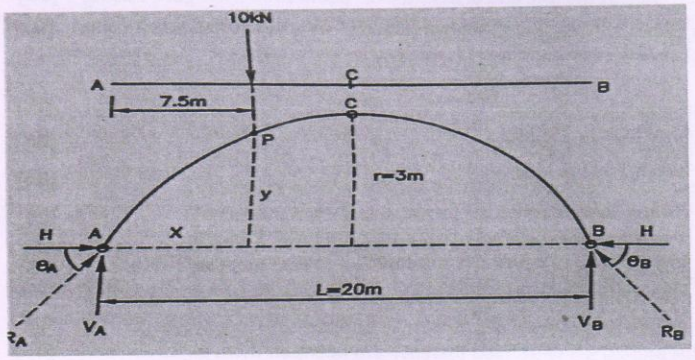

Fig. 7

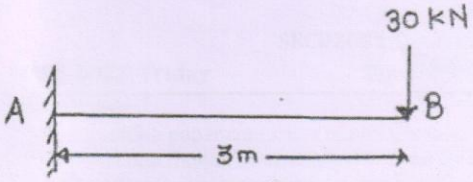

Fig.I (1)

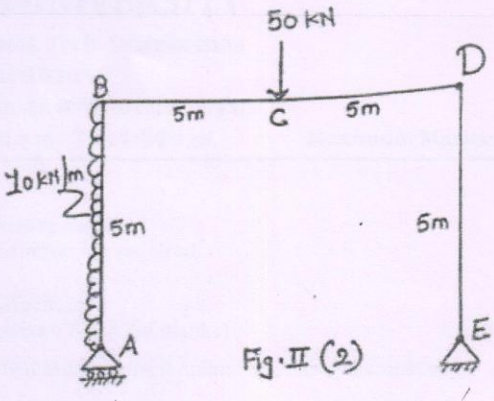

Fig.II (2)

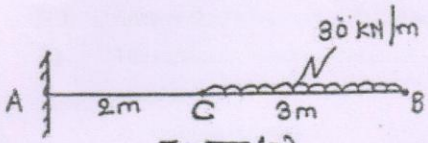

Fig.III (3)

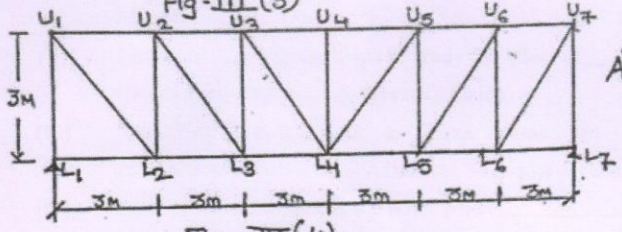

Fig-IV (4)

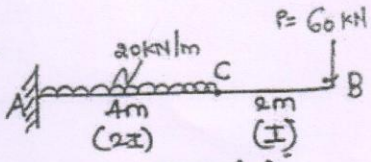

Fig.V (5)

20 KN