P P SAVANI UNIVERSITY

Forth Semester of B. Tech. Examination
May 2019
SECV 2051 Determinate Structural Analysis

15.05.2019, Wednesday **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 Followings: (Any Five) **[05]**

(i) Which conditions must be satisfied for statically determinate structure?

(ii) Define stability of structure.

(iii) What is influence line diagrams?

(iv) What is equivalent conjugate beam for beam with one end fix and other hinged?

(v) Define moment area theorem.

(vi) At which point ordinate of ILD for moment is maximum?

(vii) What is equation for maximum B.M. for beam subjected to 4 wheel concentrated load?

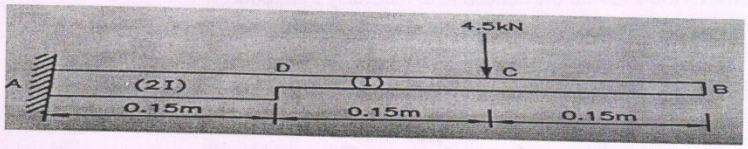
Q - 2 (a) Calculate S.I. of given figures. **[05]**

Q - 2 (b) Derive an equation of slope and deflection at free end of a cantilever beam of span 'l' and udl of 'w' kn/m on entire span. **[05]**

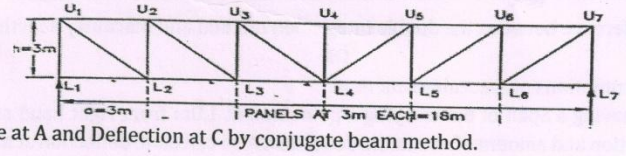
OR

Q - 2 (a) Difference between determinate and indeterminate structure. **[05]**

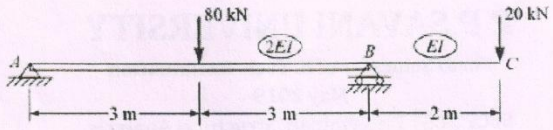
Q - 2 (b) Find slope and deflection at free end of a cantilever beam shown in fig. by moment area method. **[05]**



Q - 3 (a) Draw influence line for U2U3 and L1L2. **[05]**

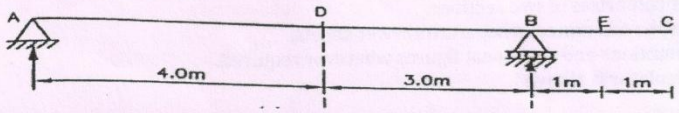


Q - 3 (b) Find Slope at A and Deflection at C by conjugate beam method. **[05]**

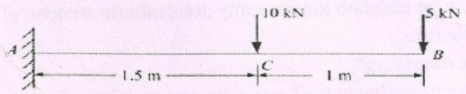


OR

Q - 3 (a) Determine S.F. and B.M. at D. **[05]**



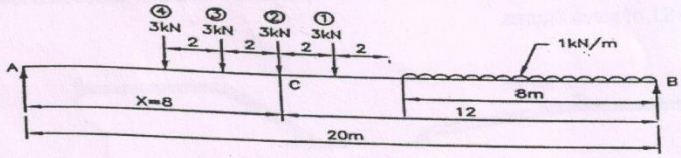
Q - 3 (b) Find slope and deflection at free end of a cantilever beam shown in fig. by moment area method. Take EI=4000 KN.m² **[05]**



Q - 4 Attempt any one. **[05]**

(i) Draw any five conditions of Real beam converted to conjugate beam.

(ii) Determine Max. B.M. at 8 m from left hand support for a given beam Shown in Fig.



SECTION – II

Q - 1 Answer the Followings: (Any Five) **[05]**

(i) Write the formula for double integration method.

(ii) Define term strain energy.

(iii) Write the Castiglino's first theorem.

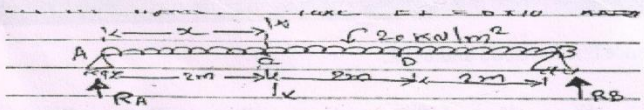
(iv) Write the uses of cable.

(v) Write the formula to find the deflection of macaulay's Method.

(vi) Draw the figure of suspension bridge and explain all components.

(vii) Write the deference between two hinge arch and three hinge arch.

Q - 2 (a) Find slop and deflection at point C for beam as shown in figure. Take EI = 6X10⁴ KN.M². **[05]**



Q - 2 (b) Write the deference between the double integration method and macaulay's method. **[05]**

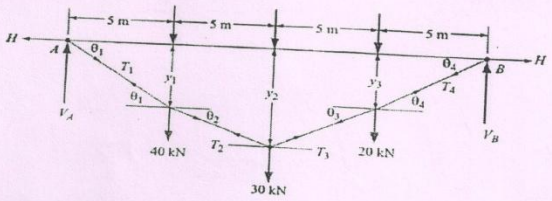
OR

Q - 2 (a) Write the assumptions of macaulay's method. **[05]**

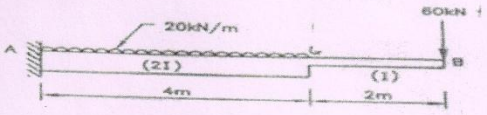
Q - 2 (b) A beam AB having a Span of 6m carrying a point load at 1.0m from right hand supports. Find the position and amount of maximum deflection. Also calculate deflection at mid span. EI = 20000 KN.M². **[05]**

Q - 3 (a) A light cable is supported at two points 20m apart which are at the same level. The cable supports three concentrated loads as shown in figure. The deflection at the first point is **[05]**

found to be 0.8m. Determine the tension in the different segments and total length of the cable.

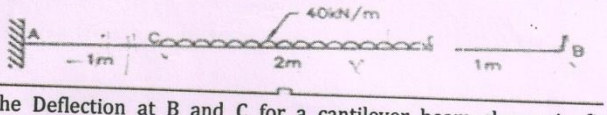


Q - 3 (b) Find the slop and deflection at point c for a beam as shown in figure using Unit load methods. **[05]**

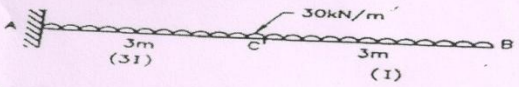


OR

Q - 3 (a) Find the slop at D and deflection at B for the cantilever beam loaded as shown in figure using castiglione's first theorem. Take E= $2x10^5$ N/mm^2 and I = $3X\ 10^8$ mm^4. **[05]**

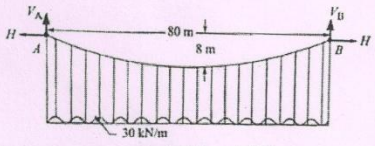


Q - 3 (b) Determine the Deflection at B and C for a cantilever beam shown in figure using castiglione's first theorem. Take EI = $10\ X\ 10^{13}$ N.mm^2. **[05]**



Q - 4 Attempt any One.

(i) A bridge cable is suspended from tower 80m apart and carries a load of 30KN/M on the entire span. If the maximum sag is 8m, calculate the maximum tension in the cable. If the cable is supported by saddles which are stayed by wires inclined at 30° to the horizontal. Determine the forces acting on the towers. If the same inclination of back stay passes over pulley, determine the forces on the towers. **[05]**



(ii) Derive an equation for three hinge arch with static load.

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