U.S.N.										

B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

October 2023 Semester End Main Examinations

Programme: B.E **Semester: IV**
Branch: Civil Engineering **Duration: 3 hrs.**
Course Code: 19CV4PCSTA **Max Marks: 100**
Course: Structural Analysis

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

UNIT - I

1 a) A three hinged parabolic arch of span 'l' has its abutments at depths h_1 and h_2 below the crown. The arch carries uniformly distributed load of w per unit length over the whole span. Determine the horizontal thrust, at each support. (ref.**Figure-01**). **10**

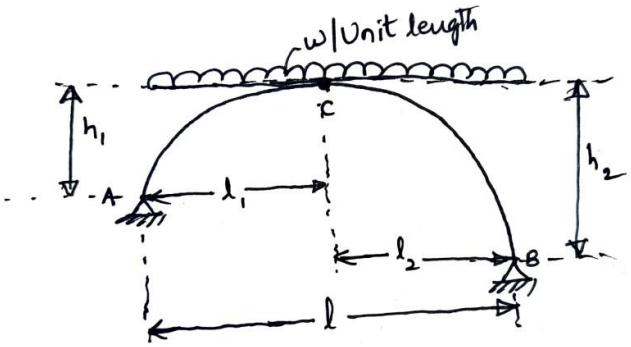

Figure-01

b) A cable subjected to concentrated loads as shown in **Figure-02** has different support levels. Support D is 1m below support A and point C has a sag of 2.2143 m as indicated. Determine the total length of the cable. **10**

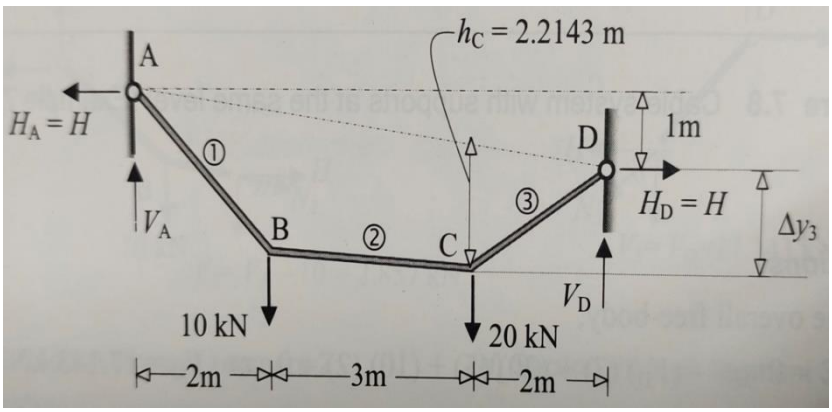

Figure-02

Important Note: Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

UNIT - II

2 For the beam shown in **Figure-03**, determine the deflection at 'C' and slope at E using Macaulay's method. Take EI= 20 x 10^3 kNm^2. **20**

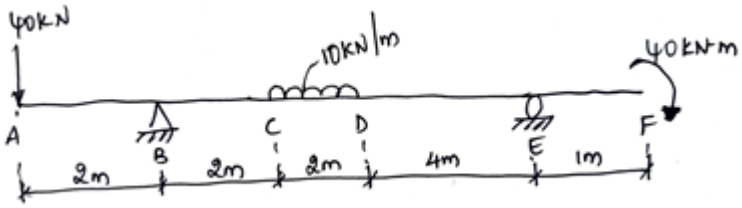

Figure-03

OR

3 A horizontal girder of steel having a uniform section is 14m long and is simply supported at its ends. It carries concentrated loads of 120kN each at section 3m and 4.5m from the left and the right ends respectively. Evaluate **20**

(i) the slope and deflection under loads using conjugate beam method,

(ii) slope at the left support using moment area method.

UNIT - III

4 a) In the propped cantilever beam shown in Fig Q4(a), support B yields by 2 mm during loading. Analyze the beam using consistent deformation method to find the support reactions. Assume EI = 4 x 10 ^{4} KN-m^2 **08**

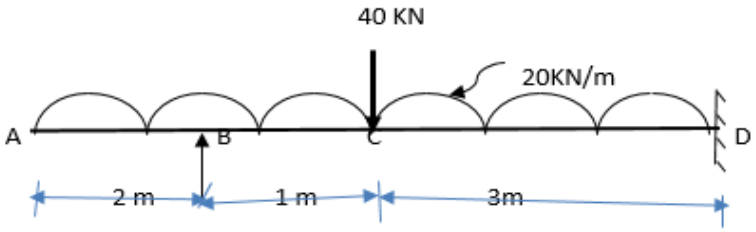

Fig Q4(a)

b) A continuous beam, ABC of length 3l consists of span AB and BC of lengths 2l and l respectively. The beam is fixed at end A and simply supported at B and C. The beam carries a uniformly distribute load of w per unit run on the whole beam. Determine the bending moments at supports. Use theorem of three moments. Assume the beam has uniform section throughout. **12**

UNIT - IV

5 The bent ABC shown in **Figure-04** carries a concentrated vertical load P and horizontal load Q at A. Find the vertical and horizontal deflections of A. Assume uniform flexural rigidity. Use Castigliano's theorem. **20**

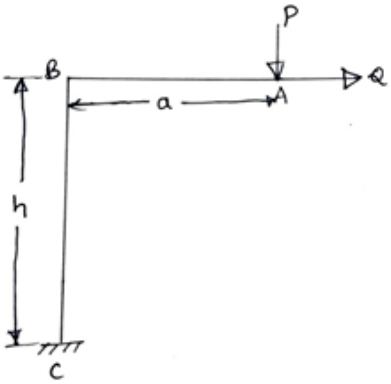

Figure-04

OR

6 Find the vertical and horizontal deflection of Joint 'C' using strain energy method (Castigliano's) for the loaded truss shown in **Figure-05**. The sectional areas of members are as follows. **20**

Horizontal members: 3000 mm^2 ; Vertical members: 4000 mm^2, Inclined members: 5000 mm^2; Take E= 200 kN/mm^2.

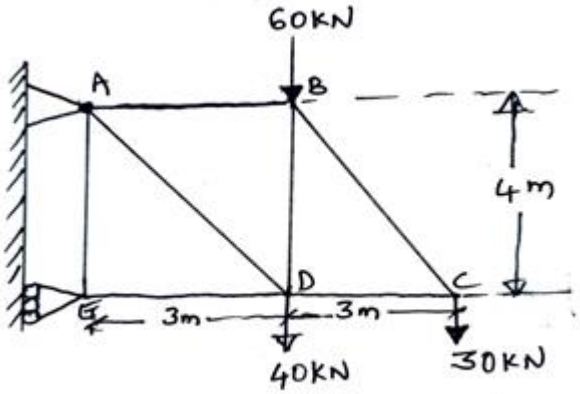

Figure-05

UNIT - V

7 a) Find the deflection at center of the beam shown in Figure-06 using unit load method. EI is constant. **15**

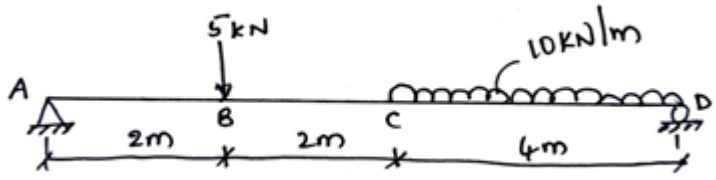

Figure-06

b) Explain the steps involved in unit load method of analysis of truss, to find vertical deflection at a joint. **05**

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