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P.E.S. College of Engineering, Mandya - 571 401

(An Autonomous Institution affiliated to VTU, Belagavi)

Fourth Semester, B.E. - Civil Engineering

Make-up Examination; March/April - 2022

Basic structural Analysis

Time: 3 hrs *Max. Marks: 100*

***Note**: Answer **FIVE** full questions, selecting **ONE** full question from each unit.*

UNIT - I

1 a. Define static indeterminacy, kinematic indeterminacy and principle of superposition. 6

b. Analyze the truss using method of joints as shown in Fig.1 (b). 14

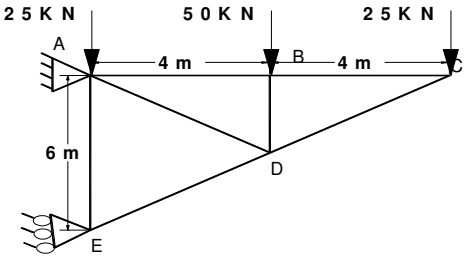

Fig. 1(b)

2. a List the assumptions made for the analysis of plane trusses. 6

b. Using Macaulay's method, calculate the slope at D and deflection at B as shown in Fig.2 (b). 14

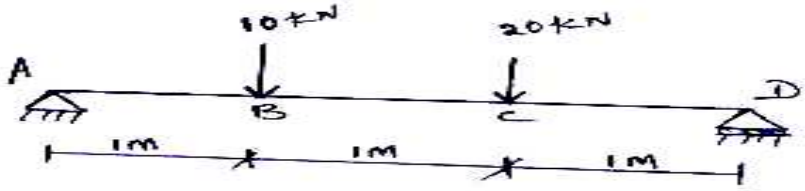

Fig.2(b)

UNIT - II

3 a. State Mohr's theorems used in moment area method and derive the equations. 10

b. Determine the slope and deflection at the free end for the cantilever beam shown in Fig.3 (b).by using moment area method. 10

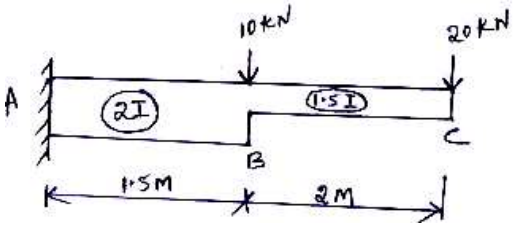

Fig.3(b)

4 a. Define conjugate beam? Tabulate the relation between the various types of real support and conjugate support. 10

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b. Compute slope and deflection at free end of a beam shown in Fig.4 (b).using conjugate beam method. 10

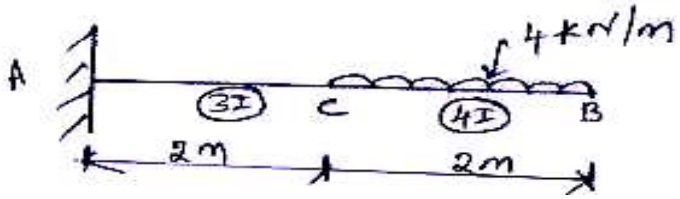

Fig.4(b)

UNIT - III

5 a. Prove that the bending moment anywhere in three hinged parabolic arch subjected to uniformly distributed load over entire span is equal to zero. 8

b. A symmetrical three hinged parabolic arch has a span of 20 m it carries UDL of 10 kN/m over a entire span and two point loads of 40 kN each at 2m and 5m from left hand support calculate reaction, bending moment, normal thrust, radial shear at a section 4 m and 15 m from left support take rise of 4 m. 12

6 a. A suspension cable has a span of 20 m and a dip of 4m carries a UDL of 20 kN/m over the entire span. Find the maximum tension in the cable and also the length of the cable. 12

b. Derive an expression for length of cable subjected to UDL 8

UNIT - IV

7 a. Define influence line. What are the uses of influence line? 6

b. For a simply supported beam of span 'l' sketch a typical ILD for shear force at a section which is at a distance a from left support and b from right support when a unit load crosses the beam. Reduce the relevant equations. 14

8 a. The loading system shown in Fig. 8(a).crosses a girder of span 30 m. Determine the maximum reaction induced at the support. 10

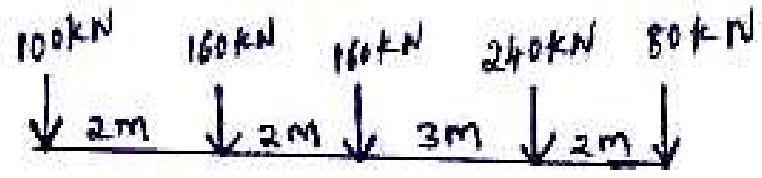

Fig. 8(a)

b. An UDl of 60 kN/m covering a length of 5 m, crosses a girder of span 16 m. Determine the maximum +ve and −ve shear force at a section 6m from the left support. 10

UNIT - V

9. Analyze the propped cantilever beam of span 3m subjected to an UDL of 10kN/m throughout and a point load of 5kN at mid-span of the beam. Draw BMD and SFD. 20

Contd…3

10. Analyze the continuous beam shown in the fig.10 by theorem of three moments, draw SFD and BMD. 20

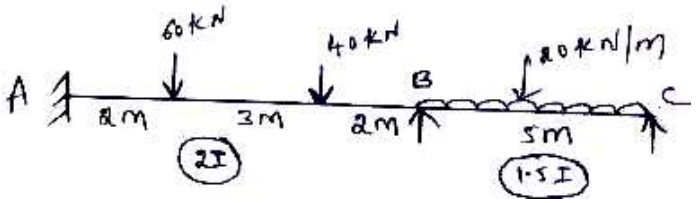

Fig. 10

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