CBCS SCHEME

USN | | | | | | | | | | |

15CV652

Sixth Semester B.E. Degree Examination, June/July 2018
Matrix Method of Structural Analysis

Time: 3 hrs. Max. Marks: 80

Note: Answer any FIVE full questions, choosing one full question from each module.

Module-1

1 a. Obtain the relationship between global stiffness matrix $[K_\Delta]$ and member stiffness matrix [K] using displacement transformation matrix [A] in the form $[K]_\Delta = [A]^T [K] [A]$. **(08 Marks)**

b. Develop stiffness and flexibility matrix for the beam element shown in Fig.Q.1(b), with respect to coordinates (1) and (2). Also show that they are inverse of each other. **(08 Marks)**

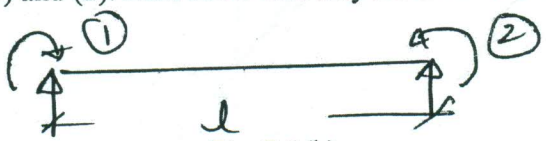

Fig.Q.1(b)

OR

2 a. Define the following: i) Stiffness [k] ii) Flexibility [f] iii) Static indeterminacy iv) Kinematic indeterminacy. **(08 Marks)**

b. Explain: i) Principle of contragradience ii) Minimum potential energy. **(08 Marks)**

Module-2

3 Analyze the continuous beam shown in Fig.Q.3 by force method. Draw BMD take moment at 'B' as redundant. **(16 Marks)**

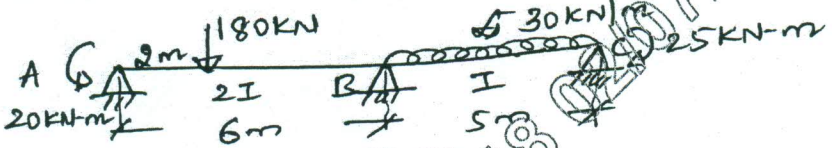

Fig.Q.3

OR

4 Analyze the rigid jointed frame shown in Fig.Q.4 by flexibility method. Use force transformation approach. Take horizontal and vertical reaction at 'A' as redundant. **(16 Marks)**

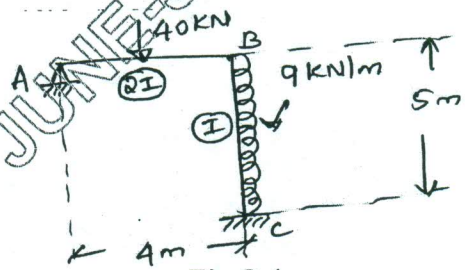

Fig.Q.4

Module-3

5 Analyze the continuous beam by stiffness matrix method using transformation approach. Refer Fig.Q.5. **(16 Marks)**

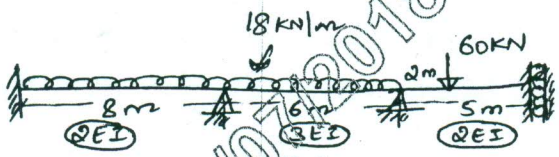

Fig.Q.5

OR

6 Find forces in all members for the given pin jointed frame shown in Fig.Q.6 and also displacement of joint A. Take E = 200GPa. **(16 Marks)**

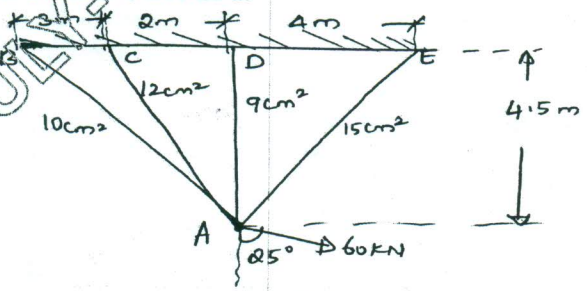

Fig.Q.6

Module-4

7 In the pin jointed truss shown in Fig.Q.7 all the members are cooled upto 20°C. Take $\alpha = 1.2 \times 10^{-5}$/°C. $E = 2 \times 10^5$ N/mm^2 for all the members. Find the displacement and forces in all the members. **(16 Marks)**

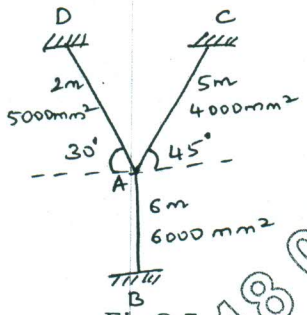

Fig.Q.7

OR

8 Analyze the truss by flexibility method member AD is too long by 3mm, AC is too short by 5mm AB is too short by 8mm. Member AB is subjected to an increase in temperature by 25°C. AE is constant for all members. Take $\alpha = 12.5 \times 10^{-6}$/°C. $AE = 250 \times 10^3$kN. Refer Fig.Q.8. Choose AD as redundant. **(16 Marks)**

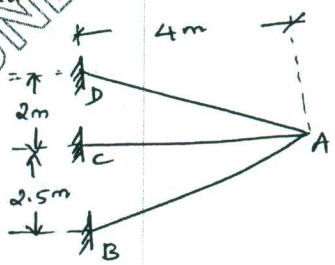

Fig.Q.8

Module-5

9 Analyze the continuous beam as shown in Fig.Q.9 by direct stiffness method. Draw BMD. **(16 Marks)**

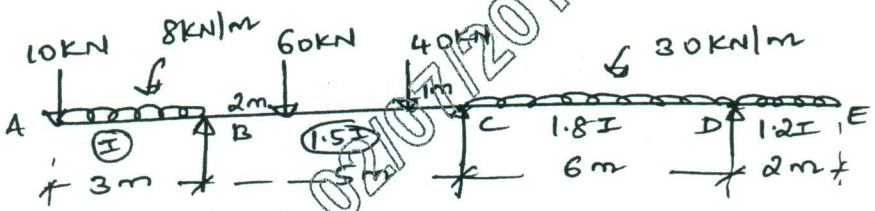

Fig.Q.9

OR

10 Analyze the frame as shown in Fig.Q.10 by direct stiffness method **(16 Marks)**

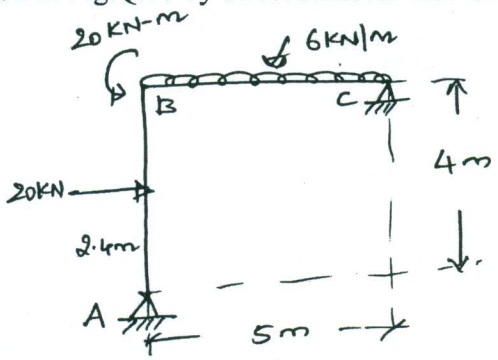

Fig.Q.10

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