320833(20)

B. E. (Eighth Semester) Examination, April-May 2021

(New Scheme)

(Civil Engg. Branch)

STRUCTURAL ANALYSIS-III

Time Allowed : Three hours

Maximum Marks : 80

Minimum Pass Marks : 28

Note : Attempt all questions. Part (a) of each question is compulsory. Attempt any **one** question part from (b) and (c) of each question.

Unit-I

1. (a) Write assumptions of portal method.   2

(b) Determine the reactions at the base of the columns for the frame shown in fig. below by portal method.
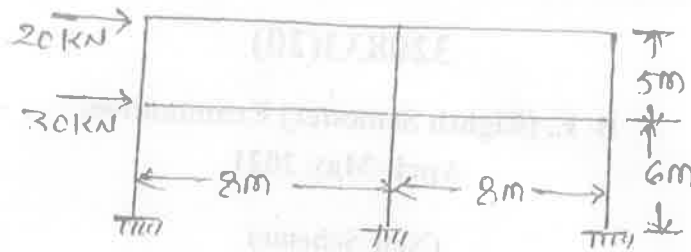

Fig.-1

(c) Solve the same frames as in prob. 1 (b) using cantilever method.

Unit-II

2. (a) Explain the term "flexibility" what are the properties of a flexibility matrix.

    (b) Analysis the continuous beam as shown below for constant flexural rigidity "EI" by flexibility matrix method.
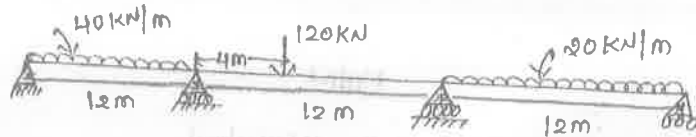

Fig.-2

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(c) Develop flexibility matrix for a simply supported beam AB with reference to coordinates shown in fig.

Fig.-3

Unit-III

3. (a) Write stiffness matrix for a beam.

    (b) Fig. shows a jib crane carrying vertical load of 10 k N at A. Find the displacement of joint A. Calculate forces in members AB & AC. The numbers in parentheses are the Cross-sectional area of the member in mm². Take $E = 200$ kN/mm².
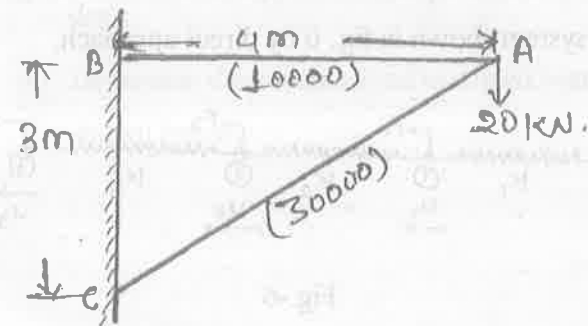

Fig.-4

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(c) Analysis the frame shown in fig. by stiffness matrix method.
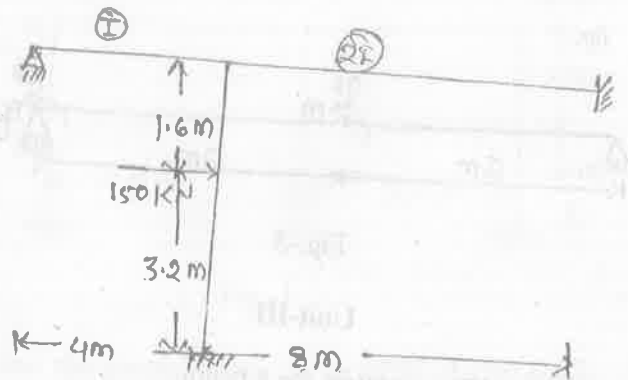

Fig.-5

Unit-IV

4. (a) What is shape function?

(b) Assemble equations of equilibrium for the spring system shown in fig. 6 by direct approach.
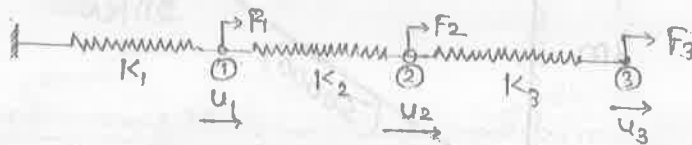

Fig.-6

(c) Analysis the beam as shown in fig. using FEM techniques. Determine the rotations at the supports. Given $E = 200$ GPa and $I = 5 \times 10^6$ mm^4.
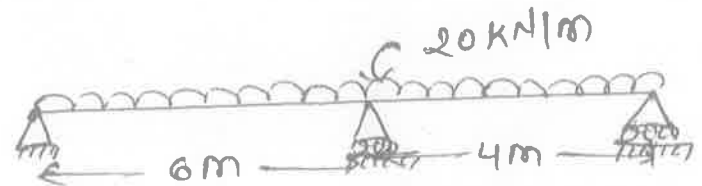

Fig.-7

Unit-V

5. (a) State upper bound theorem.

(b) Prove that the zone of yielding due to flexure is one third of span of a simply supported beam?

(c) (i) Show that plastic hinge is equal to one third of span.

(ii) Determine the collapse load in a fixed beam as shown below.