Registration no: | | | | | | | | | | |

Total Number of Pages: 2 **M.TECH**
CEPC 103

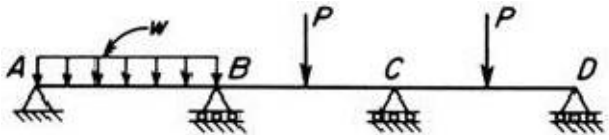
1stSemester Regular/Back Examination – 2015-16
MATRIX METHODS OF STRUCTURAL ANALYSIS
BRANCH(S):STRUCTURAL ENGG.
Time: 3 Hours
Max marks: 70
Q.CODE-T1159

Answer Question No.1 which is compulsory and any five from the rest.
The figures in the right hand margin indicate marks.

Q1 Answer the following questions: (2 x 10)

a) What is the static indeterminacy of a fixed beam with a concentrated transverse load at middle of span?
b) Differentiate between equilibrium and compatibility.
c) What is principle of superposition?
d) Enumerate the basic steps in flexibility method.
e) State the advantages of stiffness method.
f) What are combined joint loads? Give one example.
g) Differentiate between direct stiffness coefficient and cross stiffness coefficient.
h) A simply supported beam with hinge at one end and a roller at the other end is kinematically indeterminate to what degree?
i) Matrix analysis of structures comes under which category – analytical or numerical?
j) Matrix methods of structural analysis hardly distinguish the structures as statically or kinamatically indeterminate. Comment.

Q2 Analyze the continuous beam ABCD of constant flexural rigidity by flexibility method if all spans are of 10 m length, P = 100 kN and w = 10 kN/m. The load P acts in the middle of the spans. Choose the redundants suitably. (10)



Q3 A continuous beam ABC is of two spans 10m each. Audl of 10 kN/m acts on the whole beam. The left hand support A and the middle support B are on rollers, whereas the right hand support C is fixed. Support B sinks by 1/100 and support C rotates by 0.004 radians in anti-clockwise direction. Analyze the beam by flexibility method. EI is constant throughout. (10)

Q4 A rectangular truss ABCD with both diagonal members AC and BD is (10)

supported on a hinge at A and a roller at D. Horizontal members AD = BC = 3m. Vertical members AB = CD = 4m. A 20 kN load acts horizontally at B towards right and 10 kN load acts vertically downward at C. All the members are of constant axial rigidity. Using the flexibility method, analyze the truss.

Q5 Using stiffness approach, analyze the bent ABC with the following data. End A is fixed, end C is hinged, member AB is vertical and member BC is horizontal. AB = BC =3m. Audl of 10 kN/m is on BC covering the entire span. EI constant. Neglect axial deformation. (10)

Q6 A continuous beam ABC is of two spans 10m each. Audl of 20 kN/m acts on the whole beam. The left hand support A is fixed. The middle support B and the right hand support C are on rollers. EI constant for both spans. Neglecting axial deformations, analyze the beam by stiffness method. (10)

Q7 Analyze the beam in Q. 6 by stiffness approach, if the supports B and C sink downward by 300/EI and 200/EI respectively in addition to the udl 20 kN/m on the whole span ABC. (10)

Q8 Write Short Notes (Any Two) (5 x 2)

a) Difference between stiffness and flexibility approaches
b) Static and Kinematic Indeterminacies
c) Restrained structure and Released Structure in matrix analysis.
d) Unit load method