BRAINWARE UNIVERSITY

Term End Examination 2023-2024
Programme – Dip.CE-2022
Course Name – Theory of Structure
Course Code - DCEPC402
(Semester IV)

Full Marks : 60 **Time : 2:30 Hours**

[The figure in the margin indicates full marks. Candidates are required to give their answers in their own words as far as practicable.]

Group-A

(Multiple Choice Type Question) 1 x 15=15

1. *Choose the correct alternative from the following :*

(i) Identify the analytical technique of Macaulay's method is :
a) Force equilibrium b) Moment equilibrium
c) Displacement compatibility d) Energy conservation

(ii) Identify most suitable methods for beams with varying moment of inertia :
a) Conjugate Beam Method b) Moment Area Method
c) Double Integration Method d) Macaulay's Method

(iii) Identify fundamental principle in the Theory of Structures:
a) Newton's Second Law b) Archimedes' Principle
c) Equations of Equilibrium d) Ohm's Law

(iv) Identify determinacy in structures:
a) The stability of the structure b) The ability to determine forces and reactions
c) The load-carrying capacity d) The rigidity of the structure

(v) Select the method of analysis to which the concept of virtual work is applied:
a) Slope-Deflection Method b) Moment Distribution Method
c) Force Method d) Flexibility Method

(vi) Identify what the term external indeterminacy refers to:
a) The number of unknowns in the structure b) The number of reactions at supports
c) The external loadings applied to the structure d) The kinematic indeterminacy of the structure

(vii) Identify the degree of kinematic indeterminacy of a simple roller support:
a) 0 b) 1
c) 2 d) 3

(viii) Identify the primary objective of the method of consistent deformation:
a) To find displacements b) To distribute moments
c) To calculate internal forces d) To determine support reactions

(ix) Identify the type of structure more likely to be kinematically indeterminate:
a) Rigid frame b) Pinned frame
c) Simple truss d) Continuous beam

(x) Select where the maximum bending moment is typically located in a fixed beam subjected to a UDL:
a) At midspan b) At support locations
c) Where shear force is maximum d) Where shear force is zero

(xi) Choose the common assumption made when applying Clapeyron's theorem for continuous beams from the following:
a) Uniform material properties b) Rigid supports
c) Elastic deformation d) Linear behavior of materials

(xii) Choose the term for which UDL stands in the context of structural analysis:
a) Uniformly Distributed Load b) Unbalanced Dynamic Load
c) Ultimate Design Load d) Underlying Deformation Limit

(xiii) Choose the option that describes what the distribution factor represents in the moment distribution method:

a) It indicates the ratio of applied load to moment
b) It represents the distribution of moments in a structure
c) It is a factor used to calculate support reactions
d) It indicates the load distribution among members

(xiv) Choose how many unknown support moments are considered in the moment distribution method for a continuous beam with three spans:

a) One
b) Two
c) Three
d) Four

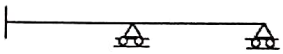
(xv) Choose the purpose of the moment distribution method in portal frames:

a) To calculate axial forces
b) To determine support reactions
c) To distribute moments in the frame
d) To find deflections

Group-B
(Short Answer Type Questions) 3 x 5=15

2. Recognize the maximum slope of a cantilever beam by applying udl throughout length L. Use the double-integration method. (3)

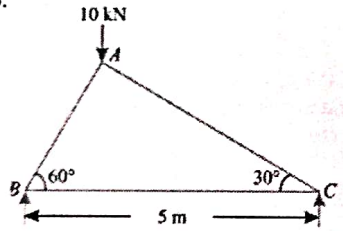
3. Show the value of the kinematic indeterminacy of the given figure. (3)



4. A fixed beam AB of 5 m span carries a point load of 20 kN at a distance of 2 m from A. Determine the values of fixing moments. Draw BMD. (3)

5. Identify the expression of shear force and bending moment in the conjugate beam method. (3)

6. (3)



Evaluate the force value of member AC.

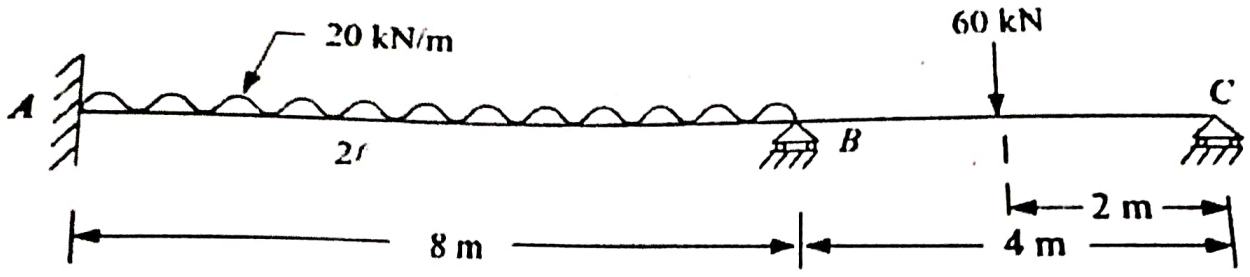
OR

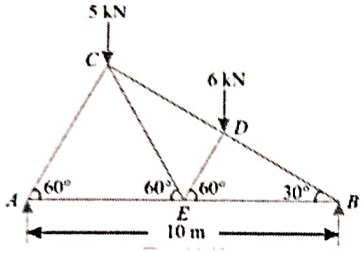
Distinguish between a deficient frame and a redundant frame. (3)

Group-C
(Long Answer Type Questions) 5 x 6=30

7. A simply supported beam of 6 m span is subjected to a concentrated load of 18 KN at 4 m from the left support. Recognize the slope at mid-span. Given E = 200 GPa, I = 15 x 10^6 mm^4. Use the double integration method. (5)

8. Calculate the moment values of the beam shown in the figure and draw the BMD. (5)

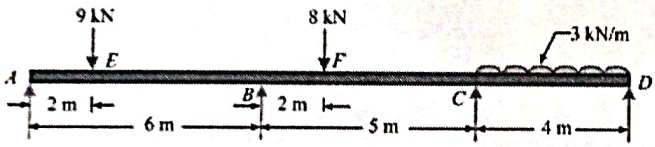


9. 

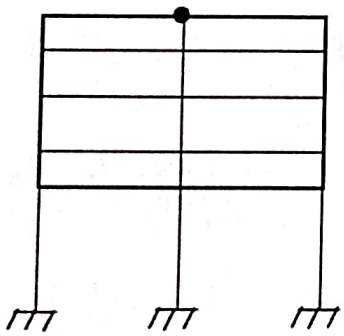
(5)

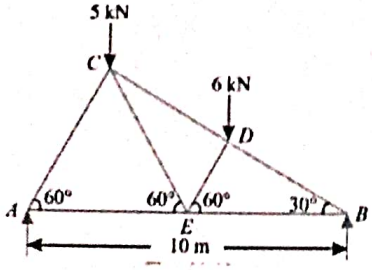
Evaluate the force value of members AC and AE.

10. A continuous beam ABCD, simply supported at A, B, C, and D, is loaded as shown in Fig. Determine the moments over the beam and draw a bending moment diagram. (5)



11. Show the value of the static indeterminacy of the given figure. (5)



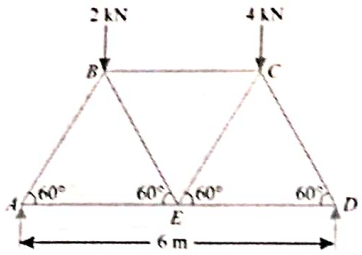
12. 

(5)

Evaluate the force value of member CD.

OR

(5)



Evaluate the force value of member CE.

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