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(REVISION — 2015) Signature .....

FOURTH SEMESTER DIPLOMA EXAMINATION IN ENGINEERING/ TECHNOLOGY — APRIL, 2017

THEORY OF STRUCTURES - II

(Common to AR & CE)

[*Time* : 3 hours

(Maximum marks : 100)

PART — A

(Maximum marks : 10)

Marks

I Answer the following questions in one or two sentences. Each question carries 2 marks.

1. Define the terms column and strut.
2. Define the core of section applicable to eccentric columns.
3. Define angle of repose of soil.
4. List the criteria for design of beams.
5. Define a rigid joint in structure. (5 × 2 = 10)

PART — B

(Maximum marks : 30)

II Answer any *five* questions from the following. Each question carries 6 marks.

1. Classify columns based on the mode of failure.
2. Explain the process of analysis of trusses by method of joints.
3. Derive equations for maximum and minimum stresses at the base of an eccentrically loaded column with circular cross section.
4. Illustrate the stability conditions for gravity dam.
5. Identify the advantages of indeterminate structures.
6. Derive equations for maximum slope and deflection of simply supported beam with UDL over the entire length.
7. State the theorem of three moments and give its application. (5 × 6 = 30)

Marks

PART — C

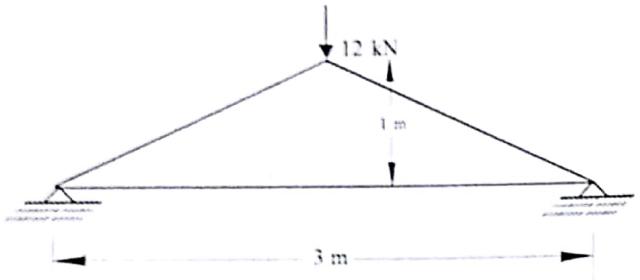
(Maximum marks : 60)

(Answer *one* full question from each unit. Each full question carries 15 marks)

UNIT — I

III (a) Identify the limitations of Euler's equation for buckling load capacity. 5

(b) Calculate the magnitude and identify the nature of member forces of truss given in fig.



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OR

IV (a) Describe the method of sections for analysing perfect frames. 5

(b) A hollow cylindrical metal column of 200mm external diameter and 20 mm thickness, 3 m long fixed at both ends. Find Euler's and Rankine's load capacities of column. Given $E = 1.2 \times 10^5$ N/mm², $\sigma_c = 500$ N/mm² and Rankine's constant $\alpha = 1/1600$. 10

UNIT — II

V (a) Illustrate the core of a rectangular column cross section. 5

(b) A masonry dam of trapezoidal section has height 10 m, top width 2 m and base width 4.5 m. The water level reaches 1 m below the crest of dam. Find the maximum and minimum stresses at the base of dam. The unit weight of masonry 22kN/m³. 10

OR

VI (a) Draw BMD of a fixed beam of span 4 m subjected to a UDL of intensity 5kN/m over the entire length of beam. 5

(b) A steel pillar of hollow circular section with external diameter 500 mm and metal thickness 20 mm. A load of 50 kN is acting on pillar with an eccentricity 60 mm. Calculate maximum and minimum intensities of stresses on column section and plot the stress distribution diagram. 10

Marks

UNIT — III

VII (a) Explain double integration method for slop and deflection of beams. 5

(b) Find maximum slope and deflection of a cantilever of length 4 mts subjected to a point load 3kN at the free end and a UDL of intensity 4 kN/m over the entire length.

The cross section of beam is 200 mm × 300 mm and $E = 8 \times 10^4$ N/mm². 10

OR

VIII (a) State moment area theorems for finding slope and deflection of beams. 5

(b) A simply supported beam 10 m span is carrying two point loads 10 kN each, symmetrically over the beam at 4 m apart. Find maximum slope and deflection of the beam using moment area method. Given $E = 1.2 \times 10^4$ N/mm⁴, cross section - 100 mm × 150 mm. 10

UNIT — IV

IX (a) Define :

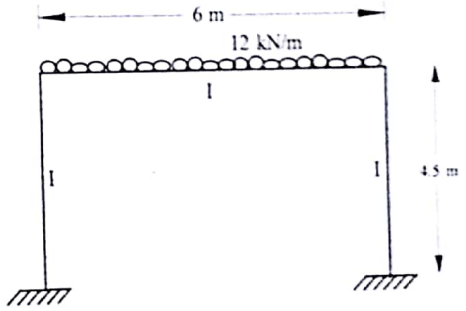
(i) Carry over factor (ii) Stiffness (iii) Distribution factor 6

(b) Analyse a continuous beam ABC has span lengths AB = 5 m, BC = 3 m. The span AB carries a point load 6 kN at the center and span BC carries UDL of intensity 3 kN/m. 9

OR

X (a) Give procedural steps involved in Hardy Cross (moment distribution) Method. 5

(b) Draw BMD of a Portal frame as shown in fig. using moment distribution method.



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