TED (15) – 4014

(REVISION — 2015)

Reg. No. .....

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# DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/ MANAGEMENT/COMMERCIAL PRACTICE — APRIL, 2018

## THEORY OF STRUCTURES - II

[*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 strut, column.
2. What is meant by a perfect frame ?
3. What is meant by eccentricity ?
4. State Mohr's theorem-I.
5. State the Clapeyron's theorem of three moments. (5×2 = 10)



### PART — B

(Maximum marks : 30)

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

1. Discuss the equivalent length of a column under different end conditions.
2. A mild steel tube 3m long, 30mm internal diameter and 5mm thickness is used as a strut with both ends are hinged. Find the crippling load, what will be the crippling load if both ends are fixed ?
   Take $E = 2 \times 10^5 n/mm^2$.
3. Sketch and explain the direct and bending stress distribution diagram at the base of a rectangular column due to eccentric load.
4. A fixed beam AB of span L carries a uniformly distributed load of w/unit length throughout the span. Determine the fixing moments.

Marks

5. Derive the equation for determining the slope and deflection by Double integration method.

6. A cantilever beam of length L carries a uniformly distributed load of w/unit length throughout the length, using Moment area method determine the slope and deflection at the free end.

7. Define the terms : (a) Carry over factor (b) Stiffness factor (c) Distribution factor. $(5 \times 6 = 30)$

## PART — C

(Maximum marks : 60)

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

### UNIT — I

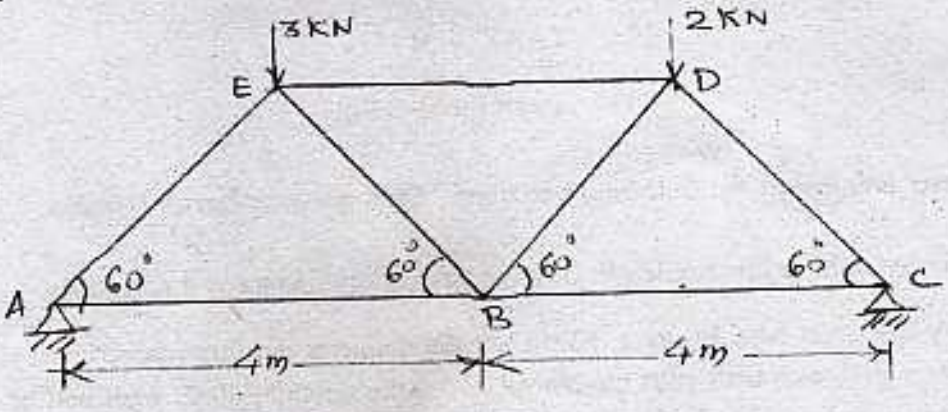
III (a) A mild steel column of cross sectional area 6000mm² has a least radius of gyration 50mm. The length of column is 4meter and both ends are fixed. Find the buckling load by Rankine's formula. Take fc =500n/mm² and Rankine's constant $\alpha = 1/7500$. Find also the buckling load when both ends of the column are hinged. 7

(b) A column 12 m long has a cross section 300×300 mm. The column is made of a metal having modulas of elasticity as $2 \times 10^5 N/mm^2$. Using Euler's formula and a factor of safety 3, determine the safe load to be applied on the column if ;

(i) Both ends are hinged (ii) One end fixed and other end free. 8

OR

IV A truss of span 8 meter is loaded as shown in the figure. Find the reaction at supports and the forces in the members of the truss by method of joints.

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### UNIT — II

V (a) Define the following terms :

(i) angle of repose (ii) active earth pressure (iii) passive earth pressure 7

(b) A solid rectangular column 200mm wide and 150mm thick carrying a vertical load of 10KN at an eccentricity of 50mm in a plane bisecting the thickness. Determine the maximum and minimum intensities of stress in the section. 8

OR

Marks

VI (a) Determine the fixing moments and draw the BM and SF diagram of a fixed beam AB of Span 4m carrying a point load of 20KN at its centre. 7

(b) A concrete dam of rectangular section 15m height and 6m wide contains water up to a height of 13m.

Find : (a) Total pressure per meter length of dam

(b) The point where the resultant pressure cuts the base

(c) Maximum and minimum intensities of pressure at the base.

Assume unit weight of concrete as 25.30KN/m$^3$ and unit weight of water w = 9.81KN/m$^3$. 8

UNIT — III

VII (a) A rectangular simply supported beam of length 2m and cross section 100mm × 200mm is carrying a uniformly distributed load of 10KN/m throughout its span. Find the maximum slope and deflection of beam. Take E = $2 \times 10^4$N/mm$^2$. 7

(b) Using moment area method, determine the maximum slope and deflection for a simply supported beam carrying a point load W at the centre. 8

OR

VIII (a) Using Mohr's theorem determine the slope and deflection of a cantilever beam AB of length 3m carries a point load 5KN at its free end.

Take I = $15 \times 10^7$mm$^4$. E = $2 \times 10^5$N/mm$^2$. 7

(b) A simply supported rectangular RC beam of length 3m and cross section 100mm × 250mm is subjected to a central point load of 15KN. Find the maximum slope and deflection of the beam. Also find the point load that can be placed centrally on the beam to cause a central deflection of 20mm. Take E = $2 \times 10^4$N/mm$^2$. 8

UNIT — IV

IX Draw the SF and BM diagram of a continuous beam ABC having span length AB = 4m and BC = 4m. The span AB is carrying a point load of 20KN at a distance of 1 m from support A. The span BC carries a uniformly distributed load of intensity 8KN/m throughout the length. 15

OR

X A beam ABC is fixed at A and C and simply supported at B.The span AB carries a point load of 10KN at its center, the span BC carries a uniformly distributed load of 10KN/m throughout the length. If AB = 4m and BC = 3m, draw the SF and BM diagram by moment distribution method. 15