TED (15) – 4014

(REVISION — 2015)

Reg. No. .....

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DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/ MANAGEMENT/COMMERCIAL PRACTICE — OCTOBER, 2017

THEORY OF STRUCTURES - II

[*Time* : 3 hours

(Maximum marks : 100)

PART — A

(Maximum marks : 10)

Marks

I Answer *all* questions in one or two sentences. Each question carries 2 marks.

1. Define effective length of column.
2. Define slenderness ratio.
3. Define core of section.
4. List the factors affecting deflection of beam.
5. Define stiffness of a structural member. $(5 \times 2 = 10)$

PART — B

(Maximum marks : 30)

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

1. Illustrate the effective lengths of columns based on end conditions.
2. Explain the reason for considering minimum moment of inertia in Euler's Equation.
3. List the assumptions made in the analysis of perfect frames.
4. Explain the method of finding active earth pressure on retaining wall by Rankine's method.
5. Compare determinate and indeterminate structures.
6. Derive equations for maximum slope and deflection of Cantilever beam with UDL over the entire length.
7. Explain the procedure for moment distribution method of analysis. $(5 \times 6 = 30)$

Marks

PART — C

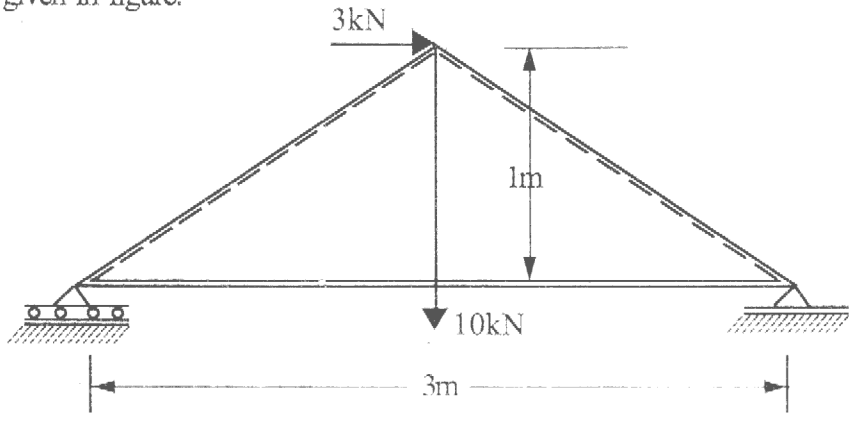
(Maximum marks : 60)

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

UNIT — I

III (a) A steel column of length 6m and diameter 100mm with one end fixed and the other free. Find the buckling load capacity of column. Given $E = 2 \times 10^5 N/mm^2$. 6

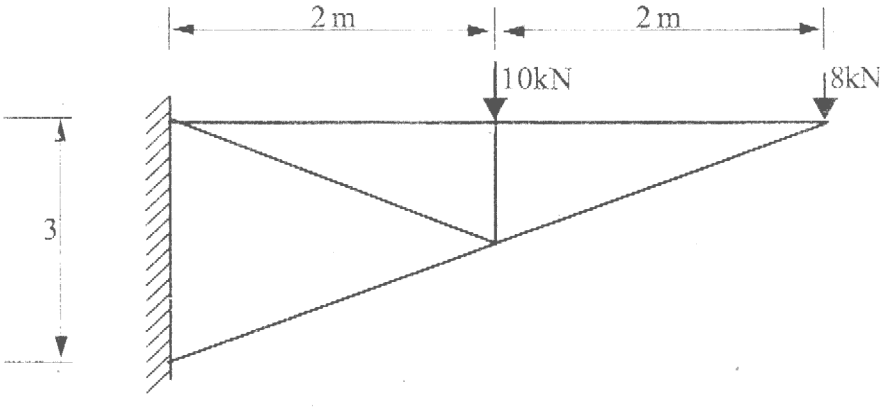
(b) Calculate the magnitude and identify the nature of member forces of truss given in figure.



9

OR

IV Analyse the truss shown in figure and also find the cross sectional area required for each member, if the safe tensile strength is 50 N/mm^2 and compressive strength $30N/mm^2$ for truss material.



15

UNIT — II

V (a) Draw SFD and BMD of a fixed beam of span 4 m subjected to a central point load 10 kN 6

(b) A retaining wall of rectangular section has 5m height and 2m width. The wall retains soil for full height. Find and plot the distribution of stresses at the base of masonry. The unit weight of soil is 17 kN/m^3 and that of masonry is $22kN/m^3$. Angle of repose ϕ of soil retained is 30°. 9

OR

Marks

VI (a) Explain the stability conditions of gravity dam. 6

(b) A column of hollow rectangular section with overall cross section 400mm × 200mm and thickness 50mm subjected to an eccentric load of 120 kN at an eccentricity 50mm along the line bisecting 200mm sides of column c/s. Find the maximum and minimum stresses at the base of column. 9

UNIT — III

VII (a) Derive the differential equation for slope and deflection of elastic curves of beams. 6

(b) A beam of span 8m with rectangular cross section 200mm × 300mm is used to carry uniform load over it. Find the maximum load that can be placed over it, if the permissible deflection is limited to 3mm. Take $E = 8 \times 10^4 N/mm^4$. 9

OR

VIII (a) Calculate the maximum deflection of a cantilever of length 5m carrying a point load 8kN at 4m from the support. The beam is of circular cross section with diameter 300mm and $E = 8 \times 10^4 N/mm^2$. 6

(b) A cantilever beam 3m length is carrying two point loads 5kN each, at 2m and 3m. Find the maximum slope and deflection of the beam in terms of EI using moment area method. 9

UNIT — IV

IX (a) Derive equation for distribution factor for various members meeting at a rigid joint. 6

(b) Analyse continuous beam ABC has span lengths AB = 7m, BC = 5m with support A fixed. The span AB carries a UDL 4 Kn/m and span BC carries a point load 20 kN. The beam cross sections are uniform for both spans. 9

OR

X Analyse continuous beam ABCD with fixed supports at extreme ends A and D. span AB = 4m carries central point load 10 kN, BC=5m carries UDL 3kN/m, Span CD = 3m carries point load 8 kN at center. Cross section for all the spans is same. 15