TED (10) -4017
(Revision -2010)

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DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/MANAGEMENT/
COMMERCIAL PRACTICE – APRIL -2021.

APPLIED MECHANICS AND STRENGTH OF MATERIALS

(Maximum Marks : 100) [Time : 3 hours]

PART–A

(Maximum marks: 10) Marks

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

1. Define Poisson's Ratio.
2. State Hook's law.
3. Define centre of gravity.
4. List the different types of riveted joints.
5. Write Slenderness ratio. (5x2=10)

PART - B

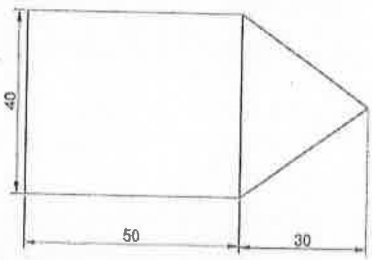
(Maximum Marks : 30)

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

1. Define Young's Modulus, Modulus of Rigidity and Bulk Modulus.
2. A steel wire is used to lift a load of 2kN. Ultimate stress for the steel is found to be 360N/mm^2. Find the minimum diameter required for the wire using a factor of safety of 5.
3. A body weighing 500N is pushed by a force of 120N on a rough horizontal plane. If the line of action of push is 20^0 with horizontal, find the coefficient of friction.
4. Illustrate four different types of welded joints with the help of neat sketches.
5. Define the term shear force and bending moment diagrams.

Marks

6. Find the centroid of the composite figure shown below.



7. Explain effective length of a column (5x6=30)

PART-C

(Maximum marks: 60)

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

UNIT-I

III. (a) Draw and explain the stress-strain diagram for a mild steel under tension and identify significant points. 7

(b) A bar of varying section is loaded as shown. Determine stress in each section

8

OR

IV. (a) Explain with necessary sketch the effect of change in temperature stress on composite bars. 7

(b) The following data refers to a tension test on a mild steel bar

i) Diameter =30mm ii) Gauge length=200mm iii) Load at elastic limit=230kN

iv) Extension at a load of 100kN=0.139mm v) Maximum load=360kN

vi) Total extension=56mm. Find a) Strain at 100kN load b) Ultimate stress

c) Young's modulus d) Elastic limit stress 8

Marks

UNIT-II

V. (a) Derive moment of inertia of a rectangular section. 7

(b) An I-section has the following dimensions in mm. Bottom flange 80x20. Top flange 40x10. Web 60x15. Determine the position of centre of gravity of the section. 8

OR

VI. (a) Explain the laws of dry friction. 7

(b) A T-section has the following dimension in mm. Flange: 150x50, Web: 50x150. Find the moment of inertia of the section about x-x axis is passing through the centroidal axis. 8

UNIT-III

VII. (a) Derive Torsion equation and state the assumption. 7

(b) Two plates of 10mm thick are joined by a double riveted lap joint. The diameter of the rivets is 15mm and pitch is 75mm. σ_t=110N/mm^2, τ=85N/mm^2, σ_b=140N/mm^2 .Determine the efficiency of the riveted joints. 8

OR

VIII. (a) A water main 500 mm diameter is containing water at a pressure head of 75m. If the weight of the water is 9810N/m^3, find the thickness of the metal required for the water main. Given the permissible stress is 20N/mm^2. 7

(b) A closely coiled helical spring is made of 6mm wire. The maximum shear stress and deflection under a 200N load is not to exceed 80MPa and 11mm respectively. Determine the number of coils and their mean diameter. Take modulus of rigidity for the spring material as 84MPa. 8

UNIT-IV

IX. (a) Explain the different types of beams with the help of necessary sketches 7

(b) A steel column is of length 8m and diameter 500mm with both ends hinged. Determine crippling load by Euler's formula. Take E= 2x10^{5}N/mm^2. 8

Marks

OR

X. (a) A cantilever of length 6m is carrying a uniformly distributed load of 16kN/m. Calculate the deflection at free end, if $I=95 \times 10^7 mm^4$ and $E=2.1 \times 10^5 N/mm^2$. 7

(b) A beam of length 1.2m is simply supported at its ends and carries two point loads of 3.5kN and 4Kn at a distance of 0.4m and 0.8m from the left end support. Draw the SF and BM diagrams for the beam. 8

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