TED (15/19) – 4021
(Revision – 2015/19)

N22 - 03494

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DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/MANAGEMENT/ COMMERCIAL PRACTICE – NOVEMBER – 2022

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 bulk modulus.
2. Explain the term composite bar.
3. Explain dynamic friction.
4. Define the strength of a riveted joint.
5. Define point of contra flexture relative to an overhanging beam. (5x2=10)

PART –B
(Maximum Marks : 30)

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

1. A steel bar 2m long and 150 mm^2 in section is subjected to an axial pull of 15 kN. Find the elongation of the bar. Take E=200 GPa.
2. Explain limiting friction and coefficient of friction.
3. State and prove perpendicular axis theorem.
4. Explain caulking and fullering of riveted joints.
5. Distinguish between circumferential and longitudinal stress in a cylindrical shell subjected to internal pressure.
6. Write the different types of springs? Explain.
7. State the difference between column and strut? (5x6=30)

PART – C
(Maximum Marks : 60)
(Answer **one full** question from each unit. Each full question carries 15 marks)

UNIT – I

III. (a) Explain lateral strain and linear strain. (6)

(b) A steel bar is placed between two copper bars each having the same area and length as the steel bar at 15°C. At this stage they are rigidly connected together at both ends when the temperature is raised to 315°C. Find the stresses in the bar. Take Es = 2.1×10^5 N/mm^2 and Ec = 1×10^5 MPa, $\alpha s = 1.2 \times 10^{-5}$ /°C, $\alpha c = 1.7 \times 10^{-5}$/°C. (9)

OR

IV. (a) Define: i) Young's modulus ii) Modulus of rigidity iii) Volumetric strain. (6)

(b) A steel rod 1.5 m long and 20 mm diameter is subjected to an axial pull of 100kN. Find the change in length and diameter of the rod, if E = 200GPa and Poisson's ratio, 1/m = 0.32. (9)

UNIT – II

V. (a) State the laws of static friction. (6)

(b) A force of 40 N pulls a weight of 60 N up an inclined plane. The force is being applied parallel to the plane if the inclination of the plane is 30°. Find the coefficient of friction. (9)

OR

VI. (a) Find the centroid of the composite section shown in figure I. (7)

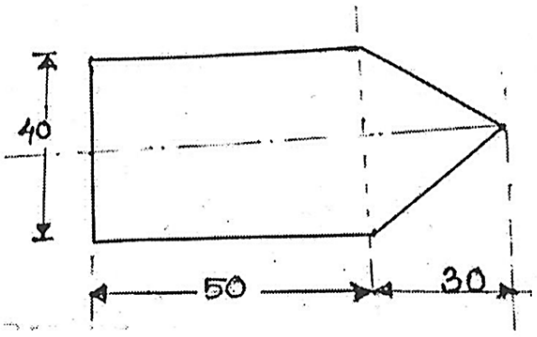

figure I

(b) Find the moment of inertia of a circular section of diameter 'd' by integration method. (8)

UNIT –III

VII. (a) State the assumptions while deriving the torsion equation. (6)

(b) A double riveted lap joint is provided in 12 mm thick plate with 22 mm diameter rivets with a pitch of 70 mm. Find the strength and efficiency of the joint. Take the permissible stresses for shearing of rivet, crushing of rivet and tearing of plate as 60MPa, 160 MPa and 90MPa respectively. (9)

OR

VIII. (a) Define the following related to fillet weld

i) Throat of weld ii) Size of weld. iii) Toe of weld. (6)

(b) A water main 800 mm diameter contains water at a pressure head of 100 m. If the weight of water is 9810 N/m^3. Find the thickness of the material required for the water main. Given the permissible stress as 20 N/mm^2. (9)

UNIT – IV

IX. (a) Write the bending equation and explain each term. (5)

(b) Draw the SF and BM diagram of a simply supported beam of length 6 m carries a UD load of 2 kN/m over the entire length. Also find the maximum bending moment. (10)

OR

X. (a) In a closed coil helical spring is made by 10 mm diameter steel rod, the coil consists of 8 turns with a mean diameter of 100 mm. The spring carries a load of 200N. Find the maximum shear stress induced and the deflection of the spring. Take modulus of rigidity as 8.4×10^4 MPa. (8)

(b) A hollow cylindrical column of 2.3 m long has an external diameter of 40 mm and internal diameter of 35 mm. Young's modulus of material is 205 kN/mm^2 . Calculate Euler's crippling load of the column. Both ends of the column are hinged. (7)

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