

**DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/MANAGEMENT/
COMMERCIAL PRACTICE, APRIL - 2026**

APPLIED MECHANICS AND STRENGTH OF MATERIALS

[Maximum marks: 100]

[Time: 3 Hours]

PART – A

Maximum marks: 10

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

1. Define young's modulus of elasticity.
2. What is poissons ratio?
3. Define size of the fillet weld.
4. Define efficiency of a rivet joint.
5. Define stiffness.

(5 x 2 = 10)

PART – B

Maximum marks: 30

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

1. Explain any six mechanical properties.
2. Draw the stress - strain diagram for mild steel and mark the significant points.
3. Explain the laws of static friction.
4. Define hoop stress and longitudinal stress acting upon a thin shell. Write the relations to determine each of them.
5. Define thin cylinder shell. What types of stresses are developed in it.
6. List different types of end conditions of columns.
7. What is the assumption made in the Euler's theory of long column?

(5 x 6 = 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. (7)

- (b) Find the Youngs modulus of a steel specimen of 14mm diameter and length 200mm was found to elongate 0.2mm when it is subjected to a tensile load of 40kN. (8)

OR

IV. (a) Define:

i) Young's modulus ii) Modulus of rigidity iii) Volumetric strain (7)

(b) In an experiment, a bar of 30mm diameter is subjected to a pull of 60kN. The measured extension on gauge length of 200mm is 0.09mm and the change in diameter is 0.0039mm. Calculate the Poisson's ratio and the values of three modules. (8)

UNIT - II

V. (a) State:

i) Parallel axis theorem ii) Perpendicular axis theorem (7)

(b) A body of weight 200N is lying on a rough horizontal plane having a coefficient of friction as 0.3. Find the magnitude of the force, which can move the body, while acting at an angle of 30° with the horizontal. (8)

OR

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

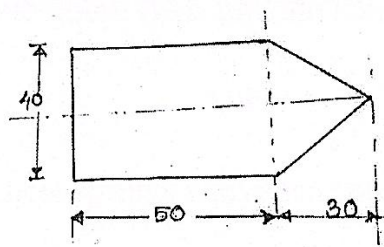


figure I

(b) The force required to pull a body of weight 50N on a rough horizontal plane is 15N. Determine the coefficient of friction if the force is applied at an angle of 15° with the horizontal. (8)

UNIT - III

VII. (a) What are the merits and limitations of welded joints? (7)

(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. (8)

OR

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

i) Throat of weld ii) Size of weld iii) Toe of weld (7)

(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 . (8)

UNIT – IV

- IX.** (a) Write the bending equation and explain each term. (7)
- (b) Draw the SF and BM diagram of a simply supported beam of length 6 m carries a point load of 2 KN at the mid point. Also find the maximum bending moment. (8)

OR

- X.** (a) Compare close coiled helical springs with open coiled helical spring. (7)
- (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/mm². Calculate Euler's crippling load of the column. Both ends of the column are hinged. (8)
