

DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/
MANAGEMENT/COMMERCIAL PRACTICE — OCTOBER, 2018
APPLIED MECHANICS AND STRENGTH OF MATERIALS

[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. State Hook's law.
2. Define volumetric strain.
3. Define angle of friction.
4. List any 4 types of riveted joints.
5. Differentiate long column and short column.

(5 × 2 = 10)

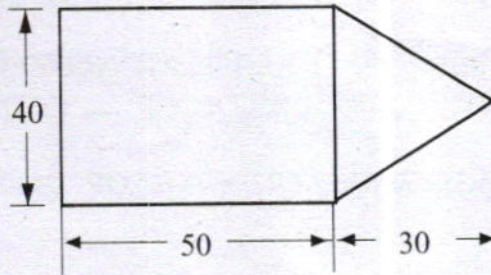
PART — B

(Maximum marks : 30)

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

1. A specimen of square section 50×50 mm is 200 mm long. It is shortened by 0.3 mm under an axial compressive load of 40 kN.
Determine : (a) Strain (b) Modulus of elasticity
2. Define the following :
(a) Modulus of rigidity (b) Bulk modulus
(c) Poison's ratio (d) Coefficient of linear thermal expansion
3. State the laws of solid friction.

4. Determine the position of centroid of the section shown in figure.



(All dimensions are in mm)

5. State the formula for finding the torque transmitted by
 (a) Solid shaft (b) Hollow shaft
6. A closely coiled helical spring is to carry a load of 500N. Its mean diameter is to be 10 times that of the wire diameter. If the maximum shear stress in the material of spring is to be 80 N/mm^2 , find
 (a) Diameter of spring coil (b) Diameter of spring wire
7. List the assumptions of Euler's equation for finding Crippling load. (5 × 6 = 30)

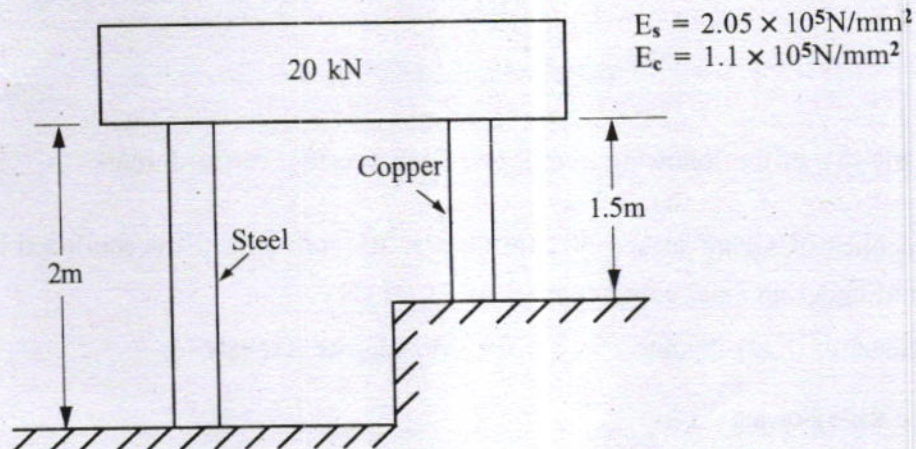
PART — C

(Maximum marks : 60)

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

UNIT — I

- III (a) A steel rod together with a copper rod support a load of 20 kN as shown in figure. The diameter of each rod is 20 mm. Find the stresses in each rod.



- (b) Define the following :
 (i) Ultimate stress (ii) Working stress (iii) Factor of safety

OR

10

5

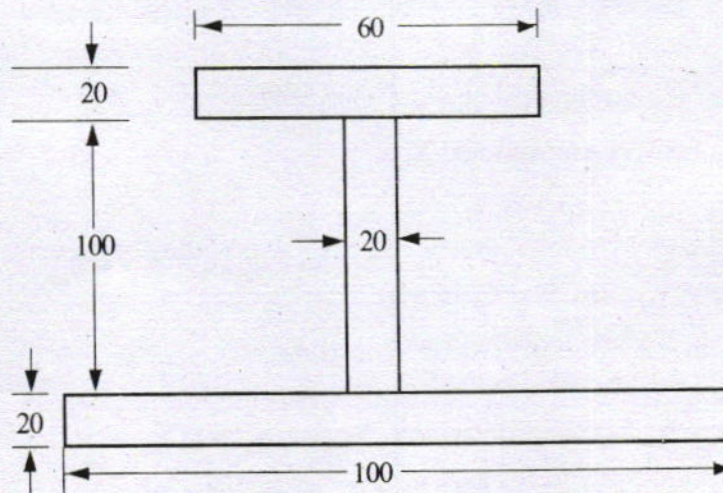
- IV (a) In a railway track, new rails are laid at a temperature of 12°C with 3 mm gap at each end. The rails were 10 m long. During the summer, the temperature rose to 45°C . Determine the intensity and kind of stress developed. Take Coefficient of thermal expansion as $12 \times 10^{-6} /^{\circ}\text{C}$ and Modulus of elasticity as $2 \times 10^5 \text{ N/mm}^2$. 10
- (b) Draw the stress - strain diagram for mild steel under tension and identify the significant points. 5

UNIT — II

- V (a) A body weighs 500 N is dragged up on a plane inclined at an angle 30° to the horizontal. A force of 400 N inclined at 20° with the plane can just move the body up the plane. 10
- (i) Draw the diagram indicating all the forces.
- (ii) Find the Normal reaction.
- (iii) Find the coefficient of friction.
- (b) State : (i) Parallel axis theorem (ii) Perpendicular axis theorem 5

OR

- VI (a) Determine (i) Centroid and (ii) Moment of inertia about centroidal axis of the lamina shown in figure



(All dimensions are in mm)

- (b) Define : (i) Sliding friction (ii) Rolling friction (iii) Pivot friction 5

UNIT — III

- VII (a) The diameter of a thin cylinder is 1 meter. It is subjected to an internal pressure of 2 N/mm^2 . Calculate the minimum thickness of cylinder, if 10
- (i) Hoop stress should not exceed 40 N/mm^2 .
- (ii) Longitudinal stress should not exceed 30 N/mm^2 .
- (b) Illustrate any 5 types of welded joints. 5

OR