



TED (15) – 4021

Reg. No.

(REVISION — 2015)

Signature

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

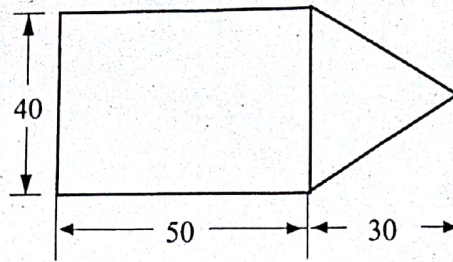
2. Define the following :

- (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. It's 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/mm², 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)

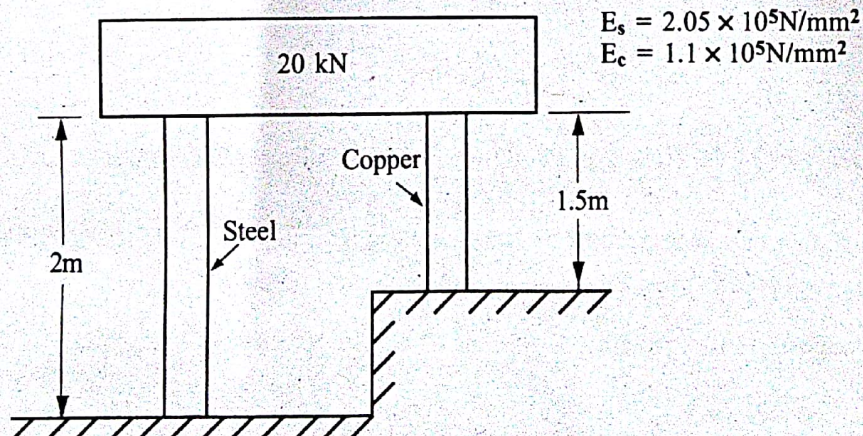
PART — C

(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.



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- (b) Define the following :

- (i) Ultimate stress (ii) Working stress (iii) Factor of safety 5

OR



Marks

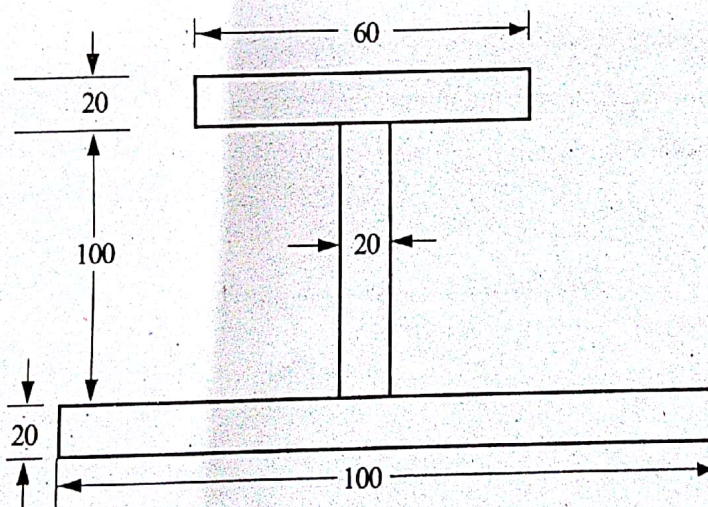
- IV (a) In a railway track, new rails are laid at a temperature of 12°C with 3 mm gap at each end. The rails were 10 m long. During the summer, the temperature rose to 45°C . Determine the intensity and kind of stress developed. Take Coefficient of thermal expansion as $12 \times 10^{-6} /^{\circ}\text{C}$ 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.
- (i) Draw the diagram indicating all the forces.
- (ii) Find the Normal reaction.
- (iii) Find the coefficient of friction. 10
- (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
- (i) Hoop stress should not exceed 40 N/mm^2 .
- (ii) Longitudinal stress should not exceed 30 N/mm^2 . 10
- (b) Illustrate any 5 types of welded joints. 5

OR



Marks

- VIII (a) (i) A solid shaft is to transmit 350 kW at 100 rpm. If the shear stress of shaft material is not to exceed 90 N/mm^2 , find the diameter of the solid shaft.
- (ii) The above solid shaft is replaced by a hollow shaft of same material and length. It's internal diameter is $\frac{2}{3}$ of external diameter. Calculate the percentage of material saved.
- (b) List the advantages and disadvantages of welded joint over the riveted joint.

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UNIT — IV

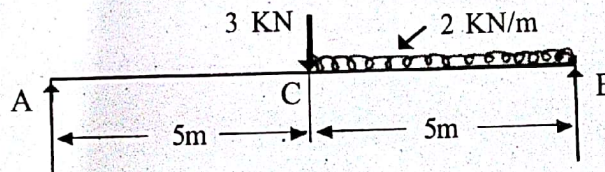
- IX (a) A beam of uniform rectangular section 175 mm wide and 250 mm deep is simply supported at its ends. It carries a uniformly distributed load of 7.5 kN/m over the total length of 4 meter. Modulus of elasticity of beam is $1.2 \times 10^4 \text{ N/mm}^2$.
- Find : (i) Slope at the supports (ii) Maximum deflection
- (b) Define : (i) Shear force (ii) Bending moment

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OR

- X (a) Draw the shear force and bending moment diagrams for the system of forces shown in the figure.



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- (b) (i) Distinguish between long column and short column.
- (ii) Distinguish between Column and strut.

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