

DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/MANAGEMENT/
COMMERCIAL PRACTICE – APRIL -2020.

MATERIAL SCIENCE AND STRENGTH OF MATERIALS

(Maximum Marks : 75)

[Time : 2.15 hours]

PART-A

Marks

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

1. Define strength.
2. Name the allotropic forms of iron.
3. Define modulus of elasticity.
4. What is radius of gyration?
5. Write down the torsion equation.

(3x2=6)

PART - B

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

1. Describe the need for heat treatment.
2. What are the salient points of a stress-strain curve?
3. List advantages of welded joints.
4. Explain the laws of solid friction.
5. State and explain parallel axis theorem.
6. Explain the different types of loads.
7. Write down the bending equation and describe the notations used.

[4x6 =24]

PART - C

(Answer **any of the three units** from the following. Each full question carries 15 marks)

UNIT I

- III** (a) Explain any four mechanical properties of materials. (6)
(b) Differentiate between annealing and normalizing. (9)

OR

- IV** (a) Write any four heat treatment process and explain any one of them. (6)
(b) Compare thermoplastics and thermosetting plastics. (9)

UNIT- II

- V (a) Describe different types of riveted joints. (6)
- (b) A steel rod 20 mm in diameter and 600mm long is subjected to an axial pull of 40kN. Determine the elongation of the rod if, modulus of elasticity $E=2.0 \times 10^5 \text{N/mm}^2$. (9)

OR

- VI (a) Compare riveted and welded joints. (6)
- (b) A single riveted lap joint is used to connect two plates of 12mm thickness using 20mm rivets at a pitch length of 50mm. Determine the efficiency of the joint if the permissible shear stress and bearing stress of the rivet as 80N/mm^2 and 250N/mm^2 respectively and tearing stress of the plates as 156N/mm^2 . (9)

UNIT- III

- VII (a) Explain with sketch the coefficient of friction, angle of friction and cone of friction. (6)
- (b) Find the centroid of the T section having the following dimensions. Web 50mm x 150mm and flange 150mm x 50mm. (9)

OR

- VIII (a) State and explain perpendicular axis theorem. (6)
- (b) A body weighing 540N is pulled along a rough horizontal plane by a force of 180N acting at an angle of 30° with the horizontal. Find the coefficient of friction. (9)

UNIT – IV

- IX (a) Explain the different types of supports with simple diagram. (6)
- (b) Draw the SF and BM diagrams of a cantilever beam carrying point loads of 60N and 80N at 1m and 2m respectively from the free end. (9)

OR

- X (a) Explain the theory of simple bending. (6)
- (b) A simply supported beam of 1.2m length is carrying point loads of 3.5kN and 4kN at distances of 0.4m and 0.8m from the left support. Draw the SF and BM diagram of the beam. (9)
