TED (15) – 4053

(REVISION — 2015)

Reg. No. .....

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DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/ MANAGEMENT/COMMERCIAL PRACTICE — APRIL, 2018

MATERIAL SCIENCE 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. List the factors promoting fine grain formation.
2. State the relation between working stress and ultimate stress.
3. Write down the equation for moment of inertia of rectangle.
4. Name the beam which is fixed at one end and free at the other end.
5. Define cone of friction.

(5×2 = 10)

PART — B

(Maximum marks : 30)

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

1. List and explain the different types of composite materials.
2. Differentiate carburising and nitriding.
3. Explain limit of proportionality and elastic limit.
4. Describe about the strength of fillet weld.
5. Find the moment of inertia of a rectangle 25mm wide and 30 mm deep about a given axis PQ which is at a distance of 50mm from its centroidal axis XX.
6. Outline the theory of simple bending.
7. State torsion equation and explain the terms.

(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) Describe the normalizing process and its purposes. 8

(b) List and explain any four mechanical properties. 7

OR

Marks

IV (a) List the applications of plastics in automobile industry. 8

(b) State the properties and uses of fiber reinforced plastics. 7

UNIT — II

V (a) Describe stress strain curve for mild steel. 8

(b) List and describe different types of welded joints. 7

OR

VI (a) Describe percentage elongation and Young's modulus. 8

(b) Point out and explain strength of riveted joints. 7

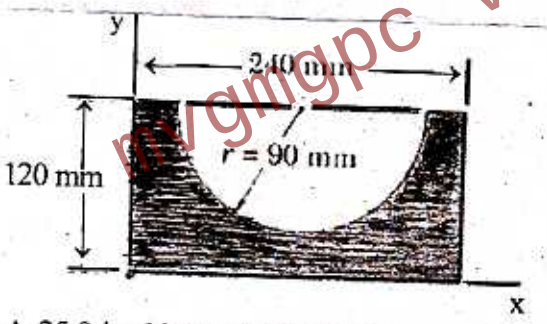
UNIT — III

VII (a) A pull P is applied on a 67.0 kg crate of mass across the floor at an angle of 33.0°. The coefficient of friction between the surfaces is 0.234. If the crate moves at a constant speed, what is the applied force ? 8

(b) Find the centroid of a symmetrical I section with the following dimensions. Top and bottom flanges = 160mm × 12mm. Web 175mm × 12mm. 7

OR

VIII (a) Determine the moment of inertia of the shaded area with respect to the x axis.



8

(b) A 25.0 kg block slides down a ramp at constant speed. The elevation angle is 42.5°. What is the coefficient of friction ? 7

UNIT — IV

IX (a) Draw shear force and bending moment diagrams for a simply supported beam of length L mm and carries a uniformly distributed load of WN/m. 8

(b) Find the maximum bending stress in a beam of rectangular section of 125mm wide and 225mm deep, when the maximum bending moment is 80kNm. 7

OR

X (a) A cantilever of 2m long carries a uniformly distributed load of 15kN/m over 0.75m of its length beyond 0.5m from fixed end. Draw shear force and bending moment diagrams. 8

(b) A propeller shaft on a car is to transmit 30kW at 40rad/s. Compute the torsional shear stress in the hollow shaft of 35mm outside diameter and 20mm internal diameter. 7