TED (15) – 3013

(REVISION — 2015)

Reg. No.....

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DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/ MANAGEMENT/COMMERCIAL PRACTICE — APRIL, 2019

THEORY OF STRUCTURES - I

[*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 the principle of moments.
2. Define centre of gravity.
3. State Hook's law.
4. Define circumferential and longitudinal stress.
5. What do you mean by section modulus ? (5×2 = 10)

PART — B

(Maximum marks : 30)

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

1. A simply supported beam of span 6m carries a uniformly distributed load of 1.5 KN/M over a length of 3.5m from the right support. In addition to a point load of 2KN at a distance of 1m from the right support. Find the support reactions.
2. Define the (a) Moment of Inertia, (b) Polar moment of inertia, and (c) Radius of gyration.
3. List any six mechanical properties of materials.
4. Define the (a) Poisson's ratio, (b) Bulk modulus, and (c) Modulus of rigidity.
5. Draw SFD and BMD for a cantilever beam of length '1' and carrying a point load of 'W' at the free end.
6. State the assumptions in pure torsion.
7. List the assumptions in the theory of simple bending. (5×6 = 30)

Marks

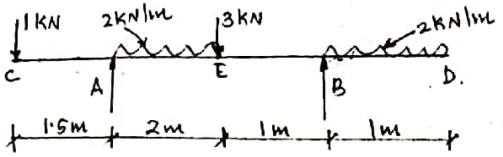
PART — C

(Maximum marks : 60)

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

UNIT — I

III (a) Calculate the support reactions of the overhanging beam as shown in figure. 8



(b) Find the Centre of gravity of a channel section 100mm × 50mm × 20mm. 7

OR

IV (a) Find the moment of inertia of a 'T' section with flange as 100mm × 50mm and web as 100mm × 50mm about X-X axis and Y-Y axis through the centre of gravity of the section. 8

(b) A simply supported beam ABCD is of 5m span. Such that AB =2m, BC = 1m and CD =2m. It is loaded with 5KN/m over AB and 2KN/m over CD. Calculate the support reactions. 7

UNIT — II

V (a) Draw and explain the stress strain curve for Mild steel. 8

(b) A steel rod 20mm diameter is 2m long. Find the maximum instantaneous stress and work done at maximum elongation, when an axial load of 50KN is suddenly applied to it. Also calculate the maximum dynamic force in the rod. Take E = 2×10^5N/mm². 7

OR

VI (a) In an experiment, a bar of 20mm diameter is subjected to a pull of 40KN. The measured extension on gauge length of 150mm is 0.08mm and change in diameter is 0.0029mm. Calculate the Poisson's ratio, Young's modulus, Modulus of rigidity and Bulk modulus. 9

(b) Define resilience, proof resilience and modulus of resilience. 6

UNIT — III

VII (a) A simply supported beam AB of length 6m, it carries a uniformly distributed load of 4KN/m over a length of 1.5m from left end and 2KN/m over a length of 3m from right end, also it carries a point load of 5KN at a distance of 1.5m from the right end. Draw Shear force and Bending moment diagrams. 9

(b) A cylindrical shell 2m long and lm internal diameter is made up of 20mm thick plates. Find the circumferential and longitudinal stresses in the shell material, if it is subjected to an internal pressure of 5N/mm². 6

OR

Marks

VIII (a) A cylindrical vessel 1m long and 250mm in diameter with 8mm thick plates is subjected to an internal pressure of 2 MPa. Calculate the change in volume in the vessel. Take E = 200GPa and Poisson's ratio l/m = 0.3. 9

(b) A circular shaft of 80mm diameter is required to transmit power at 120 r.p.m. If the shear stress is not to exceed 40N/mm², find the power transmitted by the shaft. 6

UNIT — IV

IX (a) An I section beam 400mm × 200mm has a web thickness of 12.5mm and a flange thickness of 25mm. It carries a shear force of 250KN at a section. Sketch the shear stress distribution across the section. 9

(b) A steel wire of 3mm diameter is to be wound around a circular component. If the bending stress in the wire is limited to 80MPa, find the radius of the component. Take E = 200GPa. 6

OR

X (a) A rectangular beam 80mm wide and 120mm deep is simply supported over a span of 3m. If the beam is subjected to a uniformly distributed load of 10KN/m, find the maximum bending stress induced in the beam section and sketch the stress distribution. 8

(b) A wooden beam 80mm wide, 200mm deep and 3m long is carrying a uniformly distributed load of 30KN/m. Determine the maximum shear stress and sketch the variation of shear stress along the depth of the beam. 7

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