TED (10) – 4017 Reg. No. .....

(REVISION — 2010) Signature .....

FOURTH SEMESTER DIPLOMA EXAMINATION IN ENGINEERING/ TECHNOLOGY — MARCH, 2015

APPLIED MECHANICS AND STRENGTH OF MATERIALS

(Common for ME, TD and WP)

[*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. Define lateral strain and find the equation to find the poisson's ratio.
2. Define static, limiting and kinetic friction.
3. Define moment of intertia and radius of gyration.
4. State the applications of riveted joints.
5. List the different types of springs. (5×2=10)

PART—B

(Maximum marks : 30)

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

1. List and describe the elastic constants.
2. A metal bar 200mm long and cross-sectional area 25mm^2 carries an axial load of 5KN which produce an extension of 0.2mm. Find the stress in the bar and modulus of elasticity of the material.
3. A body weighing 540N is hauled a long a rough horizontal plane by a pull of 180N acting at an angle of 30° with the horizontal. Find the co-efficient of friction.
4. Find the moment of intertia of a rectangle 20mm wide and 30mm deep about a given axis, A B which is at a distance of 45mm from its centroid.
5. Explain the following terms with neat sketches :
   (i) Caulking (ii) Fullering.
6. Derive the expression for hoop stress in a thin cylindrical subjected to internal pressure.
7. State the assumptions are made 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) List and explain four different types of strains. 7

(b) A bar of 30mm × 30mm × 250mm long is subjected to a pull of 90KN in the direction of its length. The extension of the bar found to be 0.125mm, while the decrease in each lateral dimension found to be 0.00376mm. The value of modulus of rigidity for the material of the bar is $0.8 \times 10^5 N/mm^2$. Find the Young's modulus, Poisson's ratio and bulk modulus. 8

OR

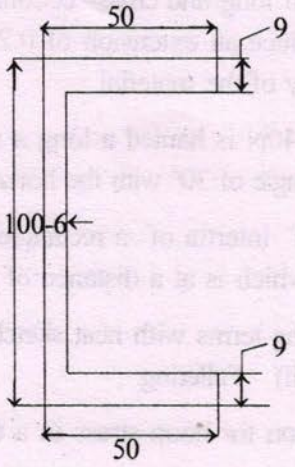
IV (a) Derive an expression for temperature stresses in the following cases :
(i) No yield is permitted (ii) Yield is permitted. 7

(b) A compound rod of 1m long is made up of copper rod 400mm long and steel rod 600mm long connected end to end. The cross-sectional area of the copper rod is $1000mm^2$ and that of the steel rod is $1500mm^2$. The compound rod is then held firmly between two rigid supports and heated through 100°C. Calculate the stress developed in copper and steel rods.
Take $Ec = 1 \times 10^5 N/mm^2$, $Es = 2 \times 10^5 N/mm^2$, $\alpha' c = 18 \times 10^{-6}/°C$ and $\alpha' s = 12 \times 10^{-6}/°C$. 8

UNIT—II

V (a) Explain the angle of friction and cone of friction. 7

(b) Determine the moment of intertia of a channel section about its centroidal axes. The dimensions are indicated in millimeters.



8

OR

Marks

VI (a) State and prove the perpendicular axis theorem. 7

(b) A weight of 250N resting on a rough horizontal surface. If the coefficient of friction between the surface is 0.3. Determine the least value of the effort, acting at an angle θ with the horizontal. 8

UNIT—III

VII (a) State and explain the ways of failure of riveted joints. 7

(b) A solid shaft is to transmit 75KW at 200 RPM. Taking the allowable shear stress of 70N/mm^2, find the suitable diameter of the shaft, if the maximum torque is 35% greater than the mean. 8

OR

VIII (a) List and explain the welding terms. 7

(b) A close coiled helical spring is made of 6mm wire. The maximum shear stress and deflection under a 200N load is not exceed 80N/mm^2 and 11mm respectively. Determine the number of coils and their mean diameter. Take modulus of rigidity for the spring material as 84MPa. 8

UNIT—IV

IX (a) Classify and explain with the aid of sketches the different types of loads applied on the beam. 7

(b) A steel column is of length 10mm and diameter 600mm with both ends hinged. Determine the crippling load by Euler's formula. Take E $=2 \times 10^5$N/mm^2. 8

OR

X (a) A simply supported beam of 1.5m is subjected to a central load 10KN. Find the deflection of the beam. If E = 200GN/mm^2, take I for the beam as 12.1×10^6mm^4 . 7

(b) A cantilever of 3m long carries two point loads each 4KN, one placed at free end and other at 2m from fixed end. Draw shear force and bending moment diagram. 8

———————