

7

TED (10)–4017

Reg. No.

(REVISION—2010)

Signature

FOURTH SEMESTER DIPLOMA EXAMINATION IN ENGINEERING/
TECHNOLOGY—OCTOBER, 2013

APPLIED MECHANICS AND STRENGTH OF MATERIALS

[Common for ME, TD, WP]

[Time : 3 hours

(Maximum marks : 100)

Marks

PART—A

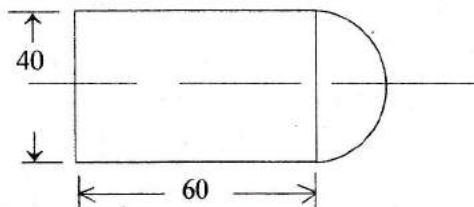
I Answer *all* questions in one or two sentences. Each question carries 2 marks.

1. Define lateral strain and write the equation to find the Poisson's ratio.
2. Define limiting friction.
3. List the different types of welded joints.
4. Distinguish between long column and short column.
5. Write the Euler's formula and Rankine's formula for axial loads. (5×2=10)

PART—B

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

1. List and describe the elastic constants.
2. A steel wire is used to lift a load of 5 KW. Ultimate stress for the steel is found to be 360 N/mm². Find the minimum diameter required for the wire using a factor of safety of 5.
3. Derive the expression for the moment of inertia of a circular section.
4. Find the centroid of the composite figure shown below :



5. List and describe any four types of failures in a riveted joint.
6. A closely coiled helical spring of 100 mm mean diameter is made up of 10 mm wire. The spring carries an axial load of 200 W. Determine the shear stress induced in the wire.
7. Explain slope and deflection of a beam. (5×6=30)

PART—C

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

UNIT - I

- III (a) Explain with necessary sketch the effect of change in temperature on composite bars. 7
- (b) A compound bar ABC 1.5 m long is made up of two parts of aluminium and steel and the cross sectional area of aluminium is twice that of the steel bar. The rod is subjected to an axial tensile load of 200 Kw. If the elongation of aluminium and steel parts are equal, find the length of the compound bar. Take E for steel as 200 GPa and for aluminium as one third of E for steel. 8

OR

- IV (a) Explain the principle of super position. Give any two uses. 7
- (b) The following data refers to a tension test on MS bar :
1. Diameter : 30 mm
 2. Gauge length : 200 mm
 3. Load at elastic limit : 230 Kw
 4. Maximum load : 360 Kw
 5. Total extension : 56 mm
 6. Extension at a load 100 Kw : 0.139 mm

Find : (i) Strain at 100 KN

(ii) Ultimate stress

(iii) Young's modulus

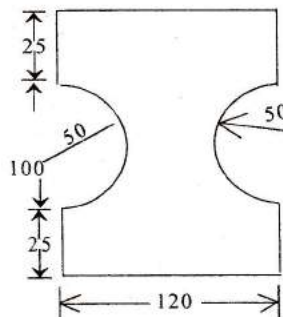
(iv) Elastic limit stress. 8

UNIT - II

- V (a) State and prove perpendicular axis theorem. 7
- (b) A man is walking over a dome of 20 m radius. How far he can descend from the crown of the dome without slipping ? Take coefficient of friction between the surface of the dome and the shoe of the man as 0.75. 8

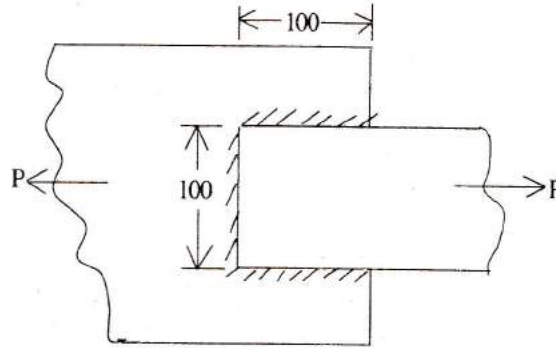
OR

- VI (a) Predict and prove that angle of friction and coefficient of friction are equal at limiting condition. 7
- (b) Determine the moment of inertia of the section about horizontal and vertical axes passing through the centroid of the section. The figure is given below : 8



UNIT - III

- VII (a) Derive the torsion equation and state the assumptions. 7
- (b) A tie bar is welded to a plate as shown in figure. Find the strength of the weld. Take size of the fillet as 6 mm and working stress of the fillet weld as 100 MPa.



OR

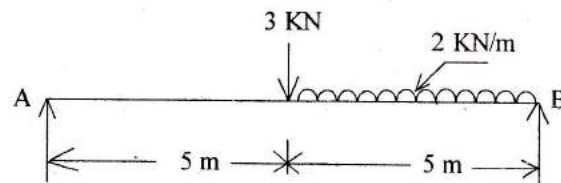
- VIII (a) Explain the different methods used to prevent leakage through a riveted joint. 7
- (b) A cylindrical shell of 1.3 m diameter is made up of 18 mm thick plates. Find the circumferential and longitudinal stress in the plates, if the boiler is subjected to an internal pressure of 2.4 MPa. Take efficiency of the joint as 70%. 8

UNIT - IV

- IX (a) Explain the different types of beams with the help of necessary sketches. 7
- (b) A steel column is of length 8 m and diameter 500 mm with both ends hinged. Determine the crippling load by Eulers formula. Take $E = 2 \times 10^5 \text{ N/mm}^2$. 8

OR

- X (a) Enumerate the assumptions made to formulate Eulers column theory. 7
- (b) Draw SF and BM diagram for the following beam :



8