TED (10)–4017 Reg. No. .....

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FOURTH SEMESTER DIPLOMA EXAMINATION IN ENGINEERING/ TECHNOLOGY—MARCH, 2012

APPLIED MECHANICS AND STRENGTH OF MATERIALS

(Common for ME, WP and TD)

[*Time :* 3 hours

(Maximum marks : 100)

PART—A

Marks

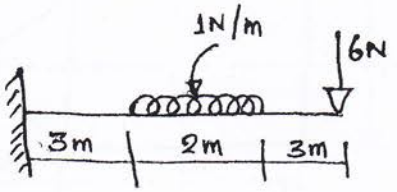
I Answer the following questions in one or two sentences. Each question carries 2 marks.

1. Define volumetric strain.
2. Compare centroid and centre of gravity.
3. Describe limiting friction.
4. State efficiency of riveted joint.
5. Define fixed beam. (5×2=10)

PART—B

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

1. A steel rod 30 mm diameter 500 m long is subjected to an axial pull of 50 KN. Determine the elongation of the rod, if $E = 2 \times 10^5$ N/mm^2.
2. Prove that angle of friction and angle of repose are same at limiting condition.
3. A body weighing 300 N is pushed by a force 120 N on a rough horizontal plane. If the line of action of push is 20° with the horizontal, find the coefficient of friction.
4. List any six common types of welded joints with symbols.
5. Define thin cylinder shell. What types of stresses are developed in it ?
6. Find the power transmitted by the circular shaft of 30 mm diameter at 120 rpm. The maximum shear stress in the shaft is not exceed 40 N/mm^2.
7. Draw the shear force diagram of the cantilever beam shown in figure.



(5×6=30)

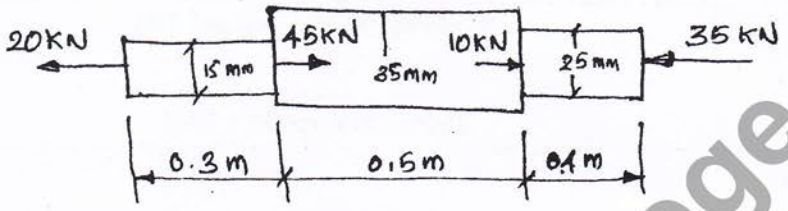
Marks

PART—C

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

UNIT—I

III (a) A bar of varying section is loaded as shown in figure.
Determine : Stress in each section. Take E= 2×10^5 N/mm^2.

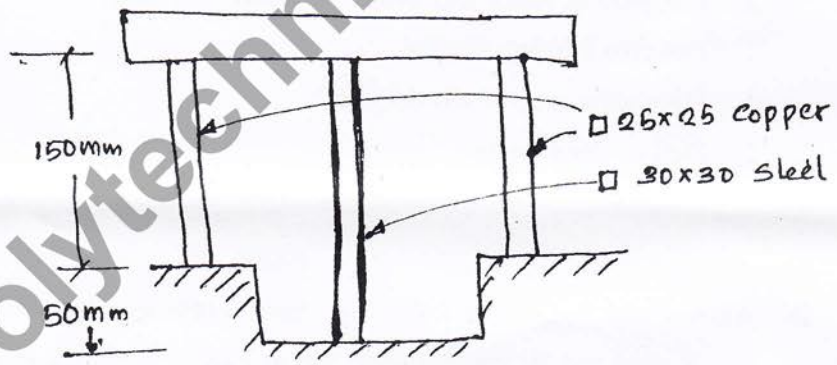


8

(b) Draw and explain stress strain diagram for a mild steel under tension and identify the significant points. 7

OR

IV (a) Two copper rods and one steel rod together support a load as shown in figure. If the stress in copper and steel are not to exceed 60×10^6 N/m^2 and 120×10^6 N/m^2 respectively, find the safe load that can be supported. Young's modulus of steel is twice that of copper.



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(b) Illustrate the expression for volumetric strain of a circular bar with diameter d, length l, subjected to an axial load. 7

UNIT—II

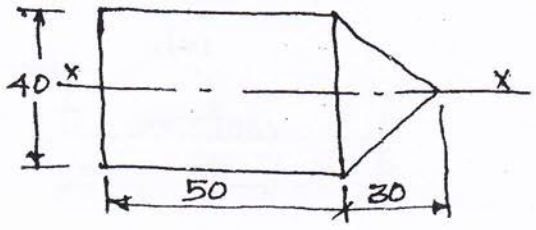
V (a) A body weighs 500 N is dragged upon a plane inclined at an angle 30° to the horizontal. A force of 400 N inclined at 20° with the plain can just move the body up the plane. Find the coefficient of friction. 8

(b) Derive moment of inertia of rectangular section. 7

OR

VI (a) Find the moment of inertia of a T-section about XX axis passing through the centre of gravity of the section. Size of flange is 50 × 150 mm. 8

(b) Find the centroid of the composite section as shown in figure.



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Marks

UNIT—III

VII (a) A circular plate of diameter 150 mm is welded on to another plate by means of 10 mm fillet. Determine the maximum twisting moment which can be applied to the circular plate if the permissible shear stress is 100 MN/m^2. 8

(b) Calculate the bursting pressure for a cold drawn seamless steel tubings of 60 mm inside diameter with 2 mm wall thickness. The ultimate strength of steel is 380 MN/m^2. 7

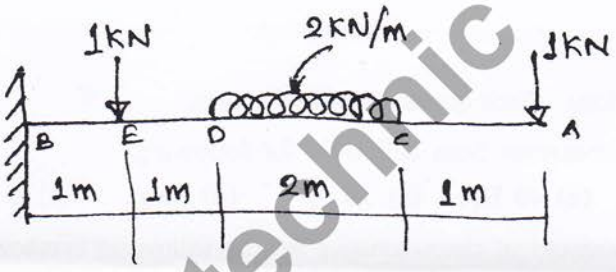
OR

VIII (a) List the different stresses occurring in a shaft with short notes. 8

(b) State the function of a spring. Distinguish between close coiled and open coiled spring. 7

UNIT—IV

IX Draw the shear force and the bending moment diagram for cantilever loaded as in figure.



15

OR

X (a) Define the terms buckling load, safe load, slenderness ratio and strut. 8

(b) A strut 2 m long is 50 mm in diameter. One end of the strut is fixed while the other end is hinged. Find safe compression load for member using Euler's formulae, allowing a factor of safety of 3.5. Take E = 2.1 × 10^5 N/mm^2. 7