TED (10)–4017

(REVISION—2010)

Reg. No. 11020654

Signature

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

APPLIED MECHANICS AND STRENGTH OF MATERIALS

(Common for ME, WP and TD)

[*Time* : 3 hours

(Maximum marks : 100)

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PART—A

Marks

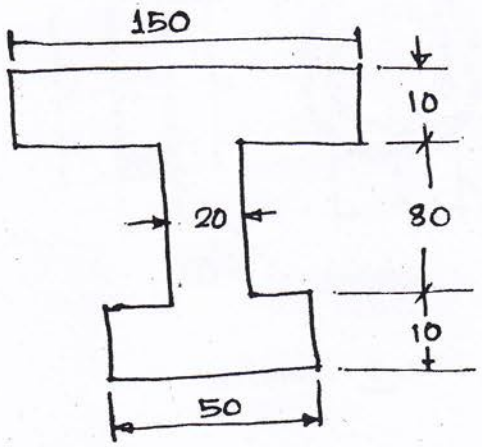
I Answer the following questions in one or two sentences. Each question carries 2 marks.

1. State Hooke's law.
2. Define factor of safety.
3. Define coefficient of friction.
4. State long column and short column.
5. Define continuous beam. (5×2=10)

PART—B

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

1. Define Youngs modulus, modulus of rigidity and bulk modulus.
2. Determine the position of centroid of the I-section shown in figure.



3. Explain about tearing strength, shearing strength and a bearing strength of a riveted joint.
4. List any six common types of welded joints with symbols.
5. Draw the shear force diagram and the bending moment diagram of a cantilever beam with uniformly distributed load and a concentrated load at the free end.

Marks

6. What you mean by a beam ? Describe about cantilever beam and simply supported beam.

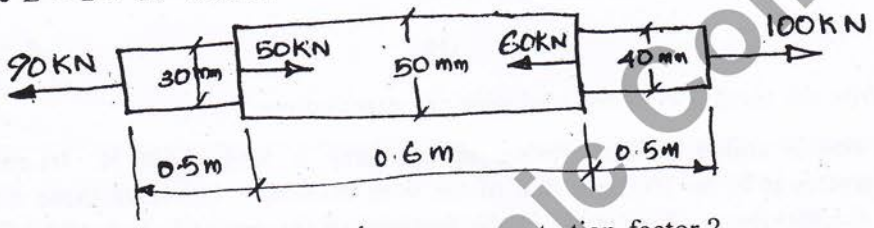
7. What are the assumption made in the Euler's theory of long column ? (5×6=30)

PART—C

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

UNIT—I

III (a) A bar of varying section is subjected to axial load as shown in figure. Determine stress in each section and also find total elongation of the bar. Take E = 2 × 10 ^{5}N/mm^{2}. 8



(b) What is stress concentration and stress concentration factor ? 7

OR

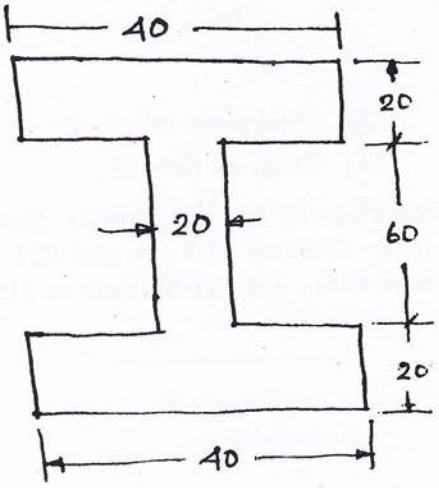
IV (a) A steel rod of 30 mm diameter passes centrally through a light filling copper tube of external diameter 50 mm. The tube is closed with the help of rigid washers of negligible thickness and nut threaded on the rod. The nuts are tightened till the compressive load of the tube is 50 kN. Determine the stress in the rod and the tube when the temperature of the assembly falls by 50° C. Take Es= 200 GN/m^{2} $\alpha s = 12 \times 10^{-6}$ per° c.
Ec= 100 GN/m^{2} $\alpha c = 18 \times 10^{-6}$ per° c. 8

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

UNIT—II

V (a) Derive the equation for moment of inertia of circular section. 7

(b) Calculate the moment of inertia about the centroid axis of the following figure. 8



OR

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Marks

VI (a) A body of weight 2000 N is to be pulled up an inclined plane of angle 20°. Coefficient of friction between body and plane is 0.3. Find the effort required when it is parallel to the base. 8

(b) Explain angle of repose and cone of friction. 7

UNIT—III

VII (a) Advantages and disadvantages of welded joints over riveted joints. 7

(b) Two plates each 20 mm thick are to be joined by a double riveted double strap butt joint. The pitch of the rivets in the outer row is to be twice that of inner row. Zig zag riveting is to be done. Assuming $Z = 80$ MN/m^2 and $\tau = 100$ MN/m^2, Calculate the following :

(i) rivet diameter

(ii) rivet pitch in outer and inner rows

(iii) thickness of the butt strap. 8

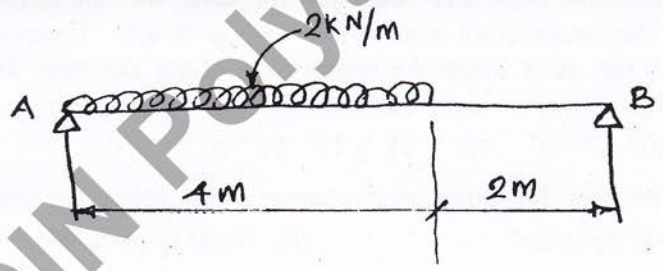
OR

VIII (a) Write the torsion equation and state the assumptions. 8

(b) A closely coiled helical spring is to carry a load of 500 N. Its mean coil diameter is to be 10 times that of the wire diameter. Calculate these diameters if the maximum shear stress in the material of the spring is to be 80 MN/m^2. 7

UNIT—IV

IX (a) Draw the shear force and the bending moment diagram of simply supported beam as shown in figure.



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(b) A timber beam of rectangular section 100 mm wide and 250 mm deep, supports over a span of 5 m. Find the magnitude of central point load it can carry if the maximum permissible deflection is 5 mm, Take $E = 1 \times 10^4$ N/mm^2. 7

OR

X (a) Define :

(i) column

(ii) strut

(iii) slenderness ratio and

(iv) Rankines formula 8

(b) Find the crippling load given by rankines formula for tubular strut 2.25 m long having outer and inner diameter 37.5 mm and 32.5 mm respectively loaded through pin joint at both ends. Take yield stress as 315 N/mm^2, a = 1/7500. 7

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