



KC-6127

B. E. - II (Sem. III) (Mechanical) Examination
November / December – 2012
Strength of Materials - I

Time : Hours]

[Total Marks : 100

Instructions :

(1)

नीचे दृष्टविले निशानीवाणी विगतो उत्तरवही पर अवश्य लभवी. Fillup strictly the details of signs on your answer book.	Seat No. :
Name of the Examination :	<input type="text"/>
<input type="text" value="B. E. - 2 (SEM. 3) (MECHANICAL)"/>	<input type="text"/>
Name of the Subject :	<input type="text"/>
<input type="text" value="STRENGTH OF MATERIALS - 1"/>	<input type="text"/>
Subject Code No. : <input type="text" value="6"/> <input type="text" value="1"/> <input type="text" value="2"/> <input type="text" value="7"/>	<input type="text"/>
Section No. (1, 2,.....) : <input type="text" value="NIL"/>	<input type="text"/>
	Student's Signature

- (2) Make suitable assumptions wherever necessary.
(3) Figures to the right indicate full marks.
(4) All dimensions are in mm wherever required.

1 (a) Fill in the blanks :

5

- (i) The ratio of shear stress to shear strain is known as _____.
(Modulus of elasticity, modulus of rigidity, poisson's ratio).
- (ii) The nature of shear stress distribution in a rectangular beam is _____.
(uniform, linear, parabolic).
- (iii) The ratio of direct stress to volumetric strain is known as _____.
(Bulk Modulus, Modulus of elasticity).
- (iv) _____ beams have one end fixed and the other free.
(cantilever, fixed, simply supported).
- (v) Lateral strains are _____ longitudinal strains.
(equal, always less than, always greater than).

(b) Define following : (any two) 6

- (i) Toughness
- (ii) Brittleness
- (iii) Creep
- (iv) Fatigue

(c) States whether the statement is True or False: 5

- (i) Non dimensional expression of deformation is called stress.
- (ii) Mild steel is more ductile than cast iron.
- (iii) The ratio of longitudinal strain to lateral strain is called as Poisson's ratio.
- (iv) The bulk modulus is expressed in mm^2 .
- (v) Torsion induced bending stress in shaft.

2 Draw Shear Force and Bending Moment Diagram for a beam shown in figure. 14

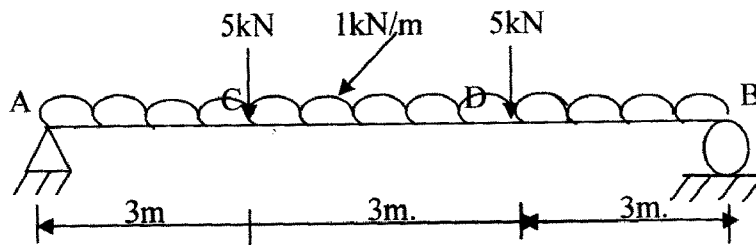


Fig.

3 Attempt any two : 20

- (i) Derive the equation for volumetric strain of a rectangular bar, subjected to three mutually perpendicular forces.
- (ii) Derive the relationship between the modulus of elasticity, shear modulus and Poisson's ratio.
- (iii) A circular beam of 100 mm diameter is subjected to a shear force of 12 kN. Calculate the value of maximum shear stress and draw the variation of shear stress along the depth of the beam.

- (iv) Find stress and deformation in each part of rod ABCD as shown in figure below.

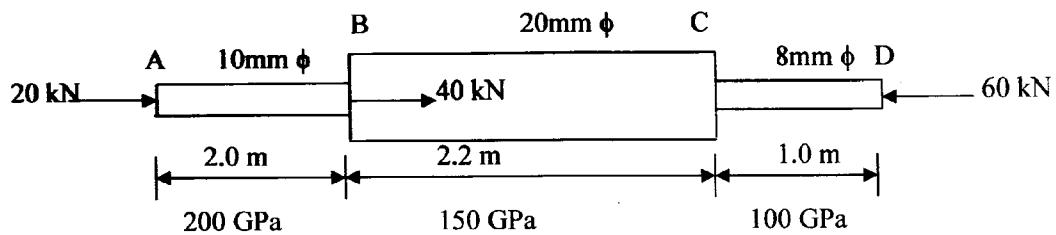


Fig.

- 4 Define any **five** : 10
- (1) Slenderness ratio
 - (2) Modulus of rupture
 - (3) Modulus of section
 - (4) Toughness
 - (5) Shear force in a beam
 - (6) Bending moment.
- 5 (a) A cantilever beam of span 3m is loaded by a point load of 2 kN at its free end. The beam has a circular cross-section of diameter 100 mm. Determine maximum bending stresses in the cantilever beam. 10
- (b) (i) Draw shear stress distribution across 'I' and T-section. 2
- (ii) A point load of 100 kN applied at mid-span on a simply supported beam 5.5 m long. Size of beam is 230 mm × 460 mm. (Rectangular cross-section). Find the maximum shear stress and the ratio of maximum and average shear stress. Also plot shear stress distribution diagram. 10
- 6 Attempt any **two** of the following : 18
- (1) Explain with neat sketches : failure patterns, End conditions and effective length observed in column under compression test.
 - (2) Derive Euler's expression for buckling load of a column with one end fixed and one end free.

- (3) A material carries stresses in N/mm^2 as shown in fig. 1. Calculate principal stresses and their location. Also calculate maximum shear stress and location of plane on which it exists.

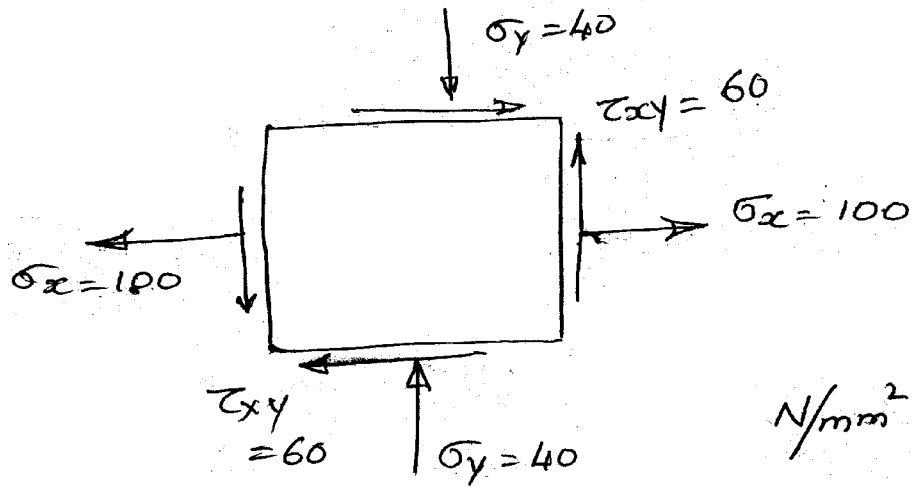


Fig. 1