

Roll No.

Total No. of Questions : 09]

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Paper ID [CE207]

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B.Tech. (Sem. - 3rd)

SOLID MECHANICS (CE - 207)

MAY 2008

Time : 03 Hours

Maximum Marks : 60

Instruction to Candidates:

- 1) Section - A is **Compulsory**.
- 2) Attempt any **Four** questions from Section - B.
- 3) Attempt any **Two** questions from Section - C.

Section - A

(10 × 2 = 20)

Q1)

- a) Distinguish between stress and force.
- b) Define a composite bar.
- c) What is the angle between two principle stresses?
- d) What do you understand by point of inflexion?
- e) What do you understand by flitched beams?
- f) Where do we use closed coiled helical springs?
- g) List out the instances where moment area method is particularly convenient to use.
- h) Define resilience and proof resilience.
- i) Differentiate between column and strut.
- j) State limitations of Euler's theory.

Section - B

(4 × 5 = 20)

- Q2) How will you find the stresses and load carried by each member of composite bar?
- Q3) A rectangular bar of cross-sectional area 12000 mm^2 is subjected to an axial load of 360 N/mm^2 . Determine the normal and shear stresses on a section which is inclined at an angle of 30° with the normal cross-section of the bar.
- Q4) A cast iron pipe of external diameter 60 mm, internal diameter of 40 mm and of length 5 m is supported at its ends. Calculate the maximum bending stress induced in the pipe if it carries a point load of 100 N at its centre.
- Q5) Derive torsion equation and state the assumptions made.
- Q6) A steel bar of 500 mm length, 30 mm width and 20 mm thickness is subjected to a direct tensile load of 60 kN. If Young's modulus of the bar material is 200 GN/m^2 , find the strain energy and resilience of the bar. Find also the modulus of resilience if the elastic limit for the material in tension is 220 N/m^2 .

Section - C

(2 × 10 = 20)

- Q7) Derive an expression for crippling load when both the ends of the column are hinged.
- Q8) Draw the S.F. and B.M. diagram for a cantilever of length L carrying a point load W at the free end.
- Q9) Determine the mean coil radius, wire diameter and number of turns of a closed coiled spring of 1 kN/m stiffness and solid length 45 mm. The shear stress in the spring under the axial load of 75 N should not exceed 180 MPa modulus of rigidity for the spring material = 82 GPa.

