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Total No. of Pages : 02

Total No. of Questions : 09

B.Tech.(Marine Engg.) (2013 Onwards) (Sem.-4)

STRENGTH OF MATERIALS-II

Subject Code : BTME-401

Paper ID : [72434]

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTION TO CANDIDATES :

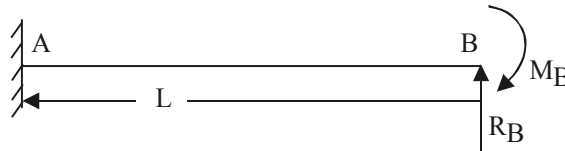
1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students has to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students has to attempt any TWO questions.

SECTION-A**1. Answer briefly :**

- a) What is energy of distortion?
- b) How is the work done during non elastic strain is utilized?
- c) What is the generally accepted criterion of failure?
- d) Define overlap in case of a leaf spring.
- e) Define stiffness with reference to springs.
- f) State the types of stresses in thick cylinder subject to internal pressure.
- g) What is hoop stress?
- h) What is shear centre?
- i) At which point on a ring subject to a diametral pull does the maximum stress occur?
- j) What is shrinkage stress?

SECTION-B

2. Using Castigliano's theorem, determine the reaction at the support for the beam and loading as shown in figure below :



3. A shaft of uniform circular section is subjected to torsion. Determine the ratio of requisite diameters according to maximum shear stress theory and maximum normal stress theory.
4. A closed coiled helical spring made of round steel wire 6 mm diameter having 10 complete turns is subjected to an axial couple M . The mean coil radius is 42 mm. If the maximum bending stress in spring wire is not to exceed 240 MN/m^2 , determine:
- The magnitude of axial couple M .
 - The angle through which one end of spring is turned relative to the other end. Take $E_{\text{steel}} = 200 \text{ GN/m}^2$
5. Derive an expression for the change in internal volume of a thin spherical shell subjected to internal fluid pressure.
6. Explain the importance of shear centre and derive expression for locating the same in a channel section.

SECTION-C

7. In a thick cylinder subjected to internal pressure, the maximum circumferential stress produced is 1.6 times the internal pressure. Determine the cylinder thickness in terms of its internal diameter.
8. An I-section with rectangular ends has the following dimensions :
- Flanges : $10 \text{ cm} \times 1 \text{ cm}$ Web : $12 \text{ cm} \times 1 \text{ cm}$
- If this section is subjected to a bending moment of 5 kNm and a shearing force of 5 kN, find the maximum tensile and shear stresses induced in it.
9. Write a note on maximum shear stress theory.