Registration No. : | | | | | | | | | | |

Total number of printed pages – 2

B. Tech

CPME 6305 (Old)

Sixth Semester (Back) Examination – 2013

MECHANICS OF MATERIAL – II

BRANCH : MECH

QUESTION CODE : B 363

Full Marks – 70

Time : 3 Hours

*Answer Question No. **1** which is compulsory and any **five** from the rest.*
The figures in the right-hand margin indicate marks.

1. Answer the following questions : 2×10

   (a) What do you mean by statically indeterminate beams ?

   (b) Define notch sensitivity.

   (c) Distinguish thick cylinder and thin cylinder.

   (d) What is the relation between the circumferential strain and radial displacement of a thick walled cylinder ?

   (e) State the stress optical law.

   (f) Write the function of polariscope and role of dark field in it.

   (g) What is the sign convention of bending moment in case of curved beams ?

   (h) Define shear centre and neutral axis in case of unsymmetrical bending.

   (i) Show the stress distribution on the cross-section of a beam subjected to bending.

   (j) What do you mean by stress concentration ?

2. (a) State and prove Maxwell's reciprocal theorem. 5

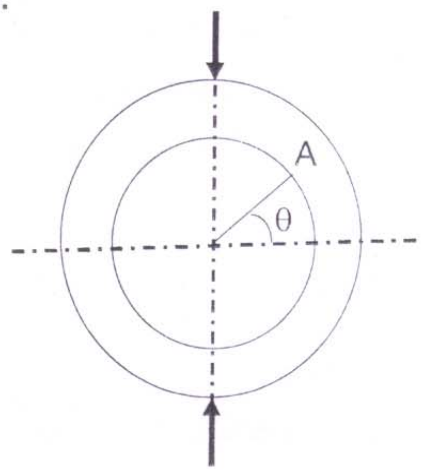
   (b) A cantilever beam of length 'L' is simple supported at the free end. The beam is subjected to uniformly distributed load of w per unit length. Determine the reaction at the free end using castigliano's theorem. 5

P.T.O.

3. A thick steel cylinder with internal diameter of 100mm and external diameter 200 mm is fixed on the outer circumference. Determine the stresses at inside and outside surface if it is subjected to an internal fluid pressure of 100kg/cm^2. Assume $\mu = 0.3$. 10

4. Derive the expression for stress in beams with unsymmetrical cross-section due to application of bending moment and the position of neutral axis. 10

5. A ring with rectangular cross-section is subjected to a diametrical compression as shown in Fig. determine the bending moment and stress at point A of the inner radius across a section 'θ'. R_1 and R_2 are inner and outer radii respectively. Assume all related data. 10



6. Derive the two sets of compatibility equations which relate the six components of the strain of a continuous material. Also derive the required strain equations used for deriving the compatibility equations. 10

7. Two carbon steel balls, each 25mm in diameter are pressed together by a force F=18N. At the centre of the area of contact, determine the values of the principal stresses, the maximum shear stress, and the octahedral shear stress. For carbon steel, E= 207GPa and poisson's ratio = 0.292. 10

8. Write short notes on any **two :** 5×2

   (a) Strain Rosettes

   (b) Isochromatic fringe patterns

   (c) Stress in crane hook