Roll No. .....

22231

M. E./M. Tech. 2nd Semester (ME-DE) Examination – June, 2013

THEORY OF ELASTICITY

Paper : M-802A

Time : Three hours] *[Maximum Marks : 100*

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt any *five* questions.

1. (a) Write short note on body force, shear force and stress vector. 10

   (b) What do you understand by principle stresses ? Explain it with graphical representation. 10

2. Derive the expressions for thick cylinder subjected to internal and external pressures. 20

3. State second theorem of Castigliano and explain with appropriate mathematical expressions. 20

4. (a) What is the significance of compatibility conditions ? 10

(b) Explain plain state of stress with its mathematical expressions. 10

5. (a) Explain Mohr's Circle for the three dimensional state of stress. 10

(b) Explain the stress components of an arbitrary plane. 10

6. The component of a strain tensor at a point in a body are given by $E_{xx} = 0.005$, $E_{yy} = 0.004$ and $E_{zz} = -0.002$, $\chi_{xy} = 0.001$, $\chi_{yz} = 0.0005$, $\chi_{zx} = 0.002$, if $E = 2 \times 10^5$ MPa and V = 0.25, determine the components of stress tensor. 20

7. For the structure shown in fig. (1) determine the vertical deflection at end A. 20

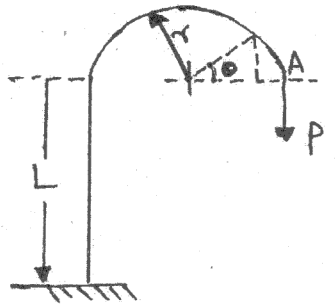

Fig. (1)

8. Define modulus of rigidity, bulk modulus, and Poisson's ratio and show that for the bulk modulus to be positive, the value of Poissons ratio can not exceed a value 0.5. Also prove that material with Poisson's ratio 0.5 are incompressible. 20
