Total No of Questions: [08] *SEAT NO. :* [ ]

[Total No. of Pages : *01*]

M.E. 2013 Civil (Structurs)

Advanced Mechanics of Solid

(Semester - I)

Time: 3 Hours *Max. Marks : 50*

Instructions to the candidates:

1) ***Answers to the questions should be written in single answer book.***
2) ***Answer any five questions.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right side indicate full marks.***
5) ***Use of Calculator is allowed.***
6) ***Assume Suitable data if necessary***

Q. 1) a) Derive compatibility conditions in-terms of strains for 3-D elasticity problem. [05]

b) Explain in brief stress tensor and strain tensor. [05]

Q. 2) Show that $\phi = \frac{q}{8c^3}\left[x^2\left(y^3 - 3c^2y + 2c^3\right) - \frac{1}{5}y^3\left(y^2 - 2c^2\right)\right]$ is a stress function, and find what problem it solves when applied to the region included is $y = \pm c$, $x = 0$, on the side x positive. [10]

Q. 3) Derive equations of equilibrium for 2-D elasticity problems in polar coordinates. [10]

Q. 4) A simply supported circular plate of radius 'a' with circular hole at the center of radius 'b' subjected to shearing forces Q_0 uniformly distributed along inner edges. Determine maximum deflection of the plate. [10]

Q. 5) Prove that for the equilateral triangular cross section of side '$2a$', the torque 'T' is given by approximately $T = G\theta a^4 \frac{\sqrt{3}}{5}$. [10]

Q. 6) Find the equation for deflection, bending moment and shear force for a semi-infinite long beam resting on elastic foundation subjected to force 'P' at left end. [10]

Q. 7) Semi-circular beam simply supported on three supports equally spaced carrying uniformly distributed load of intensity W/m over entire span. Determine maximum bending moment and twisting moment. [10]

Q. 8) Derive an expression for bending stress for curved beam in elevation. [10]