Total No. of Questions : 8] SEAT No. :

P4523 [Total No. of Pages : 2

[4760] - 1028

M.E. (Civil - structures) (Semester - I)

ADVANCED MECHANICS OF SOLID

(2013 Pattern) (Credit System)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates :

1) ***Answers any five questions from the following.***
2) ***Answers should be written in one answer book.***
3) ***Figures to the right side indicate full marks.***
4) ***Neat diagrams should be drawn wherever necessary.***
5) ***If necessary, assume suitable data.***
6) ***Use of nonprogrammable electronic pocket calculator is allowed.***
7) ***Use of Cell phone is prohibited in examinaion hall.***

Q1) a) Derive compatibility conditions in-terms of strains for 3D elasticity problem. **[5]**

b) Explain in brief stress tensor and strain tensor. **[5]**

Q2) a) Derive the stress equilibrium equation with usual notation. **[5]**

b) State and explain in brief Generalized Hook's law for Isotropic material. **[5]**

Q3) a) Derive the differential equations of equilibrium in terms of polar co-ordnates. **[5]**

b) Develop the relationship between the Cartesian and polar coordinates for two dimensional problems. **[5]**

Q4) a) Obtain stress componets when a concentrated load acting on the vertex of a wedge (Michell's problem). **[5]**

b) A thick cylinder of internal radius r_1= 150 mm and external radius r_0=260 mm is subjected to an internal pressure p_1=60MPa. Show the variation of radial and circumferential stress across the section of thick cylinder.**[5]**

P.T.O.

Q5) a) A quarter circle beam of radius 1500 mm curved in plan is fixed at A and free at end B as shown in Fig. 5 a. It carries a vertical load P = 30kN at its free end. Determine the shear force (V), bending moment (M) and twisting moment (T). Also determine deflection at point B. **[7]**

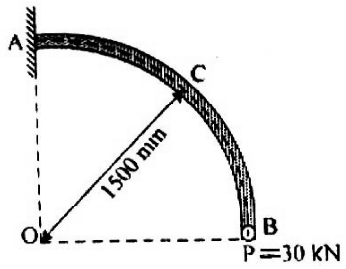

Fig. 5 a

b) Draw the shear force (V), bending moment (M) and twisting moment (T) diagram for the beam shown in Fig. 5 a. **[3]**

Q6) a) Explain in details St. Venant's theory of torsion for prismatic bars of non-circular cross-sections. **[5]**

b) Explain torsion of thin walled structures by membrane analogy. **[5]**

Q7) a) Show that the neutral axis of curve beam in elevation is below the centroidal axis towards the centre of curvature. **[5]**

b) Differentiate beams curved in plan and elevation. Plot the bending stress distribution for rectangular section of the crane hook. **[5]**

Q8) a) Explain in details, Winkler type of foundation. **[4]**

b) Explain in details of an infinite beam subjected to a single concentrated load related to beams on elastic foundation. **[6]**