Roll No: ----------

UPES

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES

End Semester Examination, December 2017

Program/course:	**M.Tech. Structural Engineering**	**Semester –**	**I**
Subject:	**Theory of Elasticity & Plasticity**	**Max. Marks**	**: 100**
Code :	**CIVL 7002**	**Duration**	**: 3 Hrs**
No. of page/s:	**2**		

(Answer all questions of Section A , B & C)
(Assume all the necessary data if required)

Section A (attempt all questions)

1. Using strain energy method analyze triangular section for torsion. **[20]**

Section B (attempt all questions)

2 The stress tensor at a point is given as **[15]**

$$\begin{matrix} 200 & 160 & -20 \\ 160 & -240 & 100 \\ -20 & 100 & 160 \end{matrix} \text{ N/m}^2$$

Determine the strain tensor at this point. Take E= 210kN/mm^2 and v=0.3

3 The following are the principal stress at a point in a stressed material. Taking E= 210kN/mm^2 and v=0.3, calculate the volumetric strain and the Lame's constant. **[15]**
σ_x= 200N/mm^2, σ_y= 50N/mm^2, σ_z= 20N/mm^2,

4 Define hardening rules with proper diagrams and explanations. **[10]**

Section C (attempt all)

5. Analyze stress concentration in circular holes using equilibrium and compatibility equations. Obtain stress concentration factors for biaxial stress field. **[40]**

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End Semester Examination, December 2017

Program/course:	**B.Tech.Civil Engineering (Spl. Infrastr)**	**Semester –**	**V**
Subject:	**Design of Concrete Structures**	**Max. Marks**	**: 100**
Code :	**CEEG 311**	**Duration**	**: 3 Hrs**
No. of page/s:	**2**		

(Answer all questions of Section A, B & C)
(Assume all the necessary data if required)

Section A (attempt all questions)

1. Define: **[20]**
   (a) Elastic perfectly plastic models
   (b) Elastic linear strain hardening
   (c) Elastic exponential hardening
   (d) Rambers-Osgood Model
   (e) Non Linear Analysis

Section B (attempt all questions)

2 Define and calculate stresses when torsion applied on an elliptical cross section **[15]**

3 A rectangular strain rosette gives the data as below. **[10]**

ε_0 = 670 micrometers/m

ε_{45} = 330 micrometers/m

ε_{90} = 50 micrometers/m

Find the principal stresses if E=2 x 10^5 Mpa and v=0.3

4 Analyze thin rectangular box girder under torsion. **[15]**

Section C (attempt all questions)

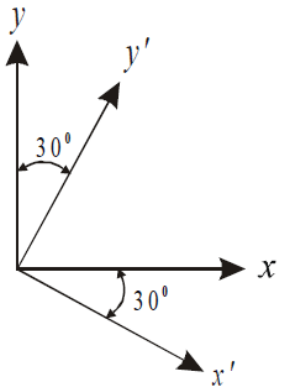
5 A sheet of metal is deformed uniformly in its own plane that the strain components related to a set of axes xy are **[40]**

ε_x = -200 x 10^{-6}

$\varepsilon_y = 1000 \times 10^{-6}$

$\gamma_{xy} = -200 \times 10^{-6}$

(a) Find the strain components associated with a set of axes x'y' inclined at an angle of 30^0clockwise to the x y set as shown in the Figure. Also find the principal strains and the direction of the axes on which they act.



(b) Calculate and Draw principal strains from Mohr's circle of strain.