JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT
TEST -2 EXAMINATION- April 2018
B.Tech VIII Semester AND M.Tech II Semester

COURSE CODE:12M1WCE211

MAX. MARKS: 25

COURSE NAME: Solid Mechanics in Structural Engineering

COURSE CREDITS: 03

MAX. TIME: 1.5 Hrs

Note: All questions are compulsory. Carrying of mobile phone during examinations will be treated as case of unfair means.

**CO1.** To Understand the analysis of stress and strain for deformed solids.

CO2. Application of plane stress and plane strain in a given situation.

CO3. Demonstrate the ability to analyze the structure using plasticity.

CO4. To impart the knowledge of stress-strain relations for linearly elastic solids, and Torsion.

1. Show that lames's ellipsoid and the stress director together completely define the state of stress at a point. (5) **(CO1)**

2. Consider the rectangular beam as shown in figure 1. According to the elementary theory of bending the fibre stress in the elastic range due to bending is given by:

$$\sigma_x = \frac{-My}{l} = \frac{-12\,My}{bh^3}$$
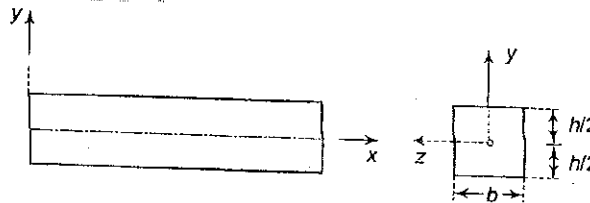
Where M is the bending moment which is a function of x. Assume that $\sigma_z = \tau_{zx} = \tau_{zy} = 0$ and also that $\tau_{xy} = 0$ at the top and bottom, and further that $\sigma_y = 0$ at the bottom. Using the differential equations of equilibrium, determine τ_{xy} and σ_y. Compare these with the values given in the elementary strength of materials. (5) **(CO1,CO2)**

3. Discuss the cubical dilation in analysis of strain. (5) **(CO1)**

4. Derive the Modulus of rigidity and bulk modulus for linearly elastic solids. (5) **(CO3)**

5. Derive the displacement equations of equilibrium. (5) **(CO3)**