

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -3 EXAMINATION- May 2018

B.Tech (VIII) AND M.Tech (II) Semester

COURSE CODE: 12M1WCE211

MAX. MARKS:35

COURSE NAME: SOLID MECHANICS IN STRUCTURAL ENGINEERING

COURSE CREDITS: 03

MAX. TIME: 2 Hrs.

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

1. Describe two theories of failure or yield criteria.
2. Determine the shear stress distribution in a channel section of a cantilever beam subjected to a load  $F$  as given in figure 1. Also, locate the shear centre of the section.

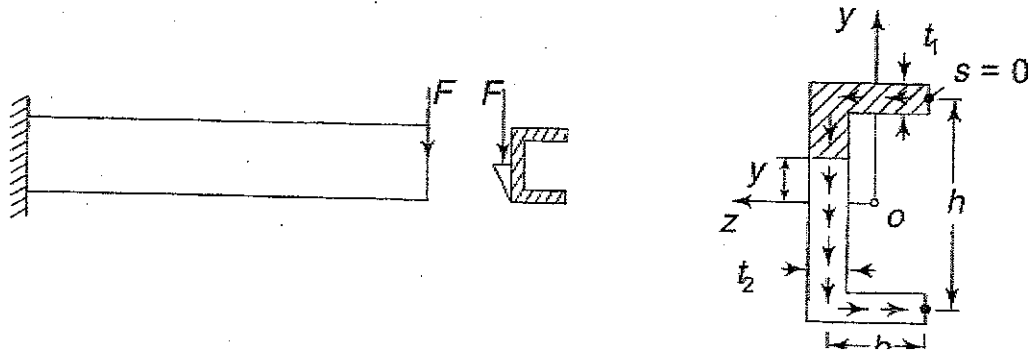


Figure 1

3. The following figure 2 shows a unsymmetrical one cell box beam with four corner flange members A, B, C, and D. Loads  $P_x$  and  $P_y$  are acting at a distance of 125 cm from the section ABCD. Determine the stresses in the flange members A and D. Assume that the sheet metal connecting the flange members does not carry any flexural loads.

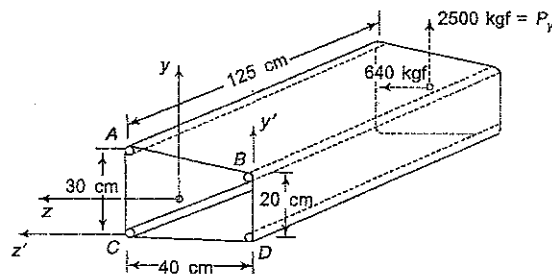


Figure 2

4. Derive the shear stresses in thin walled open sections.

5. Derive the expression for torsion of prismatic bar- solid section.
6. Derive the case of plane stress and plane strain in axisymmetric problems.
7. A cubical element is subjected to the following state of stress:

$$\sigma_x = 100 \text{ MPa}, \sigma_y = -20 \text{ MPa}, \sigma_z = -40 \text{ MPa}, \tau_{xy} = \tau_{yz} = \tau_{zx} = 0.$$

Assuming the material to be homogenous and isotropic. Determine the principal shear strains and the octahedral shear strain, if  $E = 2 \times 10^5 \text{ MPa}$  and  $\nu = 0.25$ .

UT 3 EXAMINATION A-108