Dr Abhilash

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -3 EXAMINATION- May 2019

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. Derive the expressions for strain energy when an elastic member is subjected to axial forces, shear force, bending moment and torsion.
3. Define the shear centre or centre of flexure with an example.
4. Derive the shear stresses in thin walled open sections.
5. Derive the Euler-Bernoulli hypothesis.
6. Derive the case of plane stress and plane strain in axis symmetric problems.
7. A cubical element is subjected to the following state of stress:

   $\sigma_x = 100$ MPa, $\sigma_y = -20$ MPa, $\sigma_z = -40$ 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 $E = 2 \times 10^5$ MPa and $v = 0.25$.