JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT
TEST-1 EXAMINATION- FEBRUARY -2018
B.Tech VIII Semester and M.Tech II Semester

COURSE CODE: 12M1WCE211

COURSE NAME: Solid Mechanics in structural engineering

COURSE CREDITS: 03

MAX. MARKS: 15

MAX. TIME: 1 HRS

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

1. Derive the stress components in an arbitrary plane.
2. A rectangular steel bar having a cross section 2 cm x 3 cm is subjected to a tensile force of 6000N. If the axes are chosen as per the direction cosines given. Determine the normal and shear stresses on a plane whose normal has the following direction cosines:
   a) $n_x = n_y = 1/\sqrt{2}$, $n_z = 0$
   b) $n_x = 0$, $n_y = n_z = 1/\sqrt{2}$
   c) $n_x = n_y = n_z = 1/\sqrt{3}$
3. Prove the equality of cross shears.
4. Prove that the principal planes are orthogonal.
5. Discuss the stress invariants.