JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST–2 EXAMINATIONS–2022

M.Tech.–II Semester (Structural Engineering)

COURSE CODE (CREDITS): 12M1WCE213 (3) MAX. MARKS: 25

COURSE NAME: Earthquake Resistant Design of Structures

COURSE INSTRUCTORS: Sugandha Singh MAX. TIME: 1 Hour 30 Min

Note: *All questions are compulsory. Marks are indicated against each question in square brackets.*

1. Prove that the modes of vibration of a structure are orthogonal to each other. **[5]**
2. What are faults? Describe the components of a fault. Discuss the fault movement. **[5]**
3. Explain the Elastic Rebound Theory for earthquake occurrences. What is the application of this theory in seismic hazard analysis? **[3]**
4. Draw a diagram to show the following in relation to an earthquake. **[2]**
   a. Hypocenter
   b. Focal depth
   c. Epicenter
   d. Hypocentral Distance
5. What are the differences between the following terms? **[5]**
   a. Magnitude and Intensity of an earthquake [2]
   b. Ground Motion and Floor Response Spectrum [2]
   c. Center of Mass and Center of Stiffness [1]
6. Ground motion at a site can be described as $\ddot{u}_g(t) = 4sin\ 12\pi t\ \ m/s^2$. Find the following for the ground motion response spectrum related to the ground motion. Assume damping ratio as 4%. **[5]**
   a. Peak frequency in cycles/s [1]
   b. Peak spectral acceleration in 'g' units [2]
   c. Peak spectral displacement in 'mm' [1]
   d. Zero period acceleration in 'g' units [1]