JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

MID SEMESTER EXAMINATION - 2015

M.Tech. 2nd sem (Structural Engineering)

COURSE CODE: **12M1WCE213**   MAX. MARKS: 30

COURSE NAME: Earthquake Resistant Design of Structures   MAX. TIME: 2 Hrs

COURSE CREDITS: 03

NOTE: *All questions are compulsory. Write concisely.*

Section-A (6 × 1 = 6 marks)

Q.1. (a) Justify repetitive occurrence of earthquakes with Reid's elastic rebound theory using suitable diagrams.

(b) Discuss the nature of P and S waves and show the difference in their movement with the help of diagrams.

(c) How does a seismograph work? Draw a schematic of seismograph showing all the important components.

(d) Discuss earthquake-resistant design philosophy adopted by IS 1893 - 2002.

(e) Define and differentiate soft storey, extreme soft storey and weak storey.

(f) Under what circumstances, the vertical earthquake accelerations are also important in seismic design? Give examples.

Section B (3 × 3 = 9 marks)

2. State and justify the assumptions made in earthquake-resistant design. How would you combine the two and three components of earthquake in seismic design?

3. How do foundation soil and liquefaction affect the structural behaviour during earthquake? Give your recommendations for earthquake resistant structural foundation design.

4. What do you understand by plate margins? How does their movement result into earthquake? Explain the plate behaviour at plate margins.

Section C (3 × 5 = 15 marks)

5. How do the following building characteristics affect the seismic performance of buildings:
    (i)   Mode shape and fundamental period
    (ii)   Building frequency and ground period
    (iii)   Damping

6. What is earthquake magnitude? Discuss the different types of magnitudes, give their expression and explain their respective suitability for different topographic conditions.

7. Why the following types of damages occurred during Bhuj earthquake, should be addressed by a structural engineer :
    (i)   Soft storey failure
    (ii)   Plan and mass irregularities
    (iii)   Floating columns

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