Roll No.

Total No. of Pages : 02

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M.Tech.(Civil Engg.) (Sem.–2) EARTHQUAKE ENGINEERING Subject Code : MTCE-207 M.Code : 74300 Date of Examination : 20-12-22

Time: 3 Hrs.

Max. Marks: 100

INSTRUCTIONS TO CANDIDATES :

- 1. Attempt any FIVE questions out of EIGHT questions.
- 2. Each question carries TWENTY marks.
- 3. Missing data if any can be suitably assumed, clearly stating the same.
- **1.** a) Define the terms:
 - (i) Earthquake hazard and risk
 - (ii) Intraplate and Interplate
 - (iii) Love wave and Rayleigh wave
 - (iv) Seismic gap
 - (v) Epicentre and Hypocentre.
 - b) The response of a block foundation exited by an oscillator was noted as 25 cps. The amplitude of vibration at resonance was 0.8mm. The dynamic force oscillator at 25 cps is 7.4 kN. If the total weight of the block and the oscillator is 25 kN, what is the value of damping factor?
- 2. a) For a system with damping ratio ζ , determine the number of free vibration cycles required to reduce the displacement amplitude to 10% of the initial amplitude, the initial velocity is zero.
 - b) Show that the motion of a critically damped system due to initial displacement u(0) and initial velocity $\dot{u}(0)$ is

$$u(t) = \{u(0) + [\dot{u}(0) + \omega_n u(0)]t\} e^{-\omega_n t}$$

- 3. What do you mean by power spectra and spectral parameters in strong ground motion studies? How will you obtain central period, predominant period and shape factor?
- 4. Discuss the various field tests conducted to determine the small and large strain dynamic soil properties.
- 5. a) State the conditions under which liquefaction of soil can occur? Also, discuss the various precautionary measure taken to prevent this.
 - b) Explain theory of vibration with the help of single degree of freedom system.
- 6. Discuss in detail the criteria for machine foundation.
- 7. a) Explain the code-based procedure for the seismic analysis of reinforced concrete structures.
 - b) Explain the characteristics of strong ground motion.

8. Explain the following terms :

- a) Response control
- b) Peak Acceleration
- c) Vibration isolation
- d) Elastic rebound theory.

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.