Code: 15A01709 **R15**

B.Tech IV Year I Semester (R15) Regular Examinations November/December 2018

EARTH QUAKE RESISTANT DESIGN OF STRUCTURES

(Civil Engineering)

Time: 3 hours Max. Marks: 70

PART – A

(Compulsory Question)

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1 Answer the following: (10 X 02 = 20 Marks)

(a) Define Logarithmic decrement. Sketch Logarithmic decrement variation with damping ratio.
(b) State and explain the D' Alembert's principle.
(c) Write the dynamic equations of equilibrium.
(d) How you represent Harmonic motion in complex form?
(e) How do you quantify the magnitude of earthquakes?
(f) Write a short note on 'rigid base recitation'.
(g) Illustrate seismic zone map of India-2002.
(h) How do you classify earthquakes?
(i) Write a short note on 'non parallel systems'
(j) Draw a typical line plan of a building with shear walls.

PART – B

(Answer all five units, 5 X 10 = 50 Marks)

UNIT – I

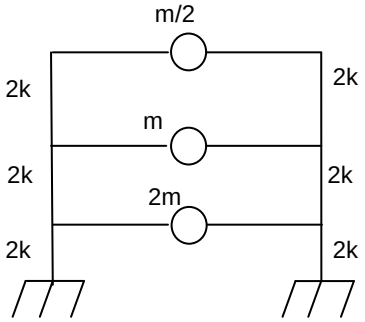
2 A vibrating system consisting of a weight of W=10 kg and a spring stiffness k=20 kg/m in a viscously damped system so that the ratio of the consequent amplitudes is 1.0 to 8.5. Determine:
(i) The natural frequency of the undamped system.
(ii) The logarithmic decrement.
(iii) Damping ratio.
(iv) Damping coefficient.
(v) Damped natural frequency.

OR

3 Obtain the expression for dynamic magnification factor for damped harmonic excitation.

UNIT – II

4 Solve for natural frequencies, time periods and modes of vibration of the multistory building shown in figure below as an Eigen value problem. Assume m=5X10^4 kg, k=5X10^4 kN/c



OR

5 (a) Discuss the orthogonality conditions for the modes of vibration of a system.
(b) Formulate equation of motion for undamped free vibrations of MDOF system.

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UNIT – III

6 (a) Derive equation of motion for single degree of freedom.
(b) Explain seismic coefficient method in detail along with different variables involved in that method.

OR

7 A 12 meter high 4 storey RC hospital building, with 3 m high floors, is situated in Delhi; soil below the foundation is assumed as hard rock. The dead load and normal live load is lumped as 2500 kN, 3000 kN, 3000 kN and 3000 kN at respective floor (4^{th}, 3^{rd}, 2^{nd} and 1^{st} floor respectively). Determine the total base shear as per IS 1893 (Part I): 2002 and compare with the earliar versions of IS 1893. Distribute the base shear along the height of the building.

UNIT – IV

8 (a) Write a short note on earthquake phenomenon.
(b) Illustrate elastic rebound theory with a schematic representation.

OR

9 (a) Write a short note on structure of the earth.
(b) Explain the theory of plate tectonics.

UNIT – V

10 (a) Write a short note on 'vertical discontinuities in load path'.
(b) Illustrate the detailing of reinforcement in a shear wall.

OR

11 (a) Write a short note on 'Re-entrant corners'.
(b) Illustrate the 'diaphragm discontinuity'

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