GANPAT UNIVERSITY

B. Tech. Semester: 7th Civil Engineering

Regular Examination November – December 2013

2CI708 Elective Paper –I (Design of Earthquake Resistant Structures - I)

Time: 3 Hours   **Total Marks: 70**

Instruction:
1. All Questions are Compulsory.
2. Draw Sketches/ Figures wherever necessary which indicates full marks.
3. IS 1893-2002, IS 875 (part –III) is allowed.

Section – I

Que. – 1   Estimate the design lateral forces and show its distribution for a **(11)** multistory residential building by seismic co-efficient method, having following details. Consider earthquake force in X and Y direction. Draw diagram for storey lateral force distribution and storey shear. Use IS1893:2002

No. of Bays along X direction : 4@ 6m c/c

No. of Bays along Y direction : 4 @ 5m c/c

Slab Thickness : 11 cm

Column Size : 0.6 m X 0.6 m

Beam Size : 23 cm X 50 cm

Location of Building : Bhuj

Height : G+5 storey @ 3 m height floor to floor and Typical floor height is 3.2 m

Walls : Brick masonry walls with thickness 230 mm

Floor Finishes : 2.0 kN/m^2 (including all floors and terrace weight)

Type of Soil : Medium

Live Load : 3 kN/m^2

Density of concrete : 25 kN/m^3

OR

Que. – 1 (A) A cantilever beam 3.5m long supports a mass of 600kg at its upper end. **(03)** Find the natural period and natural frequency. Take E=2X10^5 MPa and I=1300 cm^4.

(B) A system with a natural frequency of 6 Hz starts with initial amplitude **(08)** of 2 cm and an initial velocity of 25 cm/s. Determine the natural period, amplitude, maximum velocity and maximum acceleration.

Que. – 2 (A) A platform of weight 20,000 N is supported on four equal columns **(06)** which are fixed to the foundation as well as to the platform. Experimentally it is found that a force of 5000 N applied horizontal to the platform produces a displacement of 0.2 cm. It is estimated that damping in the structure is of the order of 5% of the critical damping. Determine the following :

i.   Un-damped Natural Frequency
ii.   Absolute damping coefficient
iii.   Logarithmic Decrement
iv.   The number of cycles and the time required for the amplitude of motion to be reduced from an initial value of 0.2 cm to 0.02 cm.

(B) A spring mass dashpot system consists of a spring of stiffness 343 N/m. **(06)**
The mass is displaced 20 mm beyond the equilibrium position and release to vibrate. Find the equation of motion for the system, if the damping coefficient of the dashpot is equal to 13.72 N.S/m.

Que. – 3   Attempt the following question. **(12)**
(A) Explain Moment Resisting frame System.
(B) Explain in brief: Under Damper System, Over Damped System.
(C) Derive the equation for the SDOF damped system.

OR

Que. – 3   Attempt the following question. **(12)**
(A) Explain in brief: "Degree of Freedom" and "Response Spectrum".
(B) What is vibration? Explain different types of it.
(C) Explain "Rigid Floor Diaphragm".

Section – II

Que. – 4   Write short note on **(12)**
(A) Oscillation of flexible buildings.
(B) Pounding
(C) Earthquake Resistant design of buildings

OR

Que. – 4   Write short note on **(12)**
(A) Shear wall and it's advantage for RC building
(B) Reinforcement and seismic damage
(C) Base Isolation

Que. – 5   Attempt the following question.
(A) Why horizontal earthquakes effects are different in reinforced concrete buildings? **(05)**
(B) Explain possible earthquake damage in column in RC buildings. **(06)**

OR

Que. – 5   Attempt the following question
(A) Explain : "Behavior Beam Column joints during EQ" **(05)**
(B) Which types of failures occurs in beam during EQ? Explain it **(06)**

Que. – 6   Attempt the following question.
(A) Define "Crustal Plates". Explain different types of plate margin. **(09)**
(B) Differentiate between Accelerometer and Displacement meter. **(03)**

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