

GANPAT UNIVERSITY**B. Tech. 8th Semester: Civil Engineering****Regular Examination April – June 2016****2CI808 Elective Paper – II (Design of Earthquake Resistant Structures-II)****Time: 3 Hours****Total Marks: 70**

- Instruction:**
1. All questions are compulsory.
 2. Assume suitable data wherever it is necessary.
 3. Figure indicate right full marks.
 4. Use of IS1893:2002 and IS:875:1987 are allowed.

Section - I**Que. – 1 Attempt following questions**

- (A) Define Multi Degree Freedom System. Derive the equation of motion for three degree freedom system. **06**
- (B) A spring mass dashpot system consists of a spring of a stiffness 686N/m. The mass is 6.86kg. The mass is displaced 0.02m beyond the equilibrium position and released to vibrate. Find the equation of motion for the system, if the damping coefficient of dashpot is equal to 13.72Nsec/m. **06**

OR**Que. – 1 Attempt following questions**

- (A) Define following term **06**
- | | |
|-----------------------|------------------------|
| 1. Natural Frequency | 2. Damping Ratio |
| 3. Forced Vibration | 4. Critical Damping |
| 5. Mathematical Model | 6. Centre of Stiffness |
- (B) A spring mass model consists of 10kg mass and spring with stiffness 7N/mm, was tested for fluid viscous damped vibration. Test recorded two successive amplitudes 3 and 2.5. Determine ,-
- i. The natural frequency of undamped system
 - ii. The logarithmic decrement
 - iii. Damping ratio
 - iv. Damping coefficient
 - v. Damped natural period

Que. – 2 Attempt following questions

- (A) Mention general defects in RCC and Masonry buildings. **06**
- (B) Explain different types of bracing systems in steel structures. **05**

OR**Que. – 2 Attempt following questions**

- (A) Explain with figure RCC beam retrofitting techniques. **06**
- (B) Mention the methods of strengthening of walls and describe any one. **05**

Que. – 3 Attempt following questions

- (A) Steps of seismic retrofit with flow chart of retrofit. **06**
- (B) What are the general requirements of machine foundation? **06**

Section – II

Que. – 4 Calculate wind force and draw pressure diagram for a multistoried framed building having following data.

12

Physical parameters:

- Length = 30 m
- Width = 30 m
- Height of building = 30 m
- Bay width = 5 m in both direction
- Height of each storey = 3 m

Wind analysis data:

- Location = Bhuj
- Terrain category = 3
- Topography = plan with upwind slope less than 3°
- Life of building = 100 years

OR

Que. – 4 Calculate the natural frequency and corresponding mode shapes for the given data.

12

$$m_1 = 15000 \text{ kg.}$$

$$k_1 = 3000 \text{ kN/m.}$$

$$m_2 = 12000 \text{ kg.}$$

$$k_2 = 2500 \text{ kN/m.}$$

$$m_3 = 10000 \text{ kg.}$$

$$k_3 = 2000 \text{ kN/m.}$$

Que. – 5 Attempt following questions

(A) What do you mean by structural control? Distinguish between active and passive control.

06

(B) Draw the block diagram of Passive control system, Active control system, Semi-Active control system, Hybrid Control System.

05

OR

Que. – 5 Attempt following questions

(A) What is base isolation? Explain concept of base isolation. Discuss various seismic isolators.

06

(B) Discuss various energy dissipation devices.

05

Que. – 6 Calculate base shear for the seven storey RC frame building for hospital, located in Bhuj, using seismic coefficient method for the following data:

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- a) Number of bay in X-direction = 6
- b) Number of bay in Y-direction = 4
- c) Bay width = 4 m in both direction
- d) Storey height = 3.5 m
- e) Thickness of slab = 150 mm
- f) Size of beam = 230 mm X 450 mm
- g) Size of column = 300 mm X 600 mm
- h) Live load = 4 kN/m^2
- i) Wall thickness = 150 mm

Assume suitable data if required. Also draw the distribution of shear at each floor level.

---END OF PAPER---