B.E. (Civil Engineering) Seventh Semester (C.B.S.)

Elective - I : Earthquake Resistant Design of Structures

P. Pages : 2 **TKN/KS/16/7521**

Time : Three Hours * 1 0 2 1 * Max. Marks : 80

Notes : 1. All questions carry marks as indicated.
2. Due credit will be given to neatness and adequate dimensions.
3. Assume suitable data whenever necessary.
4. Diagrams should be given whenever necessary.
5. Illustrate your answers whenever necessary with the help of neat sketches.
6. Use of non programmable calculator is permitted.
7. Is 456: Is 1893-part I 2002 and Is 875, Is 13920; 1993 may be consulted.

1. a) Describe in detail about the propagation of seismic waves. **7**

b) Explain in brief the concept of Response Spectra. **6**

OR

2. a) Explain in brief the elastic Rebound Theory of earthquake. **6**

b) Describe plate tectonics theory in detail. What are the major tectonic plates on the earth surface? **7**

3. a) How the architectural features affects the seismic behavior of the building. **7**

b) Explain with sketches, various configurational deficiencies (irregularities) in RC buildings? **7**

OR

4 a) What are the different types of structural failure due to past earthquake in India. **7**

b) Explain the effect of earthquake ground motion on structure. **7**

5. a) Explain in detail Soil Structure interaction. **7**

b) Explain Difference between rigid and flexible diaphragms. **6**

OR

6. Find lateral load distribution at different floors of a proposed four storied office building at Delhi. The building is to be constructed in medium soil and is designed as SMRF. Use Response Spectrum Method and 5% damping. Take mass of each storey is m1 = 12000kg, m2 = 10000kg, m3 = 8000kg and m4 = 8000kg. And stiffness of each storey is k1= 12000kN/m, k2 = 10000 KN/m, k3= 8000kN/m, k4=8000kN/m. **13**

Eigen values	$= \omega 1$	4.51	Modal Participation Factors	$= p1$	$= 4.508$
$\omega 2$	$=$	10.62		$p2$	$= -1.638$
$\omega 3$	$=$	16.84		$p3$	$= 0.983$
$\omega 4$	$= 20.81$			$p4$	$= 0.157$

Eigen Vectors

$$\phi_1 = \begin{pmatrix} 0.095 \\ 0.189 \\ 0.268 \\ 0.406 \end{pmatrix} \quad \phi_2 = \begin{pmatrix} -0.184 \\ -0.217 \\ 0.107 \\ 0.300 \end{pmatrix} \quad \phi = \begin{pmatrix} -0.279 \\ 0.169 \\ 0.137 \\ -0.152 \end{pmatrix} \quad \phi_4 = \begin{pmatrix} 0.068 \\ -0.152 \\ 0.406 \\ -0.215 \end{pmatrix}$$

7.	a)	Explain capacity design concept of RC building.	**6**
	b)	What is shear wall? What is the purpose of shear wall and also explain types of shear wall with neat sketches?	**7**

OR

8.	a)	Write difference between Equivalent static lateral load method and response spectrum method.	**5**
	b)	Explain about ductile detailing as per IS:13920 for different structural members.	**8**
9.	a)	What are the different techniques used for retrofitting of earthquake damaged structures.	**7**
	b)	Define seismic retrofitting and when it is needed.	**6**

OR

10.	a)	What are conventional and non-conventional retrofit methods.	**7**
	b)	What are the different sources of weakness in RC framed building.	**6**
11.	a)	Explain various repairing techniques of masonry structures.	**7**
	b)	What is base isolation? Explain about different base isolation sytsem.	**7**

OR

12.	a)	Explain various failure modes of masonry structures.	**7**
	b)	Explain briefly about the IS Code Provision for retrofitting of masonry structures.	**7**

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