

Note: Use of SP-16 and IS- 1893-2002 is allowed.

Attempt any five questions

Max Mks: 90

Duration: 3 Hrs

1. (a) Explain Reid's Elastic Rebound Theory of origin of earthquakes. 3
 (b) Discuss different types of seismic waves. 5
 (c) What is Response Spectra and give its formulation for SDOF initially at rest. 5
 (d) Explain the concept of Seismic Demand Diagrams. 5
2. (a) Explain "Soft Storey" and how it should be accounted for in analysis and design. 6
 (b) Explain the major damages experienced by R.C buildings during Bhuj earthquake and list the lessons learnt from the same. 12
3. (a) With reference to performance of RC buildings, explain 9
 (i) Diaphragm Discontinuity
 (ii) Re-Entrant Corners
 (iii) Vertical and Torsion irregularities
 (b) Explain the modeling of the following : 9
 (i) Floor diaphragms
 (ii) Soil and foundation models
4. (a) Explain the following: 9
 (i) Non-Conventional Seismic Retrofitting Strategies
 (ii) Local Retrofitting Methods.
 (b) Discuss the components of Seismic Evaluation Methodology and how are the damages in building components identified during the process. 9
5. Consider the data given below for a three storied RC building and calculate the lateral force distribution using Response Spectrum Method (SRSS). Neglect the stiffness of infill walls. 18

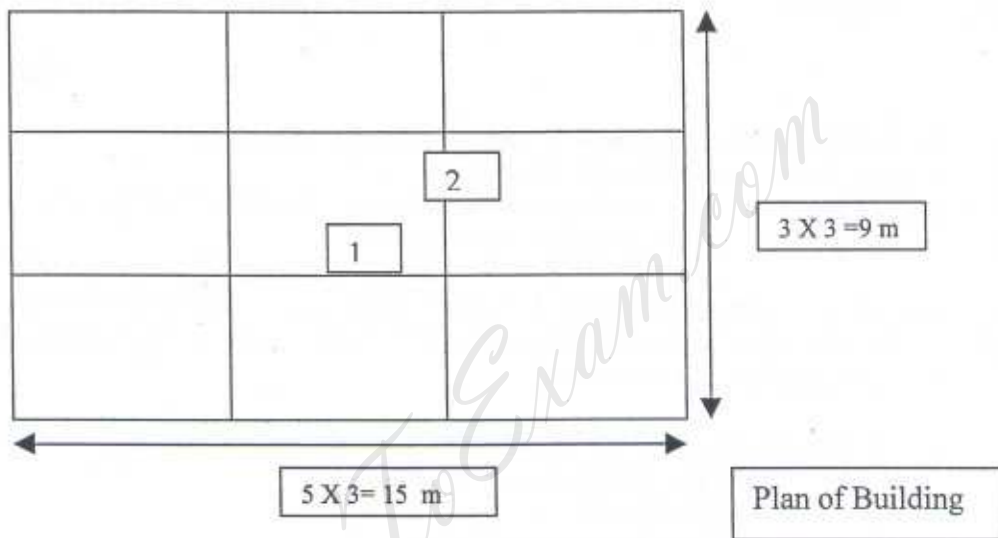
Type of structure	SMRF
Seismic Zone	III
Floor Height	3.5 m
Infill wall	150mm thick
Materials	M20 and Fe415
Imposed Load	3.5 kN/m ²
Size of columns	300mm X 450mm
Size of beams	250mm X 350mm
Depth of slab	120mm
Specific weight of RCC	25kN/m ²
Specific weight of infill	20 kN/m ²
Type of soil	Rocky

Given:

- (i) Mass matrix of the lumped model as 30 tons, 60 tons and 60 tons for the top, middle and bottom floor

- (ii) Eigen Vector as $\phi_1 = \{-0.033, -0.061, -0.08\}$, $\phi_2 = \{0.0795, 0.064, -0.03\}$
 $\phi_3 = \{0.081, -0.054, -0.045\}$.

Plan of the building is as shown below:



6. Design and Detail the Flexural Member 1, Interior Column 2 and the corresponding Beam- Column Joint for the structure shown above subjected to the following design moments and loads according to IS-13920-1993. 18
Show the detailing clearly.
- Beam 1- Hogging moment 250 kN-m, Sagging Moment 150 kN-m,
Maximum S.F= 150 kN
- Column 2 - Moment = 350 kN-m
Axial load = 500 kN

Note: Students can see their evaluated sheets on 12th Dec, 2006 at 10:00 am in the room of the concerned faculty.