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| **Name:**<br>**Enrolment No:** | |

**UPES**

**End Semester Examination, December 2024**

**Course: Earthquake Engineering & Seismic Design of Structure** **Semester: VII**

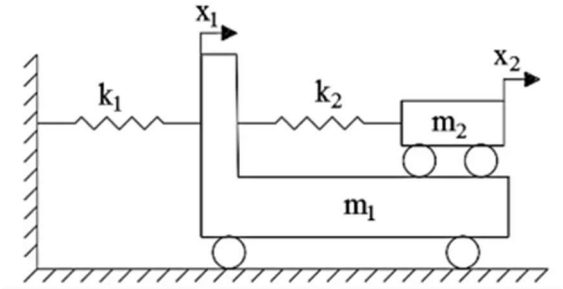
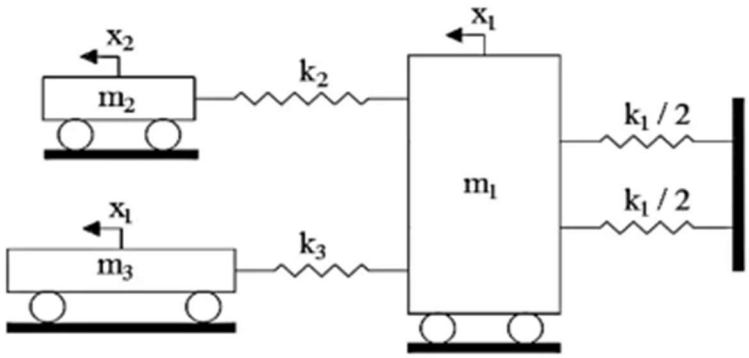
**Program: B. Tech Civil Engineering** **Time : 03 hrs.**

**Course Code: CIVL4014** **Max. Marks: 100**

**Instructions: Answer all questions.**
**IS 1893: 2002 is allowed.**
**Draw neat sketch and assume suitable data wherever necessary.**

**SECTION A**
**(5Qx4M=20Marks)**

| S. No. | | Marks | CO |
|---|---|---|---|
| Q 1 | When Inter-plate and Intra-plate earthquakes occurs? | **4** | **CO1** |
| Q 2 | Mention all different types of earthquake parameters to characterize ground motion. | **4** | **CO2** |
| Q 3 | Give four virtues of good earthquake resistant design of a structure. | **4** | **CO3** |
| Q 4 | Describe, in short, with neat sketches soft and weak storey structures. | **4** | **CO3** |
| Q 5 | How do base isolation devices protect a structure from earthquake damage? | **4** | **CO4** |
| | **SECTION B**<br>**(4Qx10M= 40 Marks)** | | |
| Q 6 | What is the Seismic Design Philosophy for Buildings? | **10** | **CO1** |
| Q 7 | Why are Horizontal Bands necessary in Masonry Buildings? | **10** | **CO2** |
| Q 8 | A SDOF system having a mass of 2.5 kg is set into motion with viscous damping and allowed to oscillate freely. The frequency of oscillation is found to be 20 Hz and the measurement of amplitude of vibration shows two successive amplitudes to be 6 mm and 5.5 mm. Determine the viscous damping coefficient. | **10** | **CO3** |
| Q 9 | How to make buildings ductile for Good Seismic Performance?<br>Or<br>How do Beam-Column Joints in RC Buildings resist Earthquakes? | **10** | **CO4** |

| SECTION-C<br>(2Qx20M=40 Marks) | | | |
|---|---|---|---|
| Q 10 | (a) What are the Seismic Effects on Structures?<br><br>(b) Discuss the dynamic analysis procedure of RC framed structure as per IS 1893: 2002 with suitable assumed data of your choice. Given data for the analysis are:<br><br>Plan dimension = 7 m<br>Storey height = 3.5 m<br>Total weight of beams in a storey ($W_b$) = 130 kN<br>Total weight of slab in a storey ($W_s$) = 250 kN<br>Total weight of column in a storey ($W_c$) = 50 kN<br>Total weight of walls in a storey ($W_w$) = 530 kN<br>Live load ($W_L$) = 130 kN<br>Weight of terrace floor ($W_t$) = 655 kN | **8+12=20** | **CO3** |
| Q 11 | (a) Explain the step-by-step procedure for seismic analysis of RC building.<br>(b) Determine the natural frequencies of vibration and the ratio of the amplitudes of motion of mass $m_1$ and $m_2$ for the system shown in given figure. Given the stiffnesses are $k_1$ and $k_2$.<br><br>  <br><br><br>Or<br><br>Determine the natural frequencies of the system as shown in figure by Holzer method.<br><br>  <br> | **10+10=20** | **CO4** |