Reg.No. \_\_\_\_\_\_\_\_\_\_\_\_



**End Semester Examination – Nov/Dec – 2017**

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| **Code :** | **14CE2032** | **Duration :** | **3hrs** |
| **Sub. Name :** | **BASICS OF DYNAMICS AND ASEISMIC DESIGN** | **Max. marks :** | **100** |

**ANSWER ALL QUESTIONS (5 x 20 = 100 Marks)**

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| **Q. No.** | **Sub Div.** | **Questions** | **Course**  **Outcome** | **Marks** |
| 1 | a. | If the natural frequency of a system is 12 Hz and its mass is 50kg. Determine its stiffness and time period. For the same frequency if mass is 100kg what will be the shift in the time period of the system. | CO1 | 6 |
| b. | Determine the natural frequency and time period of the system consisting of a mass of 135 kg attached to a horizontal cantilever beam through the linear spring k2. The cantilever beam has a thickness of 0.8cm and a width of 1.2cm. E=2.1 x 105N/mm2 , L=70cm and k2=10kg/cm. | CO1 | 14 |
| (OR) | | | | |
| 2 | a. | Enumerate the various dynamic loads. | CO1 | 2 |
| b. | Mention the nature of the system when ξ=1. Derive the equation for response of such a system. | CO1 | 8 |
| c. | A vibrating system consisting of a weight of 800 kN and a spring stiffness of 80 kN/m is viscously damped so that the ratio of two consecutive amplitudes is 1 to 0.8. determine i. logarithmic decrement, ii. natural frequency, iii. damping ratio, iv. damping coefficient and v. damped natural frequency. | CO2 | 10 |
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| 3. | a. | The forcing function on a system with natural frequency 10Hz is 200sin10t. Determine the frequency ratio. | CO1 | 4 |
| b. | “Solution of a damped system contains an exponential term”. Justify the statement. | CO1 | 4 |
| c. | A SDOF system consists of a mass of 50kg, a spring of stiffness 1500 N/m and a damping coefficient of 50Ns-m is subjected to a harmonic excitation of F=150 sin 8t. Calculate the steady state response. | CO1 | 12 |
| (OR) | | | | |
| 4. | a. | A column of length 3.2 m is fixed at both ends. E= 2 x 105 N/mm2, I= 2 x 106 mm4. Determine the stiffness of the column. | CO1 | 4 |
| b. | Determine the natural frequency and mode shapes of the shear building with the following date, m1= 24000 kg, m2 = 11500 kg, k1 = 2000kN/m and k2= 1700kN/m. | CO1 | 16 |
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| 5. | a. | Mention the scale used to measure the magnitude of earthquake. | CO2 | 2 |
|  | b. | Discuss on Elastic rebound theory. | CO2 | 2 |
|  | c. | Briefly discuss on the types of plate boundaries. | CO2 | 6 |
|  | d. | Discuss on the lessons learnt from past earthquakes. | CO2 | 10 |
| (OR) | | | | |
| 6. | a. | “Strong column- weak beam concept prevents global failure” Justify the statement. | CO2 | 4 |
|  | b. | Classify the intensity of earthquake based on damage levels as per the codal provisions. | CO2 | 6 |
|  | c. | Describe briefly the different types of seismic waves. | CO2 | 10 |
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| 7. | a. | Explain the concept of Base Isolation. | CO3 | 8 |
|  | b. | Differentiate an active control system from a semi active control system with suitable examples. | CO3 | 12 |
| (OR) | | | | |
| 8. | a. | Define ductility? Enumerate the advantages of designing a ductile RCC frame. | CO2 | 4 |
|  | b. | Based on codal provisions, explain the provisions for special confinement in beams, columns and footings. | CO2 | 16 |
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|  | | **Compulsory**: |  |  |
| 9. |  | A four storey RC school building is located in Chennai with the following data  Plan dimensions - 7 x 4 m  Storey height - 3.0m  Weight of I, II and III floors- 1200kN  Weight of terrace – 900kN  The structure is resting on hard soil. Determine the total base shear and lateral loads at each floor level for 5% of damping using seismic coefficient method. | CO1 | 20 |

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