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



**UNIVERSITY**

(Karunya Institute of Technology & Sciences)

(Declared as Deemed-to-be University under Sec.3 of the UGC Act, 1956)

**End Semester Examination – Nov/Dec – 2016**

|  |  |  |  |
| --- | --- | --- | --- |
|  |  | **Semester :** | **2016-17 ODD** |
| **Code :** | **14CE2032** | **Duration :** | **3hrs** |
| **Sub. Name :** | **BASICS OF DYNAMICS AND ASEISMIC DESIGN** | **Max. marks :** | **100** |

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

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Q. No. | Sub Div. | Questions | Course  Outcome | Marks |
| 1. | a. | Write the equation of motion for damped free vibration system. | CO1 | 1 |
| b. | Define damping ratio. | CO1 | 1 |
| c. | Write the equation for natural frequency of the system. | CO1 | 2 |
| d. | Differentiate static and dynamic load. | CO1 | 2 |
| e. | A simply supported rectangular beam has a span of1m. It is 100mm wide and 10mm deep. It is connected at mid span of a beam by means of a linear spring having a stiffness of 100kg/cm and a mass of 300kg is attached to the other end of spring. Determine the natural frequency of the system. E=2.1 x 106 kg/cm2. | CO1 | 14 |
| (OR) | | | | |
| 2 | a. | What is meant by spring in parallel? | CO1 | 2 |
| b. | A two kg mass is supended by a spring having a stiffness of 3N/mm. Determine the Natural frequency of the system. | CO1 | 4 |
| c. | List the various dynamic loads and mention how the forces are transmitted to the building. | CO1 | 4 |
| d. | Find the natural frequency of the system shown in the figure. Take K1=k2= 2000 N/m and K3 = 3000N/m. m=10kg.  K1 m k3  K2 | CO2 | 10 |
| 3. | a. | Derive the equation of motion of a damped single degree of freedom system and explain the conditions | CO1 | 6 |
| b. | A vibrating system consisting of a weight of 1200 kN and a spring stiffness of 100 kN/m is viscously damped so that the ratio of two consecutive amplitudes is 1 to 0.80. determine a) logarithmic decrement, b) natural frequency, c)damping ratio, d) damping coefficient and e) damped natural frequency | CO1 | 14 |
| (OR) | | | | |
| 4. | a. | What is relation between logarithmic decrement and damping ratio? | CO1 | 3 |
| b. | What is meant by critical damping coefficient? How is it calculated? | CO1 | 3 |
| c. | A SDOF system consists of a mass of 350kg and a spring stiffness of 250kN/m. By testing it was found that a force of 80N produces a relative velocity 10 cm/s. Find a) Damping ratio b) logarithmic decrement , c) ratio of two consecutive amplitudes. | CO1 | 14 |
| 5. | a. | A column of length 3.0 m is fixed at both ends. E= 2 x 105 N/mm2, I= 1.8 x 106 mm4. Determine the stiffness of the column. | CO1 | 2 |
| b. | Differentiate steady state and transient vibration. | CO1 | 4 |
| c. | A SDOF system consists of a mass of 25kg, a spring of stiffness 2500 N/m and a damping coefficient of 70Ns-m is subjected to a harmonic excitation of F=225 sin 5t. Calculate the steady state response. | CO1 | 14 |
| (OR) | | | | |
| 6. | a. | Why the response reduction factor for special RC moment resisting frame is higher than for ordinary moment resisting frame? | CO2 | 2 |
| b. | What is the zone factor for Delhi? Mention its zone. | CO2 | 2 |
| c. | Name the types of plate boundaries. | CO2 | 2 |
| d. | A generator of 0.8 ton weight is placed on a concrete plank of width 450mm and length 2 m and thickness 100mm. Find the static and dynamic deflection of generator running at 1850 rpm. Use M20 concrete. Assume damping ratio as 5% of critical. | CO1 | 14 |
| 7. | a. | Describe briefly the different seismic waves | CO2 | 8 |
| b. | Determine the natural frequency and mode shapes of the two degree of freedom system shown in figure  K m k m k | CO2 | 12 |
| (OR) | | | | |
| 8. | a. | Draw the response spectrum curve as per IS1893:2002. Explain the salient features | CO2 | 2 |
| b. | What is meant by ductility? How is it measured? | CO2 | 4 |
| c. | Explain briefly how ductile detailing is done as per IS codes. | CO3 | 14 |
|  | | **Compulsory:** |  |  |
| 9. | a. | Explain the concepts of bracings and base isolation. | CO3 | 8 |
|  | b. | A three storey RC school building is located in Mumbai with the following data  Plan dimensions - 8.5 m  Storey height - 3.5m  Weight of I, II floors- 1600kN  Weight of terrace – 900kN  The structure is resting on medium soil. Determine the total base shear and lateral loads at each floor level for 5% of damping using seismic coefficient method. | CO2 | 12 |

ALL THE BEST