**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 :** | **14CE3005** | **Duration :** | **3hrs** |
| **Sub. Name :** | **STRUCTURAL DYNAMICS** | **Max. marks :** | **100** |

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

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Q. No.** | **Sub Div.** | **Questions** | **Course**  **Outcome** | **Marks** |
| 1. | A  B  C | (i)Explain the various types of dynamic loads with examples.  (ii) Explain various types of damping.  A building frame shown below is subjected to an exciting force of 300Cos20 t. Assuming 06% of critical damping, determine the steady state response and maximum dynamic stress in the columns. Take EI = 80kN.m2 ; Z= 1600mm3. Take mass=200kg.  total Mass =m  F(t)  4m    4m k k 4m | CO1  CO1  CO1 | 5  5  10 |
| (OR) | | | | |
| 2. | A  B  C | For a SDOF system having mass 20 kg and spring constant 24 kN/m, the amplitude decreases to 25% of the initial value after 6 consecutive cycles. find the absolute damping of the system.  A spring mass has a natural frequency 24Hz. If spring stiffness is reduced to 2 kN/m, the frequency is altered by 50%. Determine the mass and stiffness of the original system.  Explain Logarithmic Decrement. | CO1  CO1  CO1 | 8  8  4 |
| 3. | A  B | Find the natural frequencies and the modes of vibration for the sysem shown in Figure    Using Duhamel’s integral derive an expression for the response of an undamped single degree of freedom system subjected to a rectangular impulsive load of ‘p0’ acting over a period of t1. Also determine the dynamic magnification factors for displacement at t > t1 and t ≤ t1.  p    p0  t  t1 | CO1  CO1 | 10  10 |
| (OR) | | | | |
| 4. | A  B | A cantilever beam is to be modeled by a mass-less uniform bar to which are attached two lumped masses representing the mass of the original system . Determine the natural frequencies and the natural modes for free lateral vibration.    Develop the equation of motion for undamped forced vibration of a 2 DOF system and hence explain the concept of vibration absorber. | CO1  CO1 | 10  10 |
| 5. | A  B | Determine the first two natural frequencies of a uniform cantilever beam by Rayleigh Ritz method by taking    Determine the fundamental frequency for the following building frame by Vector Iteration method. | CO1  CO2 | 10  10 |
| (OR) | | | | |
| 6. | A  B  C | Develop the equation of motion for damped forced vibration of a MDOF System.  Prove that the vibration modes are orthogonal.  Explain why Dunkerleys method under estimates the fundamental frequency. | CO2  CO2  CO2 | 8  6  6 |
| 7. | A  B | Find the response in longitudinal undamped forced vibration of a uniform bar fixed at one end and subjected to a sinusoidal axial force at the other end  Obtain the expression for a uniform beam subjected to free flexural vibration and hence obtain the first three natural frequencies and mode shapes of a cantilever beam subjected to free flexural vibrations | CO1  CO1 | 10  10 |
| (OR) | | | | |
| 8. | A  B | A simply supported beam of mass” ”per unit length, length “L” and flexural  rigidity “ EI” is carrying a concentrated mass “ M” at the middle span of the beam. Determine its fundamental frequency by Rayleigh’s method.    A simply supported beam of span 8m is subjected to a concentrated force of 700 N applied suddenly at a point 2m from the left end. Mass of the beam is 750 kg/m & EI = 30 x 106 Nm2. Determine the response by considering first two modes only. | CO1  CO1 | 10  10 |
|  | | **Compulsory:** |  |  |
| 9. | A  B  C | Using Mode superposition method , find the response of a two degree of freedom system whose Mass and Stiffness Matrices are given by the following.  and  The forcing function Sin 10 t. The system starts at rest.  Explain the step by step procedure for the solution of equilibrium equation in dynamic analysis using Houbolt method.  Write short notes on wind induced vibration and vibration due to blast loads. | CO2  CO2  2 | 10  7  3 |