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



**End Semester Examination – Nov / Dec – 2019**

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| **Code :** | **18CE3012** | **Duration :** | **3hrs** |
| **Sub. Name :** | **STRUCTURAL DYNAMICS** | **Max. Marks :** | **100** |

**ANSWER ANY FIVE QUESTIONS (5 x 16 = 80 Marks)**

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| **Q. No.** | **Sub Div.** | **Questions** | **Course**  **Outcome** | **Marks** |
| 1. | a. | Determine the natural frequency and time period of the system consisting of a mass of 100kg attached to a horizontal cantilever beam through a linear spring k2. The cantilever beam has a thickness of 8mm and a width of 12mm. E=2x105N/mm2 ,  L= 700mm and k = 10N/m. | CO1 | 10 |
| b. | Differentiate between the critically damped, underdamped and overdamped system. | CO2 | 6 |
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| 2. | a. | A SDoF system has a mass of 50 kg, stiffness of 50kN/m and damping coefficient of 100 N-s/m. The system is subjected to a harmonic force having a maximum value of 250N. Determine  i) The resonant amplitude.  ii) Maximum amplitude for the steady state motion. | CO4 | 16 |
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| 3. | a. | Determine the response of a SDoF system subjected to a periodic loading shown in figure.  Fo  T/2 T/2 T/2 | CO4 | 16 |
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| 4. | a. | Determine the natural frequencies of the system by the use of stodola method.  3k mm 2 k m 2k m | CO3 | 16 |
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| 5. |  | Derive the expression to determine the DLF for rectangular impulse using Duhamel’s Integral. | CO4 | 16 |
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| 6. |  | Find the response of a two degree of freedom system whose mass and Stiffness Matrices are given by the following.  and    The forcing function . The system starts at rest.    Find its response by newmark’s method method.  Use time step as 0.1 sec, α =0.25 and δ=0.5. | CO5 | 16 |
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| 7. |  | Determine the natural frequencies and mode shapes for a framed structure with three floors. The mass in each floor m1= 5000kg, m2=4000 kg, m3= 3000 kg is considered to be absolutely rigid.  EI= 4.5 x 106 N-m2 | CO3 | 16 |
| **COMPULSORY QUESTION (1 x 20 = 20 Marks)** | | | | |
| 8. | a. | Explain the concept of Base isolation. With case studies, enumerate the various types of base isolation. | CO6 | 10 |
| b. | Discuss the importance of machine foundations and explain how it is designed. | CO6 | 10 |