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

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**End Semester Examination – Nov/Dec – 2018**

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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. | Find the equivalent stiffness of the system shown in the figure. Take K1=k2= 2500 N/m and K3 = 3500N/m.  K1 k3  K2 | CO1 | 6 |
| b. | Determine the natural frequency and natural period of the system consisting of a mass of 100 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 k=10kg/cm. | CO1 | 14 |
| (OR) | | | | |
| 2. | a. | Define a critically damped system? Derive the relation for critical damping? | CO1 | 6 |
| b. | A vibrating system consisting of a weight of 1000 kN and a spring stiffness of 80 kN/m is viscously damped so that the ratio of two consecutive amplitudes is 1 to 0.85. determine a) logarithmic decrement, b) natural frequency, c)damping ratio, d) damping coefficient and e) damped natural frequency | CO1 | 14 |
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| 3. | a. | A column of length 3 m is fixed at both ends. E= 2 x 105 N/mm2, I= 1.5 x 106 mm4. Determine the stiffness of the column. | CO1 | 6 |
| b. | Determine the eigen value and eigen vector of the two degree of freedom system shown in figure  2K 2m k m | CO1 | 14 |
| (OR) | | | | |
| 4. | a. | The forcing function on a system with natural frequency 10Hz is 200sin10t. Determine the frequency ratio. | CO1 | 6 |
| b. | 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 | 14 |
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| 5. | a. | Discuss on the lessons learnt from past earthquakes. | CO2 | 10 |
|  | b. | Enumerate the seismic waves and describe in detail the phenomenon of the waves. | CO2 | 10 |
| (OR) | | | | |
| 6. | a. | Briefly discuss the plate tectonic theory. | CO2 | 10 |
| b. | Draw the response spectrum plot. For a building resting on hard rock and time period of 1 sec, what will be Sa/g value? | CO2 | 6 |
| c. | Enlist the various structural control methods. | CO3 | 4 |
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| 7. | a. | Discuss the design methodology for Aseismic design with respect to the architectural consideration as per IS codal provision. | CO2 | 10 |
| b. | Discuss the structural control methods. | CO3 | 10 |
| (OR) | | | | |
| 8. | a. | Explain the concept of Base Isolation. | CO3 | 6 |
| b. | Based on codal provisions, explain the provisions for special confinement in beams, columns and footings. | CO3 | 14 |
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|  | | **Compulsory**: |  |  |
| 9. |  | A four storey RC school building is located in Kolkata with the following data  Plan dimensions - 6x 4 m  Storey height - 3.1 m  Weight of I, II and III floors- 1100kN  Weight of terrace – 800kN  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. | CO2 | 20 |