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

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

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| **Code** : **17CE3016** |  | **Duration :** | **3hrs** |
| **Sub. Name : GEOTECHNICAL EARTHQUAKE ENGINEERING** |  | **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. | Define : Epicenter, hypocenter, epicentral distance and hypocentral distance with a neat sketch. | CO1 | 5 |
| b. | Describe the types of seismic waves in earthquake shaking. | CO2 | 10 |
| c. | At a recording station a difference in time of arrival between P waves and S waves was observed to be 1.5 seconds. What is the approximate distance from the station at which the event occurred? Assume P wave velocity as 4 km/sec and S wave velocity as 2 km/sec. | CO3 | 5 |
| (OR) | | | | |
| 2. |  | Assuming P and S wave traveled through the crust at 6 km/sec and 3 km/sec respectively, estimate the epicentral location (latitude and longitude) of the hypothetical earthquake whose characteristics are given below: ( Use graph for interpretation results) | CO2 | 20 |
|  |  |  |  |  |
| 3. |  | Explain the field and laboratory test in Evaluation of dynamic soil properties | CO3 | 20 |
| (OR) | | | | |
| 4. |  | A site in Japan had the measured SPT resistances indicated in table below. The procedure used in japan deliver about 72% of the theoretical free-fall energy to the sampler. Assuming that the sands have an average void ratio of 0.44 and that the water table is at a depth of 1.5 m, compute the corresponding (N1)60 values.   |  |  |  |  | | --- | --- | --- | --- | | Depth (m) | Nm | Depth (m) | Nm | | 1.2 | 7 | 7.2 | 12 | | 2.2 | 4 | 8.2 | 12 | | 3.2 | 3 | 9.2 | 14 | | 4.2 | 3 | 10.2 | 9 | | 5.2 | 5 | 11.2 | 23 | | 6.2 | 9 | 12.2 | 13 | | CO3 | 20 |
|  |  |  |  |  |
| 5. | a. | The earth dam with height 50 m is constructed of compacted clay with a shear wave velocity of 400 m/sec. Compute the first three natural frequencies for modes of vibration. (m=0) | CO2 | 10 |
| b. | Outline the steps in static approach for determination of base shear using code book [Uniform Building code]. | CO3 | 10 |
| (OR) | | | | |
| 6. | a. | Compute Vp for Steel, Vulcanized rubber and Water.   |  |  |  | | --- | --- | --- | | Material | Specific gravity | M (psi) | | Steel | 7.85 | 40.4 × 106 | | Vulcanized rubber | 1.2 | 167 × 106 | | Water | 1.0 | 0.34 × 106 | | CO2 | 10 |
| b. | What do you understand by Ground Response analysis? Explain any one method in detail. | CO2 | 10 |
|  |  |  |  |  |
| 7. |  | Explain the evaluation of slope stability using Pseudostatic Analysis. | CO3 | 20 |
| (OR) | | | | |
| 8. |  | Describe in detail about the design considerations with respect to the following aspects Geotechnical , Architectural, Structural and Capacity Design. | CO4 | 20 |
|  | |  |  |  |
|  | | **Compulsory**: |  |  |
| 9. | a. | Illustrate the General Framework for Seismic Microzonation Studies. | CO5 | 10 |
| b. | In a hypothetical seismically active region, earthquakes have been recorded over an 80-year period. Part of the record is instrumental, but part is not. Combining all available data, it appears that the earthquakes have been distributed as follows:  Estimate the Gutenberg-Richter parameters for the region. | CO6 | 10 |