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BICEE-006

DIPLOMA IN CIVIL ENGINEERING
(DCLEVI / DELVI)

00702

Term-End Examination

December, 2017

BICEE-006 : EARTHQUAKE ENGINEERING

Time : 2 hours *Maximum Marks : 70*

Note : *Attempt any **five** questions. No IS code is allowed. Use of scientific calculator is allowed.*

1. (a) Discuss in detail, Magnitude and Intensity of an earthquake. *10*

(b) 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. *4*

2. Give reasons for the following :

(a) The depth D of the flexural member shall preferably be more than $\frac{1}{4}^{th}$ of the clear span. *4*

(b) Maximum steel ratio on any face at any section shall not exceed 0·025 (2·5%). *4*

(c) Explain Elastic Rebound Theory. *6*

3. Derive the equation of motion for a free vibration damped single degree of freedom system. *14*

4. A mass m is connected with base through five springs as shown in Figure 1. Determine the natural period of the system with the given parameters : *14*

k_1 = 1000 N/cm, k_2 = 800 N/cm,

k_3 = 500 N/cm, k_4 = 900 N/cm,

k_5 = 600 N/cm, m = 2000 kg.

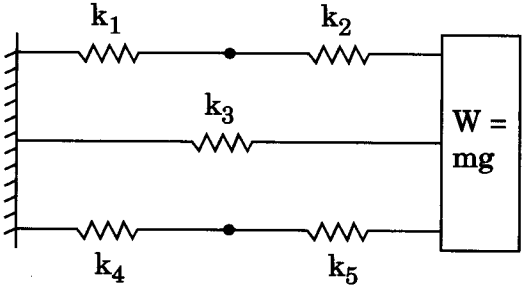

Figure 1

5. (a) Simplicity and symmetry are the keys of making a building earthquake resistant. Explain the concept with the help of examples. *4*

(b) The plan and elevation of a three-storey RCC school building is located in zone V with z = 0·36, I = 1·5, Sa/g = 2·5 and R = 3. The intensity of dead load is 10 kN/m^2 and the floors are to cater to an imposed load of 3 kN/m^2. Determine the design seismic loads on the structure by equivalent lateral load method. *10*

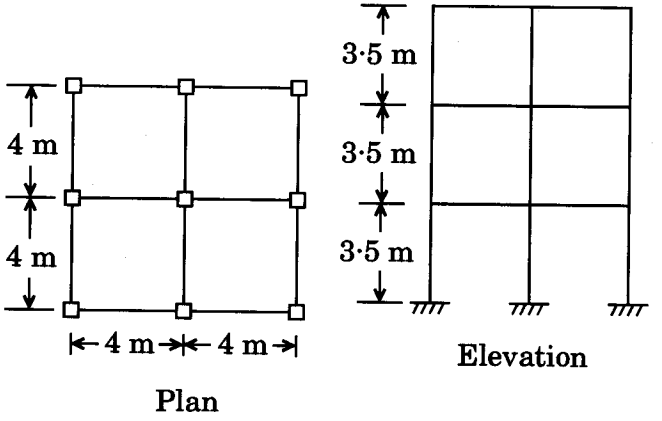

Figure 2

6. (a) What is retrofitting of structure and what are the aims of seismic strengthening of buildings ? *7*

(b) In an experiment of free vibration, it is found that the maximum amplitudes have reduced to 0·4 times its value in 3 complete cycles. Determine the damping in the system. *7*

7. Explain the following : $2\times7=14$

(a) Seismic waves

(b) Strong ground motion parameters

8. (a) Discuss the precautions to be taken in the construction of masonry buildings to make them earthquake resistant buildings. 7

(b) Discuss in detail, any ***two*** of the following : $2\times3\frac{1}{2}=7$

(i) Divergent Plate Boundaries

(ii) Convergent Plate Boundaries

(iii) Transformed Plate Boundaries