BICEE-006

DIPLOMA IN CIVIL ENGINEERING (DCLEVI / DELVI)

Term-End Examination

December, 2015

BICEE-006 : EARTHQUAKE ENGINEERING

Time : 2 hours   *Maximum Marks : 70*

Note : *Question no. 1 is* **compulsory.** *Answer any* **four** *questions from the remaining questions. Assume missing data, if any. Use of scientific calculator is allowed.*

1.   Write *True* or *False* for the following :

   (a)   An accelerogram is a time history of acceleration composed of non-periodic sequences of acceleration pulse. (T/F)   *2*

   (b)   The Peak Horizontal Acceleration (PHA) is the most commonly used measure of the intensity of shaking at a site and is taken to be the largest absolute value of the horizontal acceleration recorded at a site. (T/F)   *2*

   (c)   The zone between two plates sliding horizontally past one another is called a transform fault boundary. (T/F)   *2*

(d) The energy produced in the structure by the ground motion is dissipated through internal friction within the structural and non-structural members. (T/F) *2*

(e) The restoring force in the structures is proportional to the deformation induced in the structure during the seismic excitations. (T/F) *2*

(f) Masonry buildings are characterized by low stiffness and high weight. (T/F) *2*

(g) Timber buildings can be considered to possess low earthquake resistant capacity, if their slabs and roofs are light. (T/F) *2*

2. Determine the natural frequency for the system shown in Figure 1 ($m_1 = m_2 = m$). *14*
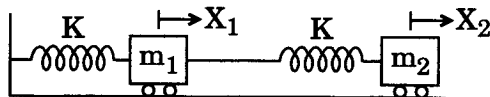

Figure 1

3. Discuss how you can increase the following for a building in an earthquake prone area : *14*

(a) Period of vibration

(b) Energy dissipation capacity

(c) Ductility

4. Which structural element of timber structures is most affected by earthquakes ? Explain methods to restore and strengthen it. *14*

5. The plan and elevation of a three storey RCC building is shown in Figure 2. The building is located in seismic zone V. The type of soil encountered is medium stiff and it is proposed to design the building with a special moment resisting frame. 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 static analysis. *14*
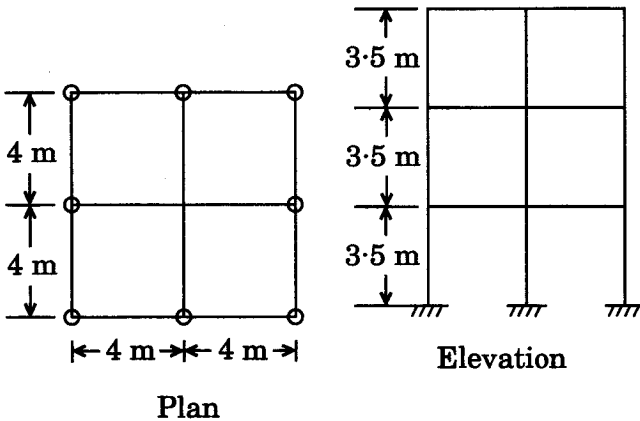

Figure 2

6. Write short notes on the following : *14*

    (a) Response of structures to earthquake motions

    (b) Merits and demerits of modelling techniques

    (c) D'Alembert's principle

    (d) Lumped mass approach to modelling of structure

7. Name the various modelling techniques of the structures and discuss time history analysis of buildings. *14*