No. of Printed Pages : 4

BICEE-006

DIPLOMA IN CIVIL ENGINEERING
(DCLEVI / DELVI)

00726

Term-End Examination

June, 2015

BICEE-006 : EARTHQUAKE ENGINEERING

Time : 2 hours *Maximum Marks : 70*

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

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

(a) The magnitude of an earthquake is a measure of the amount of energy released. (T/F) *2*

(b) The motion of the ground can be described in terms of displacement velocity or acceleration. (T/F) *2*

(c) A single storey structure can be modelled as multiple degrees of freedom system. (T/F) *2*

(d) Buildings irregular in plan and elevation, without re-entrant corners or discontinuities in transferring the vertical loads to the ground, display good seismic behaviour. (T/F) *2*

(e) Non-structural elements such as claddings, in-fill walls, partition walls, etc. interfere with the free deformation of the structure and thus become structurally very responsive in earthquake. (T/F) *2*

(f) A non-linear dynamic analysis or inelastic time history analysis is the only method to describe the actual behaviour of a structure during an earthquake. (T/F) *2*

(g) Horizontal diaphragms should be arranged to prevent relative horizontal deflection between vertical wall and columns. (T/F) *2*

2. Consider the pendulum in Figure 1 with mass 'm' connected to a chord of length L, oscillating in the gravity field.

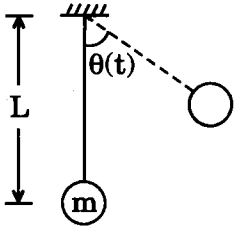

Figure 1

(a) Determine its equation of motion.

(b) Solve the equation of motion for small oscillations, when the motion starts with an initial displacement θ_0. *14*

3. Determine the free vibration response of a single-degree of freedom system shown in Figure 2 at time t = 0·20 s for the following data : *14*

Natural circular frequency, $\omega = 12$ rad/s

Damping factor, $\xi = 0{\cdot}15$

Initial velocity, $\dot{X}(0) = 10$ cm/s

Initial displacement, $X(0) = 5$ cm

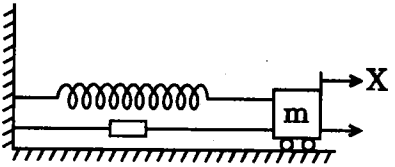

Figure 2

4. Discuss the various materials and techniques used for column jacketing and beam jacketing. *14*

5. Name the various modelling techniques of the structures and explain them in brief. Discuss the lumped mass approach in detail. *14*

6. Determine the frequency and design seismic coefficient for an ordinary masonry shear wall in a primary health centre. Given the following data :

Roof load = 15 kN/m

Height of the wall = 3·0 m

Thickness of the wall = 0·2 m

Unit weight of the wall = 9·2 kN/m^3

The building is situated on soil medium. *14*

7. Write short notes on any ***four*** of the following :

$4 \times 3\frac{1}{2} = 14$

(a) Response Spectra

(b) Restoring Force

(c) Buckling of Reinforcing Bars

(d) Splices

(e) Storey Drift

(f) Soft Storey