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BARE-073

BACHELOR OF ARCHITECTURE (B.Arch.)

Term-End Examination

00021

December, 2015

BARE-073 : EARTHQUAKE RESISTANT STRUCTURES (ELECTIVE 1)

Time : 3 hours *Maximum Marks : 70*

Note : *Question no. 1 is* ***compulsory****. Attempt any* ***four*** *more questions from the remaining questions.*

1. Write *true* or *false* for the following statements : *14×1=14*

(a) The outermost layer of the Earth is called mantle.

(b) The size of an earthquake depends on the amount of energy released.

(c) Liquefaction occurs only in unsaturated clays.

(d) S-waves can transmit through liquids.

(e) Delhi and the NCR lie in Zone V.

(f) The Himalayas were formed due to the collision of Indo-Australian plate with the Eurasian plate.

(g) The point inside the Earth at which rupture begins and the first seismic wave originates is called focus.

(h) Both MMI and MSK are 12-point scales for the measurement of earthquake intensity.

(i) Friction damper is a passive control device.

(j) Earthquake magnitude is a qualitative measure of the size of an earthquake.

(k) A Tsunami is caused by an earthquake.

(l) The response spectrum describes the maximum response of a multi-degree-of-freedom (MDOF) system to a particular input motion as a function of the natural frequency and damping ratio of the system.

(m) A one-storey structure may be considered as a single-degree-of-freedom (SDOF) system.

(n) For a two-storey frame, the mass matrix is written as $\begin{bmatrix} m_1 & m_2 \\ m_2 & m_1 \end{bmatrix}$.

2. Discuss the seismic wave propagation through the interior of the Earth to reach a building, explaining the types of seismic waves and their behaviour. *14*

3. (a) Describe the working of a seismograph with the help of a neat sketch. *8*

(b) Enlist various hazards associated with an earthquake. Discuss the effects of any one of them in brief. *6*

4. What is a shear wall ? How does it help in making the structures earthquake resistant ? Discuss its important features. With the help of a neat sketch, show the detailing of reinforcement in a reinforced concrete shear wall. *14*

5. Differentiate between the following : $4 \times 3\frac{1}{2} = 14$

(a) Divergent boundaries and Convergent boundaries

(b) Active control and Passive control

(c) Engineered and Non-engineered structures

(d) Surface waves and Body waves

6. What is base isolation ? How does this technique help in making the structures earthquake resistant ? With the help of a neat sketch, discuss the features of a base isolator. *14*

7. Write short notes on any ***four*** of the following : $4 \times 3\frac{1}{2} = 14$

(a) Bands in Masonry Buildings

(b) Factors Affecting Ductility of Structures

(c) Retrofitting

(d) Response Spectrum Analysis

(e) Internal Structure of the Earth

(f) Bhuj Earthquake