

**BACHELOR OF ARCHITECTURE (BARCH)**

**Term-End Examination**

**December, 2013**

**BARE-073 : EARTHQUAKE RESISTANT  
STRUCTURES**

**(ELECTIVE 1)**

*Time : 3 hours*

*Maximum Marks : 70*

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

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

- (a) The outer core of the earth behaves like a liquid. **14x1=14**
- (b) The core-mantle boundary is known as Gutenberg discontinuity.
- (c) S-waves cannot be transmitted through liquids.
- (d) The Himalayas were formed due to collision of Indo-Australian plate with the Eurasian plate.
- (e) The point inside the earth at which rupture begins and the first seismic wave originates is called the focus.
- (f) Delhi and the NCR lie in zone V.
- (g) Earthquake magnitude is a qualitative measure of the size of an earthquake.
- (h) MMI and MSK both are 12-point scales for measurement of earthquake intensity.
- (i) Seismographs are used to measure relatively weak ground motion.

- (j) 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.
  - (k) As per the provision of IS 13920-1993 for ductile detailing in the members of reinforced concrete buildings, the steel reinforcement of grade fe500 should be used.
  - (l) To be earthquake resistant, a masonry building with a flat roof should be provided with a gable band.
  - (m) Friction damper is a passive control device.
  - (n) Active control devices are the most effective devices for response control but they are useless in case of power failure.
2. (a) Describe liquifaction and its effects on structures. 7
- (b) Describe the elastic rebound theory. 7
3. Differentiate between the following.  $4 \times 3\frac{1}{2} = 14$
- (a) Divergent Boundaries and convergent boundaries.
  - (b) p-waves and s-waves.
  - (c) Earthquake intensity and earthquake magnitude.
  - (d) Dead load and earthquake load.
4. What is a shear wall ? How does it help in making 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. Write the governing differential equation for a SDOF system shown in figure 1. Briefly explain steps as to how will you get the response of the system from this equation. 14

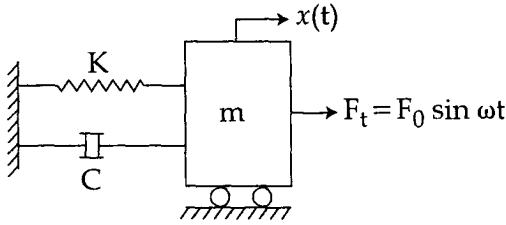


Figure 1

6. A three-storey frame with lumped masses, subjected to lateral forces, is shown in figure 2. Explain how base shear in such a building is calculated and how the base shear is distributed in the frame for analysis. 14

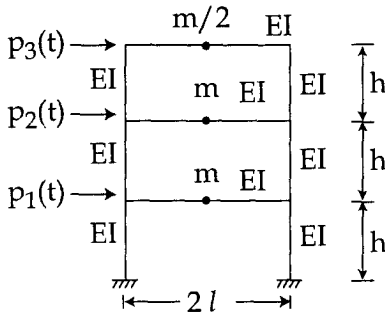


Figure - 2

7. Write short note on **any four** of the following topics : **4x3½=14**
- (a) Internal structure of earth
  - (b) Seismicity of India
  - (c) Surface Waves
  - (d) Theory of plate Tectonics
  - (e) Response spectrum analysis
  - (f) Various types of damages in seismic events
  - (g) Richter scale
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