Printed Pages : 1 Roll No. NCE064

B.TECH.

THEORY EXAMINATION (SEM–VIII) 2016-17

EARTHQUAKE RESISTANT DESIGN

Time : 3 Hours ***Max. Marks : 100***

Note : *Be precise in your answer. In case of numerical problem assume data wherever not provided.*

SECTION – A

1. Explain the following: **10 x 2 = 20**

(a) What are the different types of seismic wave?
(b) Define epicenter.
(c) State the dynamic degrees of freedom.
(d) Name any three approaches for developing governing equation of a vibrating system.'
(e) Write the assumption are made to simply the analysis in modeling of structures
(f) State the time history method.
(g) What is response spectrum?
(h) List any 2 typical features of damages due to earthquake in masonry buildings.
(i) What are the requirements are prescribed by the Indian Code for web reinforcement?
(j) Write the type of machine foundation.

SECTION – B

2. Attempt any five of the following questions: **5 x 10 = 50**

(a) (i) Discuss the theory of elastic rebound.
(ii) List the different types of seismic waves in detail.

(b) Brief note on fault, dip and their role in formation of earthquake with neat sketch.

(c) An SDOF system has a mass of 50kg, a damping ratio of 0.1, a natural frequency of 10rad/s and is subjected to a harmonic excitation of amplitude 2500N and frequency of 150rad/s. Determine the steady state amplitude and phase angle of the response.

(d) List out and explain the various factors affecting the response of the building.

(e) Describe the Hozler's numerical technique for determining natural periods of vibration for multi degree freedom system.

(f) Detail the typical reinforcement arrangement for beam column joint of reinforced concrete buildings to have resistance to earthquake forces.

(g) Explain the concept of response spectrum

(h) (i) Write the recommendations of IS code for detailing of RC beams for ductility in detail.
(ii) Discuss the behavior of masonry buildings during earthquakes including failure pattern.

SECTION – C

Attempt any two of the following questions: **2 x 15 = 30**

3 (i) Brief on causes of earthquake.
(ii) Derive the equation for single degree of freedom system for damped system. Hence draw the curve for displacement versus time for an over damped system.

4 (i) Describe some typical types of damages and their causes in RC building during earthquakes.
(ii) Discuss the principle of capacity design for earthquake resistant design of structures.

5 Determine the natural frequencies and mode shape of the given MDOF system. The mass of 3000 kg, 4000 kg and 5000 kg act from top of the storey. Assume EI = 4.5×10^6 N-m^2 for all columns.