Paper Code: ECE-064	**Roll No.**										

B. Tech.
(SEM-VIII) EVEN SEMESTER EXAMINATION, 2015-16
EARTHQUAKE RESISTANT DESIGN

[Time: 3 hrs.] **[Max. Marks: 100]**

Note: Attempt ALL Questions. All Questions carry equal marks.
Seismic codes are allowed. Assume missing data suitably.

1. Attempt any **FOUR** parts of the following:- [**5x4=20]**

(a) What is meant by focus and epicenter of an earthquake? Name the two kinds of body wave and explain how they differ?

(b) On what, the assignment of an earthquake's magnitude based? In magnitude the same as intensity? Explain?

(c) Explain the plate tectonic theory and its mechanism?

(d) What do you understand by logarithmic decrement? Explain?

(e) In an experiment of free vibration, it is found that the maximum amplitude has reduced to 0.5 times its value in 4 complete cycles. Determine the damping of the system.

2. Attempt any **TWO** parts of the following:- [**10x2=20]**

(a) Derive the expressions for free vibration of damped single degree of freedom system.

(b) A steel portal frame is subjected to free vibration by giving an initial displacement without velocity. Taking damping as 3% of critical, damped natural frequency and damped natural period. Take mass lumped at roof level = 500 KN, column height = 10 m, distance between columns 16 m, E = $2.1x10^{11}N/m^2$, I = 0.0008 m^4

(c) Derive the expression for forced vibration of a damped system.

3. Attempt any **TWO** parts of the following [**10x2=20]**

(a) A single degree of freedom system having forced vibration. Prove that magnification factor is inversely proportional to twice the damping.

(b) A two degree of freedom system having free vibration. Derive the frequency equation and amplitude for both mode shapes.

(c) What do you understand by soft story in multistory building? Explain the reason of failure in open ground story?

4. Attempt any **TWO** parts of the following **[10x2=20]**

(a) Where the vertical reinforcements are provided in masonry building to improve Seismic behavior? How they improve the resistance to earthquake?

(b) A beam is to be constructed in seismic zone IV. Beam size is 300x600 mm, with clear length of 5.0 m. Calculate the

(i) Spacing of lateral ties in the end and middle zone of the beam.
(ii) Length of confinement required in end zone.

(c) Elaborate the essential requirements to ensure box action in masonry building.

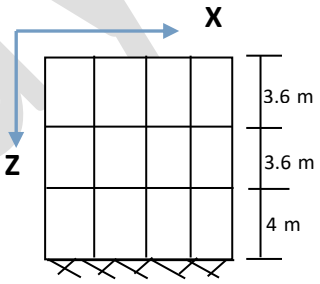
5. Attempt any **ONE** of the following. **[20x1=20]**

(a) (i) Discuss the confinement of concrete. How it changes the behavior of concrete.

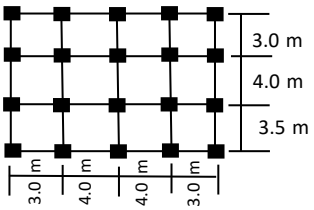
(ii) What are the provisions for ductile detailing? Discuss the spacing of ties in end zone of column.

(iii) A framed concrete Hospital building of height 15 m and plan dimension 20 m x 30 m, is to be constructed in Delhi on medium soil, determine the design horizontal seismic coefficient A_h for the building.

(b) A three story framed residential apartment is to be construction in Lucknow on medium soil.
Thickness of slab = 125 mm, live load = 2.0 KN/m^2
Column size = 300x450 mm, beam size = 250x450 mm
Calculate the base shear at each floor level in x direction.



Elevation of the building



Plan of the building