

Code No: R41015

R10

Set No. 1

IV B.Tech I Semester Supplementary Examinations, October/November - 2017

EARTHQUAKE RESISTANT DESIGN

(Civil Engineering)

Time: 3 hours

Max. Marks: 75

Answer any FIVE Questions
All Questions carry equal marks
The Use of Relevant IS Codes is Permitted.
Assume any suitable data if found necessary.

- 1 a) Explain the different factors responsible for the occurrence of earthquakes. [6]
b) Explain the characteristics of different types of seismic waves. [6]
c) Explain the various destructive effects of earthquakes. [3]
- 2 a) State and explain D'Alembert's Principle. [3]
b) Distinguish between damped and undamped systems and also explain the characteristics of various damped systems. [6]
c) Derive an expression for the response of an undamped SDOF system of mass ' m ' and stiffness ' k ' subjected to free vibrations. [6]

- 3 a) Draw the mode shapes of a building frame shown in Figure.3(a).

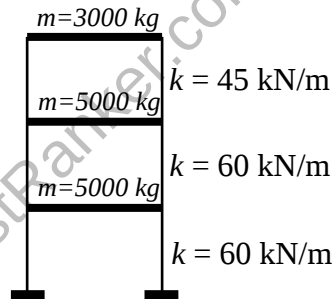


Figure.3(a)

- b) Derive an expression for the Orthogonal property of normal modes. [10]
[5]
- 4 a) Derive the equation of motion of a damped SDOF system of mass ' m ' damping coefficient ' c ' and stiffness ' k ' subjected to forced vibrations. [5]
b) Explain the uses of response spectra. [10]
- 5 a) Explain the design philosophy of earthquake resistant structures. [5]

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- b) Find the design seismic forces on each frame of a four-storeyed reinforced concrete hospital building located in Visakhapatnam, the plan is as shown in Figure. 5(b). The soil is assumed to be of hard soil. The reinforced concrete frames are filled with brick masonry and the storey height is 3.6 m. The lumped weight due to dead load is 1 kN/m^2 on floors and 2 kN/m^2 on roof. The live load on the floors is 3 kN/m^2 and 1 kN/m^2 on roof.

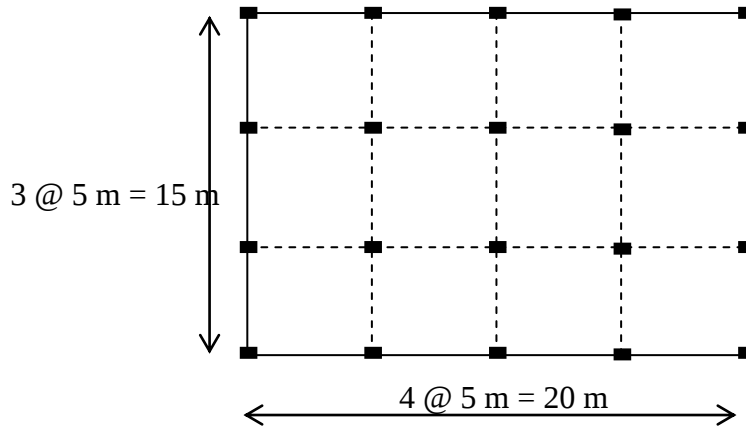


Figure. 5 (b)

[10]

- 6 a) Explain the significance of ductility on the behavior of structures during an earthquake. [6]
b) Draw the ductile detailing provisions of an RC column as per the IS code of practice and also explain the salient features. [9]
- 7 a) Explain the effect of various vertical irregularities on the performance of reinforced concrete buildings during earthquakes. [10]
b) Explain the effect of re-entrant corners affecting the performance of RC buildings during earthquakes. [5]

- 8 A shear wall of length 5 m and thickness 230 mm is subjected to the forces as given below:

Type of Load	Axial force (kN)	Moment (kNm)	Shear force (kN)
DL+LL	1800	500	25
Earthquake Load	300	4500	750

Design the RC shear wall using M30 grade of concrete and Fe415 steel and detail as per IS: 13920.

[15]