

SL-255

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Seat No.	
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B.E. (Civil Engineering) (Semester - VII) (Revised)

Examination, May - 2017

EARTHQUAKE ENGINEERING

Sub. Code : 67559

Day and Date : Tuesday, 16 - 05 - 2017

Total Marks : 100

Time : 2.00 p.m. to 5.00 p.m.

- Instructions :**
- 1) Figure to the right indicates full marks.
 - 2) Assume any suitable data whenever necessary.
 - 3) Use of non-programmable calculator and I.S. 1893: 2002 (Part - I) are allowed.

SECTION - I

Q1) a) Write short note on: [8]

- i) Types of waves
- ii) Earth interior

b) Explain in details methods of determine magnitude of earthquake. [8]

Q2) a) Derive an equation for single degree undamped vibration system. [8]

b) A SDOF vibrating system is having following parameters. $m = 10\text{kg}$, $k = 80\text{ N/m}$, $C = 10\text{ Ns/m}$. [10]

Determine:

- i) Damping Factor
- ii) Natural Frequency
- iii) Damped frequency
- iv) Logarithmic decrement
- v) No. of cycles after which the original amplitude reduces to 25%.

OR

P.T.O.

- b) A water tank is idealized as a single degree of freedom having equivalent weight of 10000 kN, damping ratio as 4% and stiffness factor as 20000 kN/m. [10]

Calculate:

- i) the natural time period
- ii) the damped time period
- iii) the damping constant and
- iv) the maximum horizontal displacement at the top of the water tank if it is loaded by a seismic force equivalent to $20 \sin(5t)$ kN.

Q3) Calculate lateral forces in the critical direction at each floor level for a building of government office having building frame (OMRF) with following data by collector office seismic coefficient method. Also draw lateral load distribution diagram. [16]

- a) No. of storeys: 4
- b) No. of bay of X & Y direction: 6
- c) Storey height: 3.5 m
- d) Width of each bay in X & Y direction: 4m
- e) Size of beam: 0.3m × 0.45m
- f) Size of column: 0.45m × 0.45m
- g) Slab thickness: 150mm
- h) Wall thickness: 0.230 meter (exterior)
- i) Live Load: 4 kN/m²
- j) Location:- Pune (Medium Soil)

SECTION - II

- Q4) a)** Explain concept of ductile detailing & explain ductile detailing of beam as per IS 13920-1993 [10]
- b) Philosophy of Earthquake Resistant Design. Give four virtue of good earthquake resistant design. [8]

OR

- b) What is soft storey problem? Explain how soft storey problems can be eliminated in the existing buildings. [8]
- Q5) a)** Discuss in detail the advantage of horizontal bands and vertical reinforcement in the masonry buildings. [8]
- b) Discuss the behavior of the following masonry walls in seismic regions: [8]
- i) Unreinforced masonry wall
 - ii) Infill masonry wall
- Q6) a)** Explain the term active and passive control system? [8]
- b) Explain in brief: [8]
- i) Viscous Fluid Dampers
 - ii) Viscoelastic Dampers

