Total No. of Questions : 12]

SEAT No. :

**P1916**

[Total No. of Pages : 3

# [5254]-12

## B.E. (Civil)

## EARTHQUAKE ENGINEERING

## (2008 Pattern) (Elective - II)

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

***Instructions to the candidates:***

1) ***From Section - I answer Q.1 or Q.2; Q.3 or Q.4; Q.5 or Q.6 and from Section II answer Q.7 or Q.8; Q.9 or Q.10; Q.11 or Q.12.***
2) ***Answers to the two sections should be written in separate answer books.***
3) ***Figures in bold to the right, indicate full marks.***
4) ***IS 456, IS 1893, IS 13920 are allowed in the examination.***
5) ***Neat diagrams should be drawn where ever necessary.***
6) ***If necessary, assume suitable data and indicate clearly.***
7) ***Use of electronic pocket calculator is allowed.***

### SECTION - I

***Q1)*** a) What is the difference between Intensity and Magnitude of an earthquake? Explain MMS measurement of earthquake in brief. **[8]**

b) Explain the Plate Tectonic theory? Describe the difference between magnitude and intensity of an earthquake? **[8]**

OR

***Q2)*** a) Classify and describe with suitable sketches different types of waves generated by an earthquake and their effects on structure? **[8]**

b) What are the learning from past earthquakes? Explain design philosophy behind earthquake resistant design of structures? **[8]**

***Q3)*** a) Obtain the response for a SDOF system subjected to forced but un-damped vibration. **[8]**

b) A simply supported beam 4 m long supports mass of 1000kg at the center. Find the natural period and natural frequency. $E = 2.1 \times 10^6$ kg/cm$^2$ & EI = 10,000 kN.m$^2$. **[8]**

***P.T.O.***

OR

***Q4)*** a) A simply supported beam 3 m long supports mass of 100kg at the center. Find the natural period and natural frequency. E = $2.1 \times 10^6$ kg/cm$^2$ & EI = 10,000 kN.m$^2$. **[6]**

b) Explain with examples, Over damped system, critically Damped system and Under damped system giving example of each for free but damped SDOF. **[10]**

***Q5)*** a) Explain R.C.C. shear walls with neat sketches. **[9]**

b) Explain the various factors used in seismic coefficient method. **[9]**

OR

***Q6)*** A symmetrical three storey RC school building located in Zone V with following data- **[18]**

a) Plan Dimensions = 7m × 7m

b) Storey Height = 3 .5m

c) Total weight of beams/ storey = 130kN

d) Total weight of columns/storey = 50kN

e) Total weight of walls/storey = 530kN

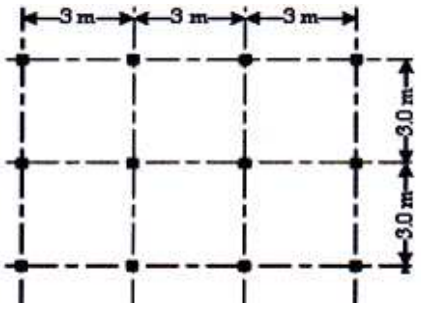
f) Live load = 130kN

g) weight of terrace floor = 655kN. Assuming Hard Rock, determine total base shear for 5% damping using seismic coefficient method.

## SECTION - II

***Q7)*** A G+2 building is located in seismic zone III. The floor-to-floor height is 3.10 m. The building is supported on Type-II strata. The R.C. frames are in-filled with brick walls. The lumped weight due to dead loads is 5 kN / m$^2$ on floors and 2.5 kN /m$^2$ on the roof. The floor slabs are designed for a live load of 2.5 kN / m$^2$ and the roof is designed 1.5 kN / m$^2$. **[16]**

Calculate the base shear and distribute along the floors along X-direction.



OR

***Q8)*** a) What is liquefaction of soil? Describe the remedial measures for reducing liquefaction of soils. **[8]**

b) Explain static analysis and dynamic analysis for structures. **[8]**

***Q9)*** What is Seismic Isolation? Discuss in details with the sketches, the concept of Active and Passive control systems? **[16]**

OR

***Q10)*** Explain the various techniques of retrofitting and rehabilitation of structures? **[16]**

***Q11)*** A (350 × 550) mm column is reinforced with 8-16#. It is supported on an isolated footing. The load coming on the footing is 450 kN and a moment of 45 kNm. The SBC of the soil is 150 kN / $m^2$. Use M20 grade of concrete and steel of grade Fe 415 and design the footing. **[18]**

OR

***Q12)*** Write notes on following with neat sketches (Any Three) : **[18]**

a) Moment Resisting Frames

b) Concentrically Braced Frames

c) Eccentrically Braced Frames

d) Ductile Detailing of Slabs

e) Tuned Mass Dampers