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Total Number of Pages : 03

M.TECH

**M.TECH 1<sup>ST</sup> SEMESTER REGULAR EXAMINATIONS, DECEMBER 2017**  
**EARTHQUAKE RESISTANT DESIGN OF STRUCTURES**

**Branch: SE, Subject Code:MSEPE1051**

**Time: 3 Hours**

**Max Marks : 70**

**The figures in the right hand margin indicate marks.**

**PART-A**

**( 2X10=20 MARKS)**

**1. Answer the following questions .**

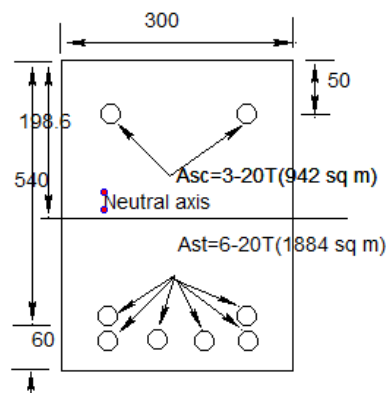
- What do you mean by intensity of an earthquake?
- What do you mean by Hypocenter?
- What is meant by the focus and epicenter of an earthquake?
- What do you mean by plate boundaries?
- What are the assumptions considered for accumulation of stresses inside the earth?
- Discuss briefly the two measures of an earthquake.
- What do you mean fault?
- Name the major plates of the earth.
- Distinguish between body waves and surface waves.
- What are the three main belts where majority earthquake occurs?

**PART-B**

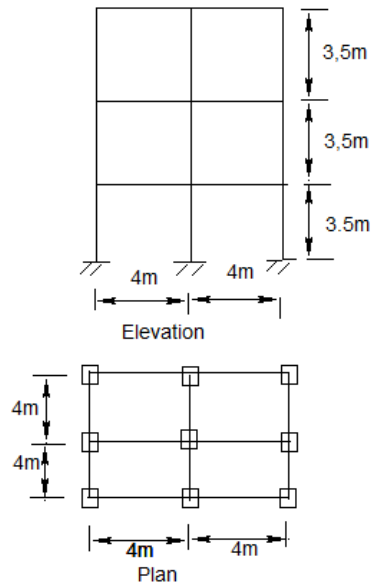
**(5 X 10=50 MARKS)**

**Answer any five questions from the following.**

- Compare the ductility with respect to curvature of the cross section of the beam as shown in figure using i) M20 and Fe 415
  - M20 and Fe 500.



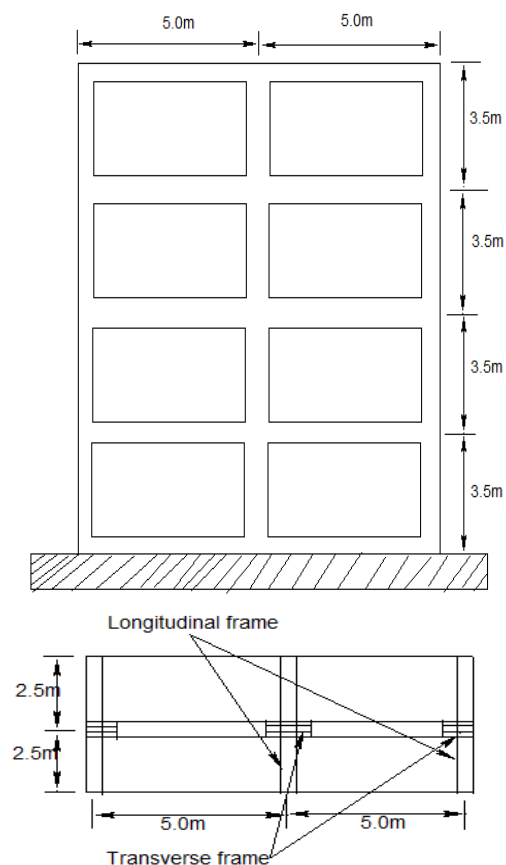
**3. a.** The plan and elevation of a three storey RCC school building is shown in Figure below. The building is located in seismic zone V. The type of soil encountered is medium stiff and it is proposed to design the building with a special moment resisting frame. The intensity of dead load is  $20 \text{ KN/m}^2$  and the floors are to cater to an imposed load of  $5 \text{ KN/m}^2$ . Determine the design seismic loads on the structure by static analysis.



Plan and elevation of multi-storey building

b. What do you mean by plate boundaries? Discuss its various types.

**4. a.** A four storeyed building as shown in Figure is to be analyzed by the equivalent static method.



Plan showing the column and beams at floor levels of the plane frame

**The following preliminary building data required for analysis is given**

- Type of structure : Multi-storey rigid jointed plane frame (Special RC moment resisting frame)
  - Seismic zone = IV (Clause 6.4.2, Table 2, IS 1893 (Part I): 2002)
  - Number of stories = Four, (G+3)
  - Floor height = 3.5 m
  - Infill wall = 250 mm thick including plaster in longitudinal and 150 mm in transverse direction
  - Imposed load = 3.5 kN/m<sup>2</sup>
  - Materials = Concrete (M25) and Reinforcement (Fe415)
  - Size of columns = 300 mm x 450 mm
  - Size of beams = 250 mm x 400 mm in longitudinal and 250 mm x 350 mm in transverse direction
  - Depth of slab = 150 mm thick
  - Specific weight of RCC = 25 kN/m<sup>3</sup> (IS 875 (Part I)- 1987)
  - Specific weight of infill = 20 kN/m<sup>3</sup> (IS 875 (Part I)- 1987)
  - Type of soil = Rock
  - Response spectra = as per IS 1893 (Part I): 2002
  - Time history = Compatible to IS 1893 (Part I): 2002 spectra at rocky site for 5 % damping
- b.** Discuss the four virtues of Earthquake Resistant Buildings.
- 5. a.** What do you mean by Isoseimals? What are the factors considered to control the outline of Isoseimals? (5)
- b.** Discuss the factors required for assessing the lateral design forces.
- 6. a.** What do you mean by magnitude? Explain various types of magnitude?
- b.** Discuss various measures of an earthquake.
- 7. a.** Write briefly on design principles for ductility.
- b.** Name the two kinds of body waves and explain how they differ.
- 8.** Write short notes on :
- a)** plate boundaries
- b)** Intensity of earthquake.