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**P.E.S. College of Engineering, Mandya - 571 401**

*(An Autonomous Institution affiliated to VTU, Belagavi)*

**Eighth Semester, B.E. - Civil Engineering**

**Semester End Examination; Aug. / Sep. - 2020**

**Earthquake Resistant Design of Structures**

Time: 3 hrs

Max. Marks: 100

- Note: i) Answer TWO full questions, selecting ONE full question from UNIT - I and UNIT - II.  
 ii) Answer any THREE full questions, choosing from UNIT - III, UNIT - IV and UNIT - V.  
 iii) Use of only IS-1893-2002 is permitted.*

**UNIT - I**

1. Explain the following :

- |                                    |                            |    |
|------------------------------------|----------------------------|----|
| i) Strong ground motion            | ii) Elastic rebound theory | 20 |
| iii) Seismograph-working principle | iv) Seismic moment         |    |

**OR**

- |   |    |
|---|----|
| 2 a. What is site effect? Explain its significance in earthquake resistant design of structure. | 10 |
| b. Explain how torsion get's induced in buildings with neat sketch.                             | 10 |

**UNIT - II**

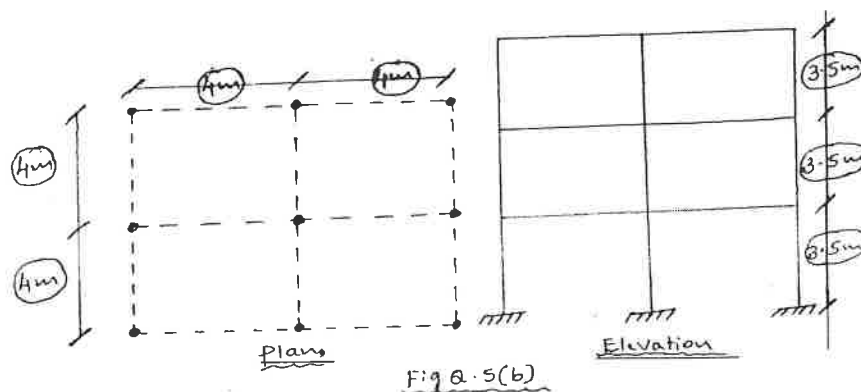
- |   |                             |
|---|-----------------------------|
| 3. Explain the following with neat sketches : | 20                          |
| i) Plan Irregularities                        | ii) Vertical Irregularities |

**OR**

- |  |    |
|--|----|
| 4 a. Explain with sketches various lateral load resisting systems adopted in structures.                                   | 8  |
| b. What are the various building characteristics affecting the performance of building during earthquake? Briefly explain. | 12 |

**UNIT - III**

- |   |   |
|---|---|
| 5 a. Briefly explain the earthquake resistant design philosophy.  | 8 |
| b. The plan and elevation of a three-storey RCC school building is shown in Fig. Q.5(b). The building is loacted 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 with brick infill. The intensity of dead load is $10 \text{ kN/m}^2$ and the floors are to cater to an imposed laod of $3 \text{ kN/m}^2$ . Determine the design seismic loads on the structure by equivalent static analysis. |   |



12

- 6 a. Explain various modes of failure of masonry building with neat sketches. 10
- b. Determine the lateral forces on a two-storey unreinforced brick masonry building resting on medium soil as shown in Fig. Q6(b) situated near Allahabad for the following data:

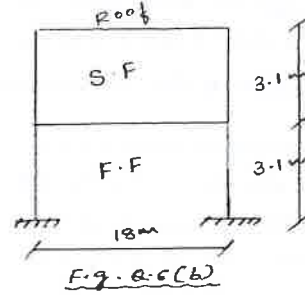
Plan size = 18 m × 8 m

Total height of the building = 6.2 m

Storey height = 3.1 m

Weight of roof = 2.5 kN/m<sup>2</sup>

Weight of wall = 5.0 kN/m<sup>2</sup>



#### UNIT - IV

- 7 a. Explain briefly, basic parameters required for dynamic analysis of soil-structure system. 10
- b. What is liquefaction? What are the various factors affecting the liquefaction characteristics? 10
- 8 a. What is ductility? Why it is required? What are the factors affecting ductility? 10
- b. Briefly explain how the “member ductility” and “structural system ductility” can be estimated for RC structures. Explain the relation between them with neat sketches. 10

#### UNIT - V

- 9 a. Define base isolation and what are the principles involved in seismic base isolation of buildings? 10
- b. What is meant by seismic evaluation? Explain the methods adopted for seismic evaluation and the necessity of seismic evaluation. 10
- 10 a. Explain the conventional methods adopted in retrofitting of RC buildings. 10
- b. Explain different methods adopted for retrofitting of masonry buildings. 10

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