

M. Tech-2
EAD

Set-K

Full Marks : 70

Time : 3 hours

Q. No. 1 is compulsory. Answer any **four** of the rest of questions

The figures in the right-hand margin indicate marks

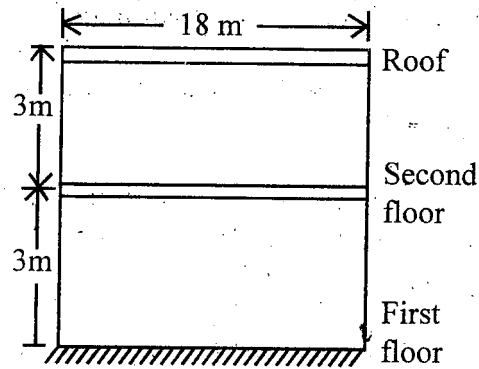
1. (a) The standard torsion seismograph records a trace amplitude 8 mm long. The distance to epicentre is estimated as 100 km. The standard correction is to 2. The distance correction for 100.0 km is 3.0. Determine the magnitude of the earthquake. 4
- (b) What is the importance of seismic zoning of India? 2
- (c) Write the equation of motion for a non-linear response history analysis and explain its terms. 2
- (d) What are four virtues of an earthquake resistant building? 2

(Turn Over)

(2)

- (e) What is the advantage of using a combined displacement (D), velocity (V), acceleration (A) spectrum? 2
- (f) Why a building twists in an earthquake? 2
- (g) Why are open ground storey buildings vulnerable in earthquakes? 2
- (h) What is a push over curve? 2
- (i) Draw a typical D-V-A curve and show the different sensitive zones. 2

2. Determine the lateral forces on a two-storey un-reinforced brick masonry building (situated at Sambalpur) shown in Fig.-1 for the following data:



Elevation of Masonry Building
Fig. 1

(3)

Building data :

Plan size $18 \text{ m} \times 18 \text{ m}$

Weight of roof = 2.5 kN/m^2

Weight of walls = 5.0 kN/m^2

LL at roof = 0

LL at floor = 1 kN/m^2

Zone factor (Z) = 0.24

Importance factor (I) = 1.0

Response reduction factor = 1.5

Spectral acceleration $\left(\frac{S_a}{g}\right) = 2.5$

Soil = Type II (Medium soil).

$12\frac{1}{2}$

3. What is base isolation ? Discuss effectiveness of base isolations for different isolation systems with help of an elastic design spectrum.

$12\frac{1}{2}$

4. What are different retrofitting techniques ? Discuss structural level (or global) retrofit methods for either RC buildings or masonry buildings.

$12\frac{1}{2}$

5. Discuss 'Response Spectrum Method' for seismic analysis of an RC frame.

$12\frac{1}{2}$

(4)

6. Discuss the problem of soil structure interaction and incorporate the effect of soil compliance in the dynamic analysis by (i) the direct approach (ii) the substructure approach. $12\frac{1}{2}$
7. (a) Discuss response spectrum characteristics. $6\frac{1}{2}$
- (b) Write the Indian Standard IS : 13920-1993 detailing guidelines for a beam-column joint in a frame under earthquake load. 6