UNIT-I

1. (a) During an earthquake the maximum amplitude recorded at a site by Wood-Anderson Seismograph is 20 cm. The maximum ground velocity recorded was 25 cm/sec. The site was found to be 75 km away from the epicenter. Determine the Magnitude and Intensity of the occurred earthquake. [7M]

(b) Explain the steps of seismic hazard analysis? [7M]

OR

2. (a) Derive an expression for damped frequency in case of single degree damped free vibration system. [7M]

(b) Derive the equation of motion of the weight \( w \) suspended from a spring at the free end of a cantilever steel beam shown in Figure below. For \( E = 29000 \text{ Ksi} \). Neglect the mass of the beam and spring. [7M]

\[
\begin{align*}
W &= mg \\
K &= 20 \text{ lb/in} \\
L &= 10' \\
2" &\text{ diameter} \\
\end{align*}
\]

UNIT-II

3. (a) Briefly introduce the philosophy and principles of earthquake resistant design of buildings. [7M]

(b) Discuss the contribution of irregularity in strength and stiffness to structural damage in structures during strong earthquakes. [7M]

OR

4. (a) Identify and discuss the plan configuration problems to structural damage in the
structures during strong earthquakes.

(b) What are the main design criteria for buildings? [7 M]

UNIT-III

5. (a) Give the details of lateral force resisting systems approved by the code IS 1893(Part1):2002. [7M]

(b) A RCC beam of rectangular section has to carry a distributed live load of 20kN/m in addition to its own weight and a dead load of 25kN/m. The maximum bending moment and shear force due to the earthquake are 60kN-m and 40 kN respectively. Centre to Centre distance between supports is 6 m. Design the beam using M-20 grade concrete and Fe 415 steel. [7M]

OR

6. (a) Explain response spectrum method? [7M]

(b) Explain time history analysis? [7M]

UNIT-IV

7. Analyse the earthquake resistant design of multi storey building [14M]

OR

8. Design rectangular beam for 8m span to support a DL of 10 KN/m and a LL of 12 kN/m inclusive of its own weight. Moment due to earthquake load is 100kN-m and shear force is 80kN. Use M20 grade concrete and Fe415 steel. [14M]

UNIT-V

9. Explain the main Code-based procedures for seismic analysis? [14M]

OR

10. Identify the damages and non damages in masonry structures [14M]
INSTITUTE OF AERONAUTICAL ENGINEERING  
(AUTONOMOUS)  

MODEL QUESTION PAPER - I  

M.Tech- II Semester Regular Examinations, February 2017  

EARTHQUAKE RESISTANT DESIGN OF BUILDINGS  
(Structural Engineering)  

Time: 3 hours  
Max. Marks: 70  

Answer ONE Question from each Unit  
All Questions Carry Equal Marks  
All parts of the question must be answered in one place only  

UNIT-I  

1. Explain how measurement of ground motion is done by seismologists and design engineers.  
[14M]  

OR  

2. (a) Write a short note on seismic zoning.  
(b) Explain dynamics of SDOF  
[7M]  

UNIT-II  

3. Explain vertical and horizontal irregularities in multistoried buildings and their effect on seismic behavior, of such buildings  
[14M]  

OR  

4. (a) explain in detail identification of seismic damages in RCC buildings  
(b) write down the basic elements of earthquake resistant design  
[7M]  

UNIT-III  

5. (a) Explain the seismic coefficient method of analysis in detail.  
[14M]  

OR  

6. (a) State the response spectrum method with an example.  
(b) develop seismic analysis procedure as per IS1893 code.  
[7M]  

UNIT-IV  

7. (a) What are the principles of earthquake resistant design of RCC buildings?  
(b) Define ‘Shear Walls’. How are these classified?  
[7M]  

OR  

8 (a) The plan of a three-storeyed R.C.C school building is shown 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 as a moment-resisting frame. The intensity of the dead load is 10 KN/m2 and the floors are to cater to an imposed load of 3 KN/m2. Determine the design seismic loads on the structure by static analysis. Storey height of each floor is 3.5 m  
[14M]
9. (a) Explain the design procedure 2 storey masonry building with example?.
(b) Sketch the details of RCC band to be provided at the plinth level of a two storied base masonry building.

OR

10. (a) Discuss with sketches the effect of openings on the performance of masonry walls under laterals shaking due to earthquakes.
(b) Compute the elastic properties of structural Masonary?