

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 0061 Roll No.

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B. Tech.

(SEM. VI) THEORY EXAMINATION 2010-11

EARTHQUAKE RESISTANCE DESIGN OF BUILDINGS

Time : 3 Hours

Total Marks : 100

Note : (1) Attempt **all** questions.

(2) Use of IS-456, IS-1893, IS-13920 is permitted.

1. Attempt any **four** parts of the following : **(4×5=20)**

- Explain the elastic Rebound theory of the occurrence of tectonic earthquakes.
- Discuss the different types of seismic waves.
- Distinguish between magnitude and intensity of an earthquake.
- Write short notes on stiff and flexible buildings.
- Discuss how to increase the ductility of a building in an earthquake prone area.
- What is a non-structure ? How does it affect the overall behaviour of the building ?

2. Attempt any **two** parts of the following : (2×10=20)

- (a) Discuss the various modelling techniques for the dynamic analysis of the structures.
- (b) Determine the free vibration response of a single degree-of-freedom system shown in Fig.1 at time 0.20 sec for the following data.

Natural circular frequency $\omega = 12$ rad/s, damping ratio $\xi = 0.15$, Initial velocity $\dot{x}(0) = 10$ cm/s, Initial displacement, $x(0) = 5$ cm.

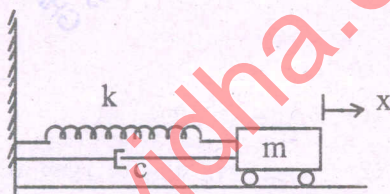


Fig. 1

- (c) What is damping ? Discuss the different types of damping mechanism of structures under earthquake disturbances.

3. Attempt any **two** parts of the following : (2×10=20)

- (a) Consider a two storeyed structure as shown in Fig. 2. Let the system be given free vibrations by giving an initial displacement of 100 mm to the top storey.

Weight at first floor = $0.5 \text{ kN sec}^2/\text{mm}$, weight at top storey = $0.4 \text{ kN.sec}^2/\text{mm}$, slittness $K_1 = 15 \text{ kN/mm}$, $K_2 = 10 \text{ kN/mm}$, $K_3 = 0$.

Determine the natural frequency

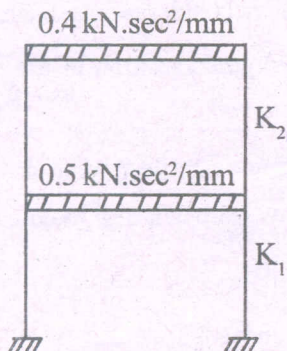


Fig. 2

- (b) Discuss the Elastic response and Inelastic response of Multi degree of freedom systems.
- (c) Discuss the natural periods and modes of vibration of MDOF systems.

4. Attempt any **two** of the following :

(10×2=20)

- (a) Explain plan Irregularities in the building.
- (b) Explain the following :
 - (i) Inertial forces
 - (ii) Response Reduction factor
- (c) Explain the following :
 - (i) Provisions for torsion
 - (ii) Storey drift
 - (iii) Soft storey.

5. Attempt any **two** of the following : (2×10=20)

- (a) Discuss the ductility consideration at beam column joint.
- (b) Discuss the design consideration in the design of shear wall.
- (c) How concrete is made ductile ? What do you understand by strong column weak beam design concept ?