

CE - 8041**B.E. VIII Semester**

Examination, June 2015

**Structural Dynamics and Earthquake Engineering
(Elective-II)****Time : Three Hours****Maximum Marks : 70****Note:** i) Attempt all Five questions.

ii) All questions carry equal marks.

iii) Assume suitable data if necessary and state them clearly.

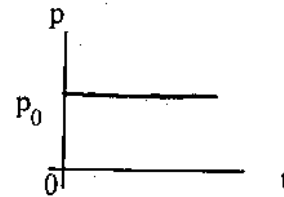
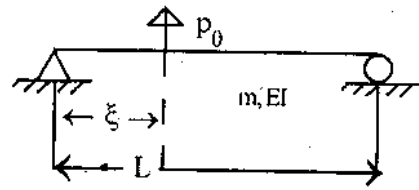
1. a) Explain, Step, Ramp and pulse excitations.

b) A sensitive instrument with weight 45.3 kg is to be installed at a location where the vertical acceleration is 0.1 g at a frequency of 10Hz. This instrument is mounted on a rubber pad of stiffness 5.62 kg/cm² and damping such that the damping ratio for the system is 10%.

i) What acceleration is transmitted to the instrument?

ii) If the instrument can tolerate only an acceleration of 0.005 g, suggest a solution assuming that the same rubber pad is to be used. Provide numerical results.

Or

2. Derive an equation of motion for a single degree of freedom vibration with viscous damping due to a pulsating load " $F_0 \sin \omega t$ " acting as the vibrating agent.

9. Write a detailed note on ductile detailing.

Or

10. Write notes on the following:

- Design of structures for ductility related to Earthquake Resistant Design.
- Energy absorption in Earthquake Resistant Structures.

3. Discuss

- Time stepping methods.
- Analysis of Non-linear response.

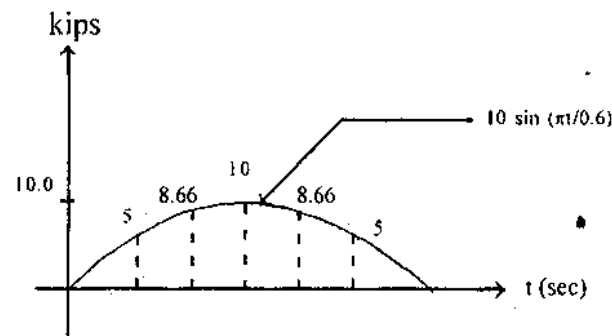
Or

4. A SDF system has the following properties
 $m = 0.2533 \text{ kip-sec}^2/\text{in}$, $k = 10 \text{ kips/in}$.

$$T_n = 1 \text{ sec } (w_n = 6.283 \text{ rad/sec}), \text{ and } \zeta = 0.05.$$

Determine the response $u(t)$ of this system to $p(t)$ defined by the half-cycle sine pulse force shown in figure by

- Using piecewise linear interpolation of $p(t)$ with $\Delta t = 0.1 \text{ sec}$, and
- Evaluating the theoretical solution.



5. Explain in detail the following terms:

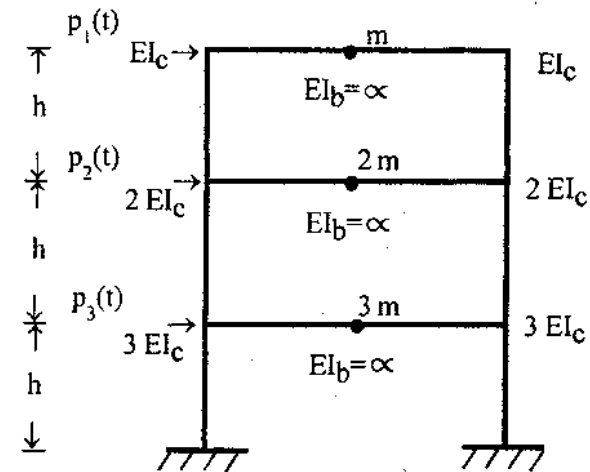
- Magnitude of earthquake.
- Intensity of earthquake.
- Epicenter of earthquake.
- Focus of earthquake.

Or

6. Discuss the following for Earthquake analysis and response of inelastic buildings.

- Equations of motion.
- P-D Effects.
- Modeling Assumptions.
- Statistical variation.

7. Formulate the equation of motion for the three - storey shear frame shown in figure.



Or

8. Derive mathematical expressions for the dynamic response - displacement and bending moments of a uniform simply supported beam to a step function force p_0 at distance ξ from the left end. Specialize the results for the force applied at midspan.