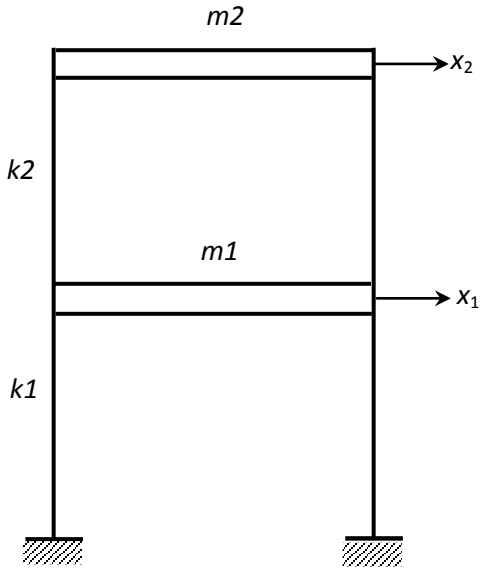
Chapter 3

Q1. A SDOF system is subjected to a harmonic ground motion of $\ddot{x}_g(t) = \ddot{x}_o(\sin\bar{\omega}t + \cos\bar{\omega}t)$. Determine the steady state response using time and frequency domain method and considering that the system starts from rest. The natural frequency and fraction of critical damping of SDOF system are $\omega_o$ and $\xi$, respectively.

Q2. A two-story building is modeled as 2-DOF system and rigid floors as shown in Figure below. Determine the maximum top floor maximum displacement and base shear due to El-Centro, 1940 earthquake ground motion. Take the inter-story lateral stiffness of floors i.e. $k_1$ = $k_2$=14000 kN/m and the floor mass $m_1$= 12000 kg and $m_2$=7000 kg.




Q3. A uniform bridge deck is simply supported as shown in Figure below. The mass of two lumped masses is *m* and flexural rigidity, *EI*. The bridge is modeled as a two-degrees-of-freedom discrete system as indicated in the figure. Assuming same earthquake acts simultaneously on both the supports in the vertical direction. Determine the maximum deflection due to El-Centro, 1940 earthquake ground motion. Take *L* = 9m, *m* = 1200 kg/m

and $EI = 8 \times 10^8$ kN.m$^2$.