SIDDHARTH GROUP OF INSTITUTIONS :: PUTTUR
Siddharth Nagar, Narayanavanam Road – 517583

QUESTION BANK

Subject with Code: STRUCTURAL DYNAMICS (19CE1006)

Course & Branch: M. Tech - Structural Engineering

Year & Sem: I M.TECH & II-Sem **Regulation:** R19

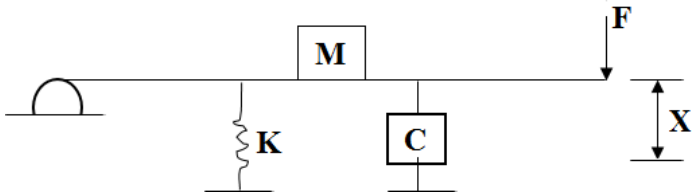
UNIT-I

INTRODUCTION TO STRUCTURAL DYNAMICS

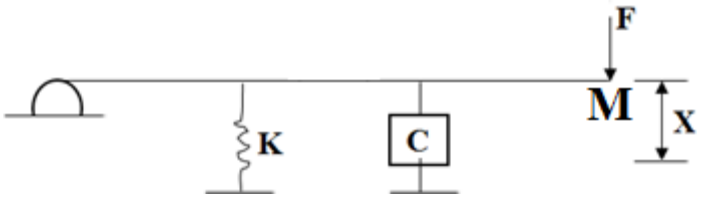
1. a) Explain about lumped mass and Continuous mass system. [6M]

b) Derive the Equation of motion for Undamped single degree of freedom system with forced vibration. [6M]

2. a) Derive the equation of motion for given system [6M]



b) Derive the equation of motion for given system [6M]



3. a) Derive the equation of motion for damped single degree of freedom system with forced vibration. [6M]

b) Briefly explain oscillatory motion. [6M]

4. Explain [12M]

a) Degree of freedom system

b) Harmonic Excitation

c) Simple harmonic motion

d) D'Alemberts principle

5. Briefly explain fundamental objectives of dynamic analysis with example [12M]

6. a) What is mathematical model with specific reference to structural dynamics. [6M]

b) Describe various method of discretization analysis of dynamic problem. [6M]

7. Derive the Equation of motion for damped single degree of freedom system with free vibration. [12M]

8. Explain about the D'Alemberts principle with example. [12M]

9. a) Derive the expression for time period of simple harmonic motion [6M]

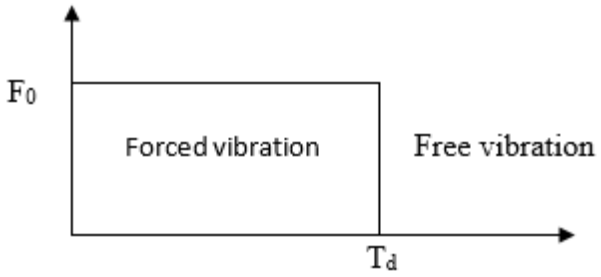
b) Derive the Equation of motion for undamped single degree of freedom system with free vibration [6M]

10. Explain different types of vibration problems and derive their equation of motion. [12M]

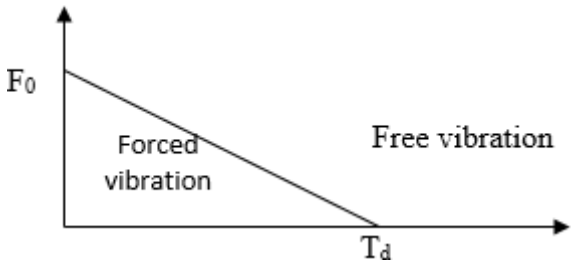
UNIT-II

SINGLE DEGREE OF FREEDOM SYSTEM

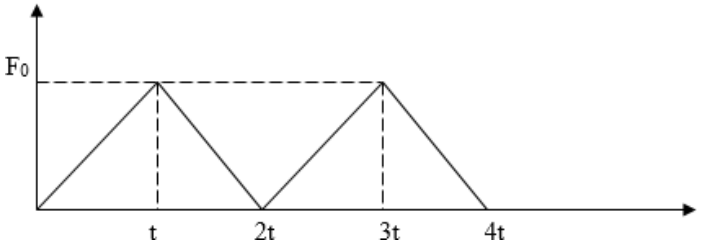
1. Derive the solution for undamped single degree of freedom system with free vibration [12M]
2. Derive the solution for damped single degree of freedom system with free vibration [12M]
3. Derive the solution for undamped single degree of freedom system with forced vibration [12M]
4. Derive the expression for logarithmic decrement for damped free vibration of SDOF for
   a) Two successive cycles [6M]
   b) Two cycles of N cycle apart [6M]
5. Derive expression for Duhamel integral. [12M]
6. Determine the response of SDOF system subjected to rectangular pulse load. [12M]



7. Determine the response of SDOF system subjected to triangle pulse load. [12M]



8. Derive the amplitude of the given problem when time is 4t. [12M]



9. Derive the equation for DMF for undamped single degree of freedom system with forced vibration. [12M]

10. Derive the formula for Damping ratio & Frequency ratio for undamped single degree of freedom system with forced vibration. [12M]

UNIT-III

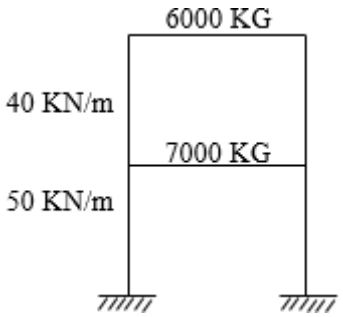
MULTI DEGREE OF FREEDOM SYSTEM

1. Derive the equation of motion for two degree of freedom system in matrix form and also derive the solution for the equation. [12M]

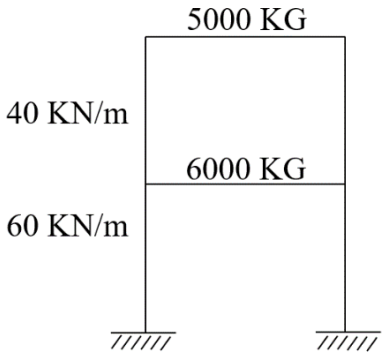
2. Derive the equation of motion for three degree of freedom system in matrix form and also derive the solution for the equation. [12M]

3. Briefly explain orthogonal properties of normal modes. [12M]

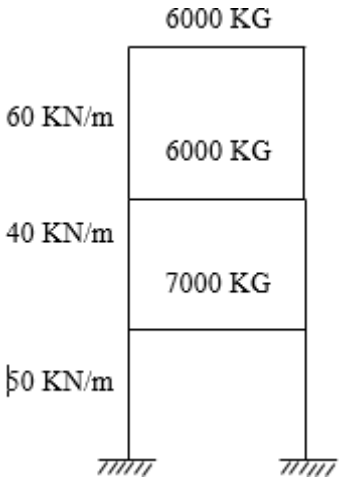
4. Draw the mode shapes for given problem [12M]



5. Draw the mode shapes for given problem. [12M]

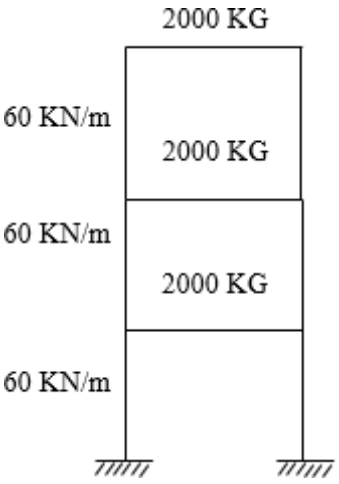


6. Draw the mode shapes for given problem. [12M]

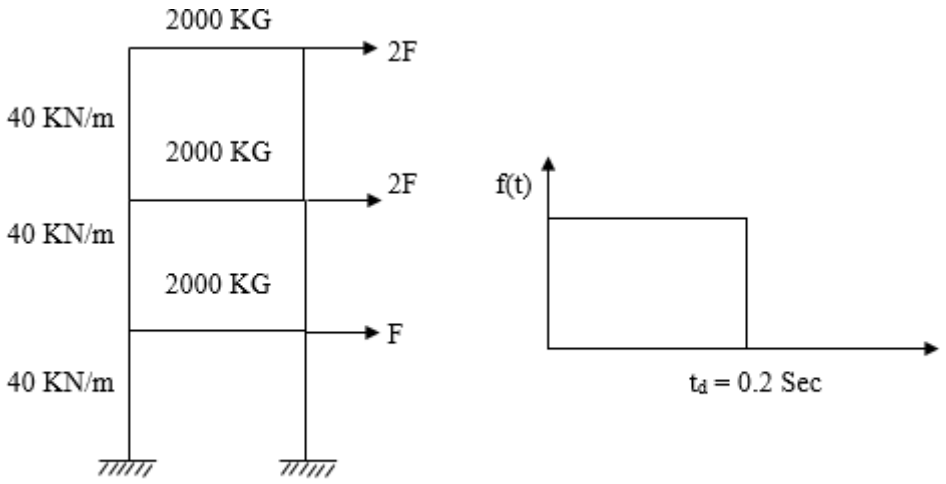


7. Draw the mode shapes for given problem. [12M]

8. Draw the mode shapes for given problem. [12M]

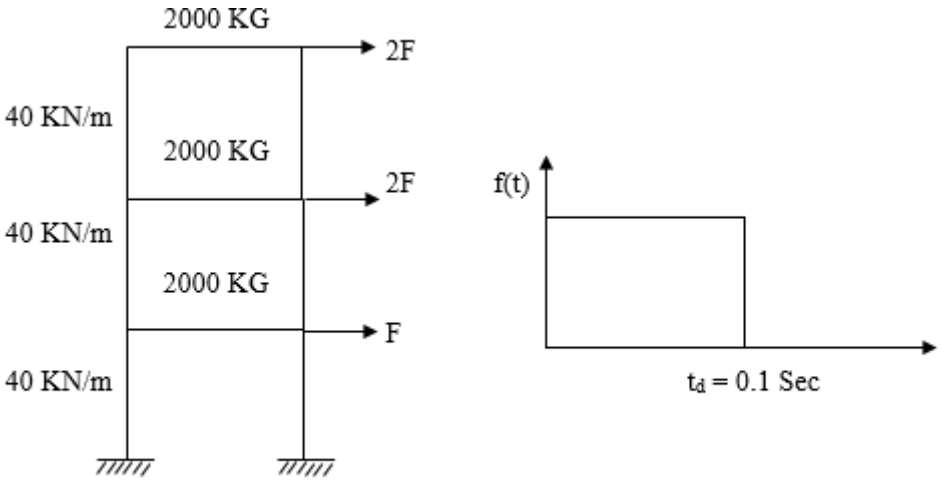


9. Draw the mode shapes for given problem [12M]



F = 2 KN

10. Draw the mode shapes for given problem. [12M]



F = 1.5 KN

UNIT-IV

CONTINUOUS SYSTEM

1. Derive the equation of motion for beam subjected to uniformly distributed load. [12M]

2. Derive the solution of equation of motion for the beam subjected to uniformly distributed load. [12M]

3. Derive the natural frequency and mode shapes for uniform beam having both end simply supported. [12M]

4. Derive the natural frequency and mode shapes for uniform beam having both end free. [12M]

5. Derive the natural frequency and mode shapes for uniform beam having one end fixed other end free. [12M]

6. Derive the natural frequency and mode shapes for uniform beam having one end fixed other end simply supported. [12M]

7. Derive the natural frequency for uniform beam having both end fixed. [12M]

8. Draw the mode shapes for uniform beam having both end fixed. [12M]

9. Draw the mode shapes for uniform beam having one end is fixed other end is simply supported. [12M]

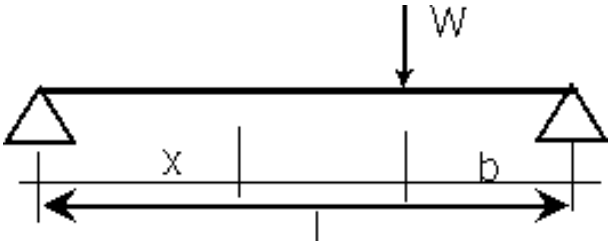
10. Draw the mode shapes for uniform beam having one end fixed other end free. [12M]

UNIT-V

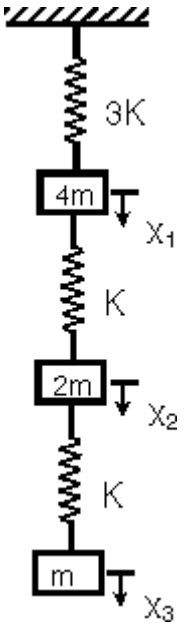
PRACTICAL VIBRATION ANALYSIS

1. Explain step by step procedure of Stodola's method? Derive fundamental natural frequencies and mode shapes? [12M]

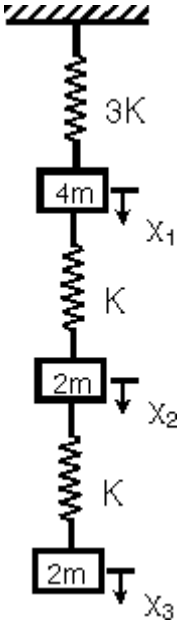
2. Find the fundamental natural frequencies and mode shapes of a vibratory system shown in figure. [12M]



3. For the given system, find the lowest natural frequency by Stodola's method. [12M]

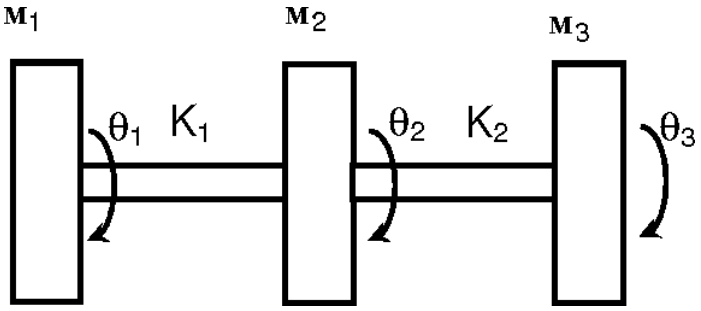


4. Find the fundamental frequencies and mode shapes of a vibratory system shown in figure.[12M]

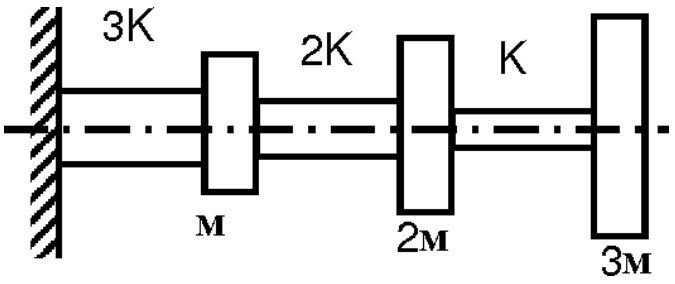


5. Explain step by step procedure of Holzer method? Derive fundamental natural frequencies and mode shapes? [12M]

6. For the system shown in figure, obtain natural frequencies using Holzer's method? [12M]

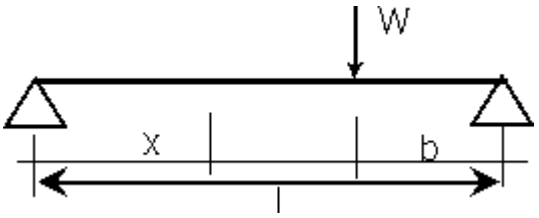


7. Calculate approximate natural frequency of a system by using Holzer's method? [12M]



8. Explain step by step procedure of Transfer matrix method? Derive fundamental natural frequencies and mode shapes? [12M]

9. Find the fundamental natural frequencies and mode shapes of a vibratory system shown in figure by using Transfer matrix method. [12M]



10. Calculate approximate natural frequency of a system by using Transfer matrix method?[12M]