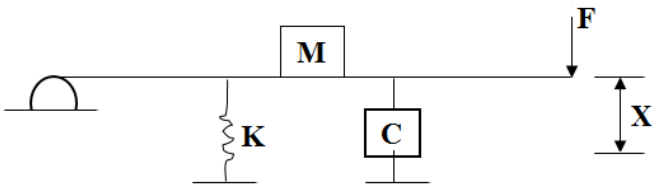
**SIDDHARTH GROUP OF INSTITUTIONS :: PUTTUR**
Siddharth Nagar, Narayanavanam Road – 517583

**QUESTION BANK**

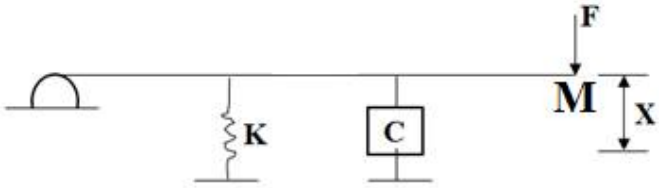
**Subject with Code:**Structural Dynamics (16CE2004)**Course & Branch**: M. Tech - Structural Engineering

**Year & Sem:**I M.TECH & I-Sem **Regulation:** R16

1. a) Explain about lumped mass and Continuous mass system.
   b) Derive the Equation of motion for Undamped single degree of freedom system with forced vibration
2. a) Derive the equation of motion for given system




   b) Derive the equation of motion for given system




3. a) Derive the equation of motion for damped single degree of freedom system with forced vibration
   b) Briefly explain oscillatory motion.
4. Explain
   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
6. a) What is mathematical model with specific reference to structural dynamics.
   b) Describe various method of discretization analysis of dynamic problem.
7. Derive the Equation of motion for damped single degree of freedom system with free vibration.
8. Explain about the D'Alemberts principle with example.
9. a) Derive the expression for time period of simple harmonic motion
   b) Derive the Equation of motion for undamped single degree of freedom system with free vibration

**10.** Explain different types of vibration problems and derive their equation of motion.

**11.** Derive the solution for undamped single degree of freedom system with free vibration

**12.** Derive the solution for damped single degree of freedom system with free vibration

**13.** Derive the solution for undamped single degree of freedom system with forced vibration

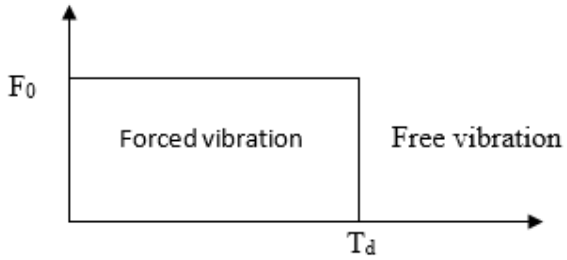
**14.** Derive the expression for logarithmic decrement for damped free vibration of SDOF for

a) Two successive cycles

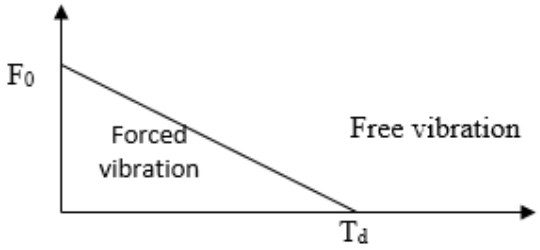
b) Two cycles of N cycle apart

**15.** Derive expression for Duhamel integral

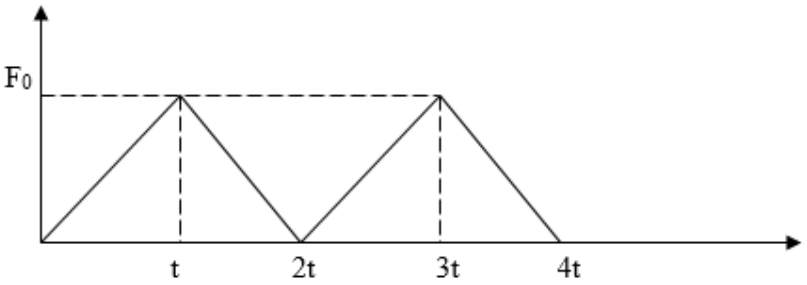
**16.** Determine the response of SDOF system subjected to rectangular pulse load.




**17.** Determine the response of SDOF system subjected to triangle pulse load.




**18.** Derive the amplitude of the given problem when time is 4t.




**19.** Derive the equation for DMF for undamped single degree of freedom system with forced vibration.

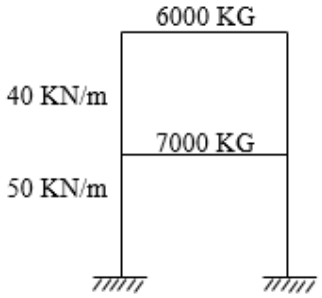
**20.** Derive the formula for Damping ratio & Frequency ratio for undamped single degree of freedom system with forced vibration.

**21.** Derive the equation of motion for two degree of freedom system in matrix form and also derive the solution for the equation.

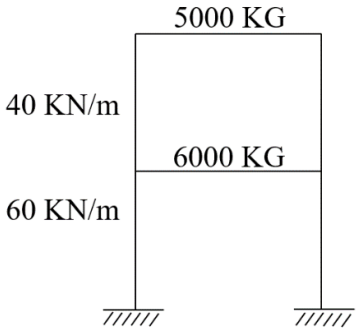
**22.** Derive the equation of motion for three degree of freedom system in matrix form and also derive the solution for the equation.

**23.** Briefly explain orthogonal properties of normal modes.

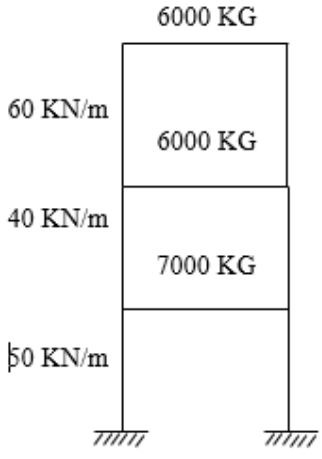
**24.** Draw the mode shapes for given problem



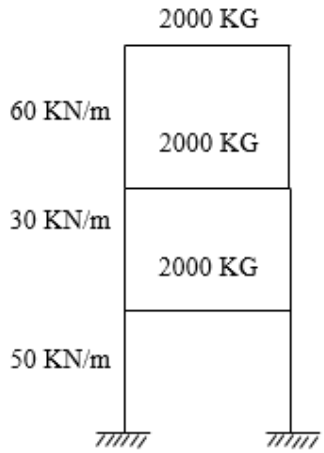

**25.** Draw the mode shapes for given problem.




**26.** Draw the mode shapes for given problem.

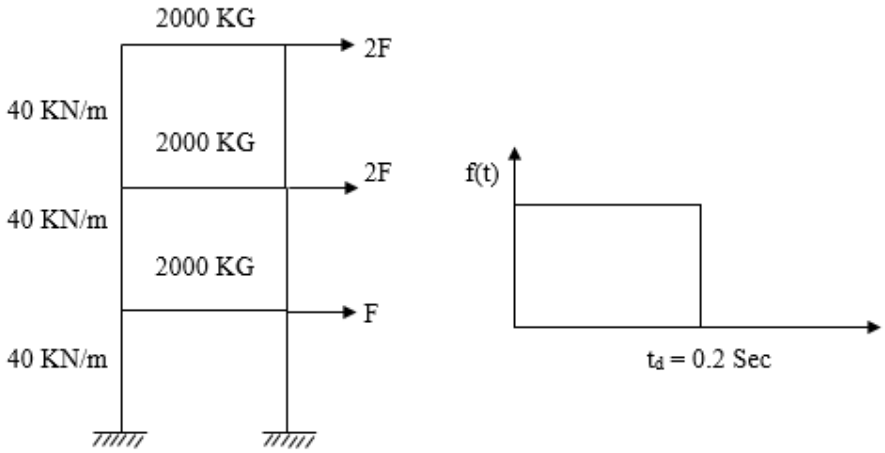


**27.** Draw the mode shapes for given problem.



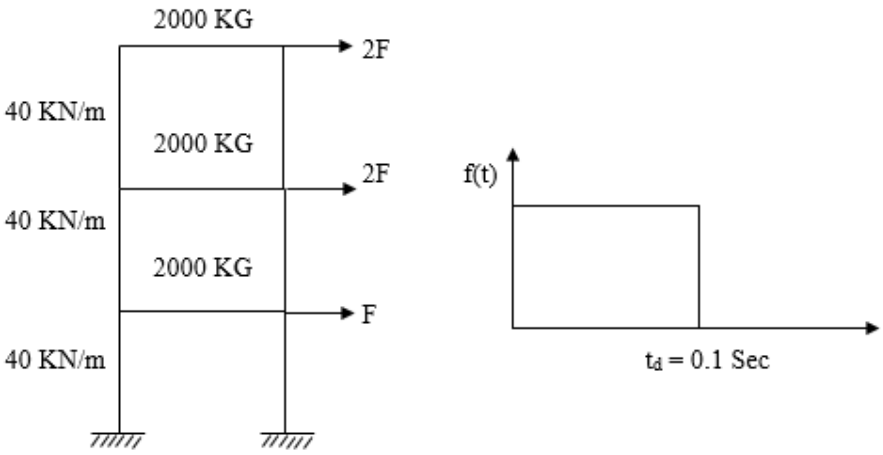

**28.** Draw the mode shapes for given problem.


**29.** Draw the mode shapes for given problem




F = 2 KN

**30.** Draw the mode shapes for given problem.




F = 1.5 KN

**31.** Derive the equation of motion for beam subjected to uniformly distributed load.

**32.** Derive the solution of equation of motion for the beam subjected to uniformly distributed load.

**33.** Derive the natural frequency and mode shapes for uniform beam having both end simply supported.

**34.** Derive the natural frequency and mode shapes for uniform beam having both end free.

**35.** Derive the natural frequency and mode shapes for uniform beam having one end fixed other end free.

**36.** Derive the natural frequency and mode shapes for uniform beam having one end fixed other end simply supported.

**37.** Derive the natural frequency for uniform beam having both end fixed.

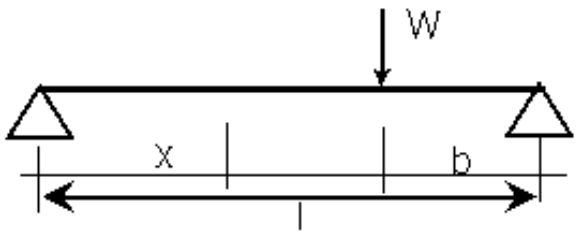
**38.** Draw the mode shapes for uniform beam having both end fixed.

**39.** Draw the mode shapes for uniform beam having one end fixed other end simply supported.

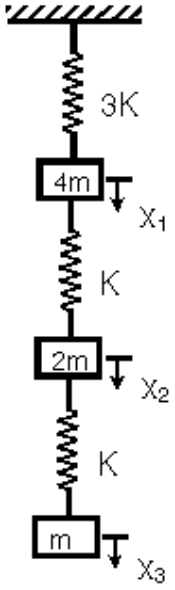
**40.** Draw the mode shapes for uniform beam having one end fixed other end free.

**41.** Explain step by step procedure of Stodola's method? Derive fundamental natural frequencies and mode shapes?

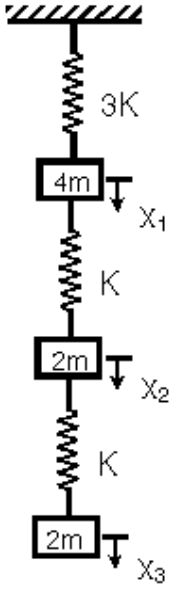
**42.** Find the fundamental natural frequencies and mode shapes of a vibratory system shown in figure.



**43.** For the given system, find the lowest natural frequency by Stodola's method.

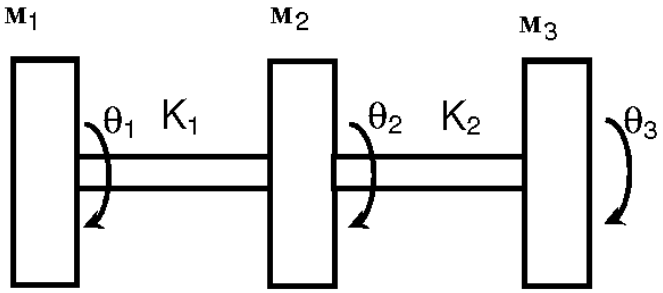



**44.** Find the fundamental frequencies and mode shapes of a vibratory system shown in figure.

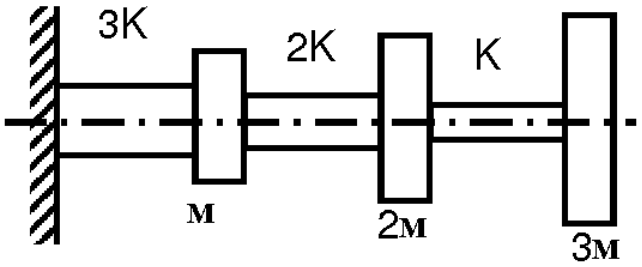



**45.** Explain step by step procedure of Holzer method? Derive fundamental natural frequencies and mode shapes?

**46.** For the system shown in figure, obtain natural frequencies using Holzer's method?

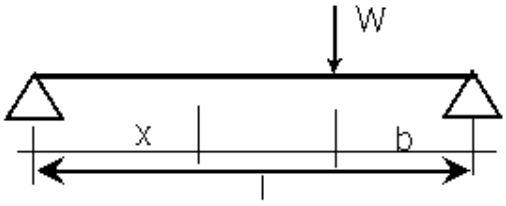



**47.** Calculate approximate natural frequency of a system by using Holzer's method?

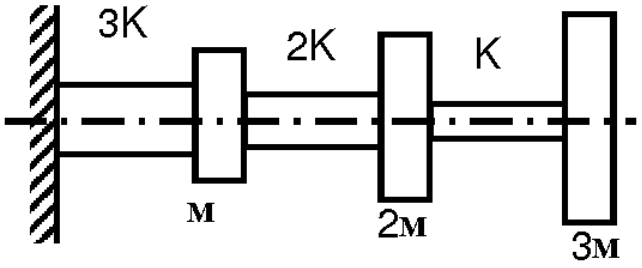



**48.** Explain step by step procedure of Transfer matrix method? Derive fundamental natural frequencies and mode shapes?

**49.** Find the fundamental natural frequencies and mode shapes of a vibratory system shown in figure by using Transfer matrix method.




**50.** Calculate approximate natural frequency of a system by using Transfer matrix method?

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