Course Code: 20CE1006 **R20**

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR (AUTONOMOUS)

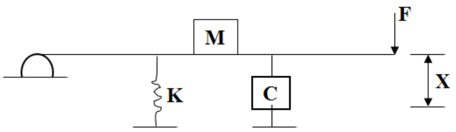
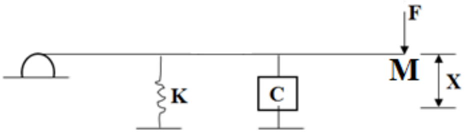
Siddharth Nagar, Narayanavanam Road – 517583

QUESTION BANK (DESCRIPTIVE)

Subject with Code: Structural Dynamics (20CE1006) **Course & Branch**: M.Tech - SE

Regulation: R20 **Year & Sem:** I-M.Tech & II-Sem

UNIT –I
INTRODUCTION TO STRUCTURAL DYNAMICS

1	a) Explain about lumped mass and Continuous mass system.	[L2][CO1]	**[6M]**
	b) Derive the Equation of motion for undamped single degree of freedom system with forced vibration.	[L2][CO2]	**[6M]**
2	a) Derive the equation of motion for given system 	[L3][CO1]	**[6M]**
	b) Derive the equation of motion for given system 	[L3][CO1]	**[6M]**
3	a) Derive the equation of motion for damped single degree of freedom system with forced vibration.	[L3][CO2]	**[6M]**
	b) Briefly explain oscillatory motion.	[L1][CO1]	**[6M]**
4	Explain		
	a) Degree of freedom system	[L2][CO1]	**[3M]**
	b) Harmonic Excitation	[L2][CO1]	**[3M]**
	c) Simple harmonic motion	[L2][CO1]	**[3M]**
	d) D'Alemberts principle	[L2][CO1]	**[3M]**
5	Briefly explain fundamental objectives of dynamic analysis with example	[L2][CO1]	**[12M]**
6	a) What is mathematical model with specific reference to structural dynamics?	[L1][CO1]	**[6M]**
	b) Describe various method of discretization analysis of dynamic problem.	[L2][CO1]	**[6M]**
7	Derive the Equation of motion for damped single degree of freedom system with free vibration.	[L3][CO1]	**[12M]**
8	Explain about the D'Alemberts principle with example.	[L2][CO1]	**[12M]**
9	a) Derive the expression for time period of simple harmonic motion	[L3][CO1]	**[6M]**
	b) Derive the Equation of motion for undamped single degree of freedom system with free vibration	[L3][CO2]	**[6M]**
10	Explain different types of vibration problems and derive their equation of motion.	[L2][CO1]	**[12M]**

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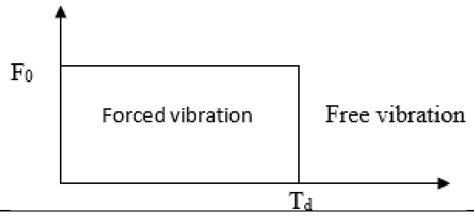
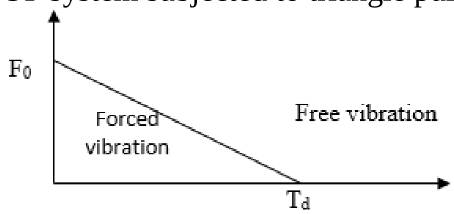
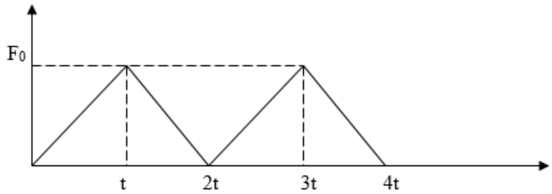
UNIT –II
SINGLE DEGREE OF FREEDOM SYSTEM

1	Derive the solution for undamped single degree of freedom system with free vibration	[L3][CO2]	**[12M]**
2	Derive the solution for damped single degree of freedom system with free vibration	[L3][CO2]	**[12M]**
3	Derive the solution for undamped single degree of freedom system with forced vibration	[L3][CO2]	**[12M]**
4	Derive the expression for logarithmic decrement for damped free vibration of SDOF for a) Two successive cycles b) Two cycles of N cycle apart	[L3][CO2]	**[12M]**
5	Derive expression for Duhamel integral.	[L3][CO3]	**[12M]**
6	Determine the response of SDOF system subjected to rectangular pulse load.  	[L3][CO3]	**[12M]**
7	Determine the response of SDOF system subjected to triangle pulse load.  	[L3][CO3]	**[12M]**
8	Derive the amplitude of the given problem when time is 4t.  	[L3][CO3]	**[12M]**
9	Derive the equation for DMF for undamped single degree of freedom system with forced vibration.	[L3][CO3]	**[12M]**
10	Derive the formula for Damping ratio & Frequency ratio for undamped single degree of freedomsystem with forced vibration.	[L3][CO3]	**[12M]**

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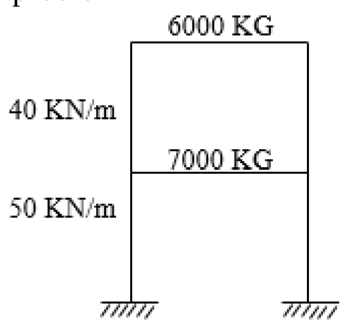
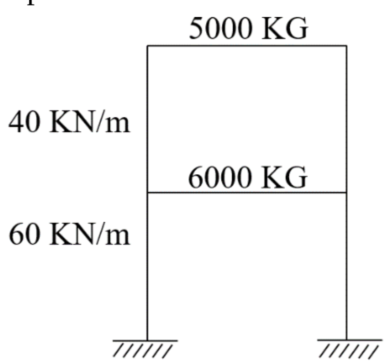
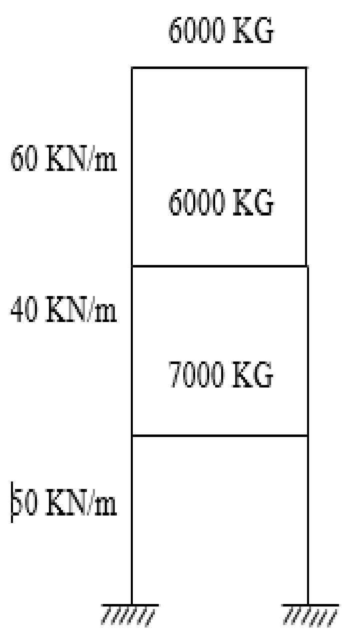
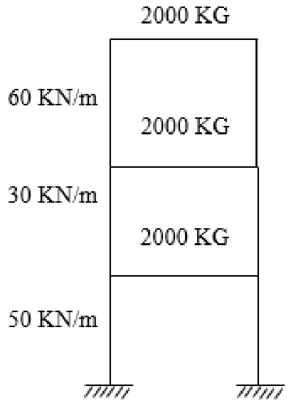
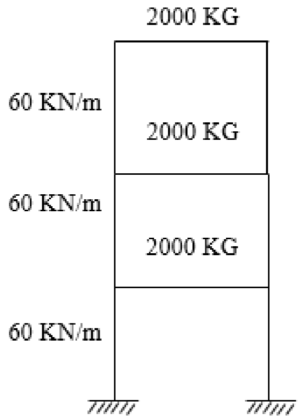
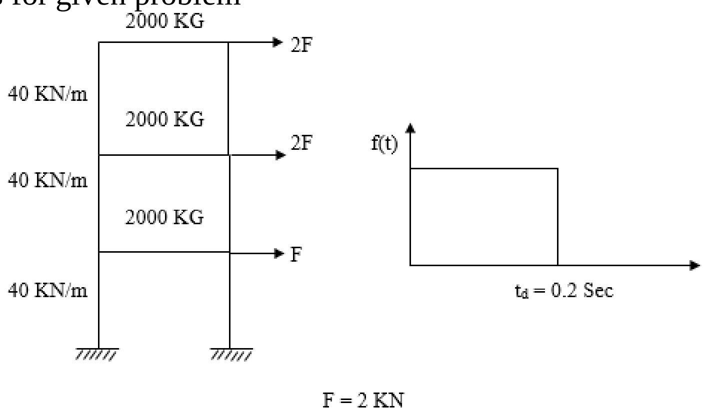
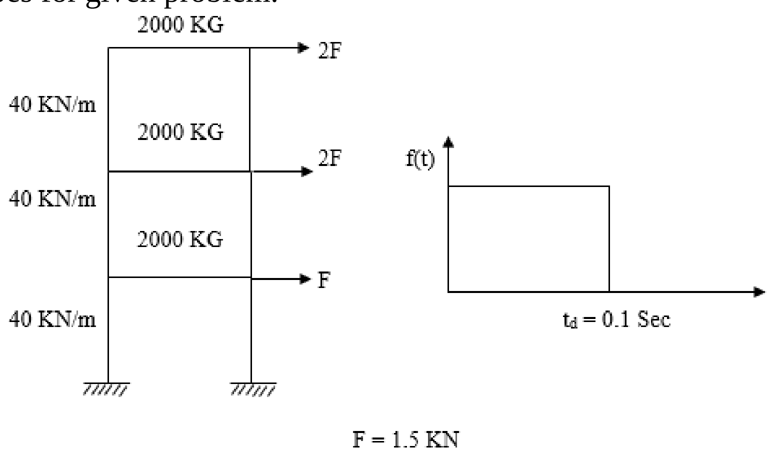
UNIT –III
MULTI DEGREE OF FREEDOM SYSTEM

1	Derive the equation of motion for two degree of freedom system in matrix form and also derive thesolution for the equation.	[L3][CO4]	**[12M]**
2	Derive the equation of motion for three degree of freedom system in matrix form and also derivethe solution for the equation.	[L3][CO4]	**[12M]**
3	Briefly explain orthogonal properties of normal modes.	[L2][CO4]	**[12M]**
4	Draw the mode shapes for given problem 	[L1][CO4]	**[12M]**
5	Draw the mode shapes for given problem. 	[L1][CO4]	**[12M]**
6	Draw the mode shapes for given problem. 	[L1][CO4]	**[12M]**

7	Draw the mode shapes for given problem.  	[L1][CO4]	**[12M]**
8	Draw the mode shapes for given problem.  	[L1][CO4]	**[12M]**
9	Draw the mode shapes for given problem  	[L1][CO4]	**[12M]**
10	Draw the mode shapes for given problem.  	[L1][CO4]	**[12M]**

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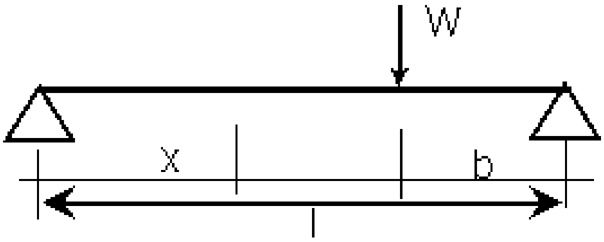
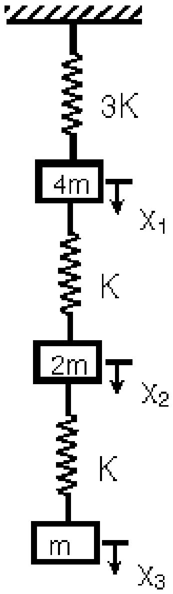
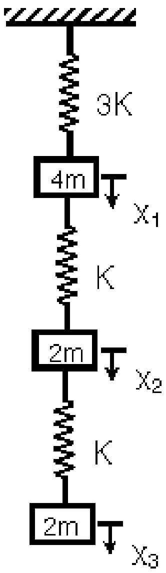
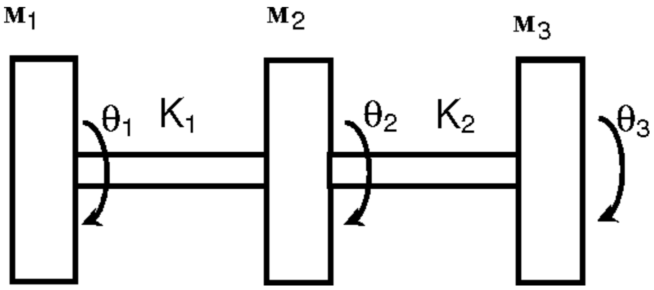
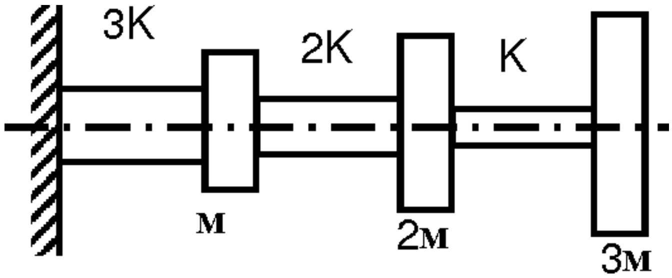
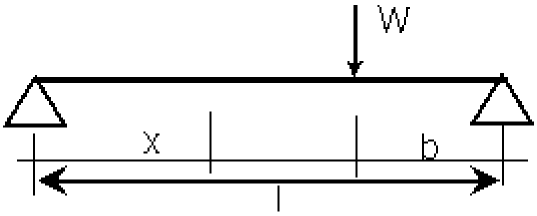
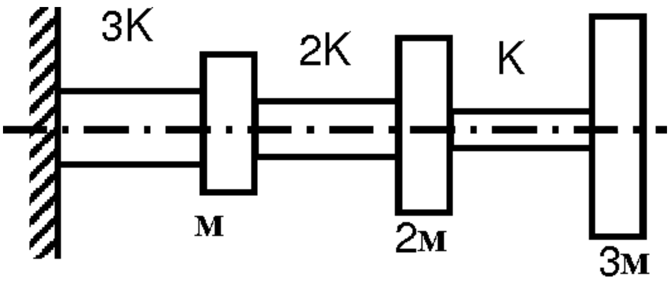
UNIT –IV
CONTINUOUS SYSTEM

1	Derive the equation of motion for beam subjected to uniformly distributed load.	[L3][CO5]	**[12M]**
2	Derive the solution of equation of motion for the beam subjected to uniformly distributed load.	[L3][CO5]	**[12M]**
3	Derive the natural frequency and mode shapes for uniform beam having both end simply supported.	[L3][CO5]	**[12M]**
4	Derive the natural frequency and mode shapes for uniform beam having both end free.	[L3][CO5]	**[12M]**
5	Derive the natural frequency and mode shapes for uniform beam having one end fixed other end free.	[L3][CO5]	**[12M]**
6	Derive the natural frequency and mode shapes for uniform beam having one end fixed other end simply supported.	[L3][CO5]	**[12M]**
7	Derive the natural frequency for uniform beam having both end fixed.	[L3][CO5]	**[12M]**
8	Draw the mode shapes for uniform beam having both end fixed.	[L1][CO5]	**[12M]**
9	Draw the mode shapes for uniform beam having one end is fixed other end is simply supported.	[L1][CO5]	**[12M]**
10	Draw the mode shapes for uniform beam having one end fixed other end free.	[L1][CO5]	**[12M]**

UNIT –V
PRACTICAL VIBRATION ANALYSIS

1	Explain step by step procedure of Stodola's method? Derive fundamental natural frequenciesand mode shapes?	[L2][CO6]	**[12M]**
2	Find the fundamental natural frequencies and mode shapes of a vibratory system shown in figure. 	[L2][CO6]	**[12M]**
3	For the given system, find the lowest natural frequency by Stodola's method. 	[L2][CO6]	**[12M]**
4	Find the fundamental frequencies and mode shapes of a vibratory system shown in figure. 	[L2][CO6]	**[12M]**

5	Explain step by step procedure of Holzer method? Derive fundamental natural frequencies and mode shapes?	[L2][CO6]	**[12M]**
6	For the system shown in figure, obtain natural frequencies using Holzer's method? 	[L3][CO6]	**[12M]**
7	Calculate approximate natural frequency of a system by using Holzer's method? 	[L3][CO6]	**[12M]**
8	Explain step by step procedure of Transfer matrix method? Derive fundamental natural frequencies and mode shapes?	[L2][CO6]	**[12M]**
9	Find the fundamental natural frequencies and mode shapes of a vibratory system shown in figure by using Transfer matrix method. 	[L1][CO6]	**[12M]**
10	Calculate approximate natural frequency of a system by using Transfer matrix method? 	[L3][CO6]	**[12M]**

Prepared by: Ms. C. Sailaja