Reg.No. _____

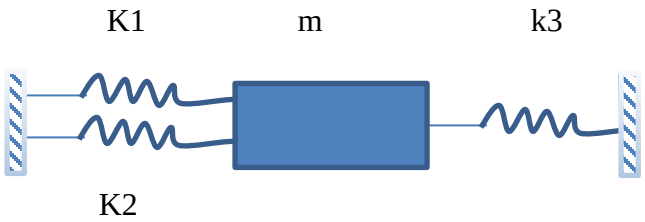
Karunya UNIVERSITY

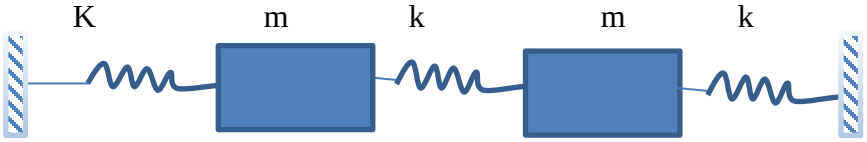
(Karunya Institute of Technology & Sciences)
(Declared as Deemed-to-be University under Sec.3 of the UGC Act, 1956)

End Semester Examination – Nov/Dec – 2016

Code : 14CE2032 **Semester : VII**
Sub. Name : Basics of Dynamics and Aseismic Design **Duration : 3hrs**
Max. marks : 100

ANSWER ALL QUESTIONS (5 x 20 = 100 Marks)

Q. No.	Sub Div.	Questions	Course Outcome	Marks
1.	a.	Write the equation of motion for damped free vibration system.	CO1	1
	b.	Define damping ratio	CO1	1
	c.	Write the equation for natural frequency of the system.	CO1	2
	d.	Differentiate static and dynamic load.	CO1	2
	e.	A simply supported rectangular beam has a span of1m. It is 100mm wide and 10mm deep. It is connected at mid span of a beam by means of a linear spring having a stiffness of 100kg/cm and a mass of 300kg is attached to the other end of spring. Determine the natural frequency of the system. E=2.1 x 10^6 kg/cm^2.	CO1	14
		(OR)		
2	a.	What is meant by spring in parallel?	CO1	2
	b.	A two kg mass is supended by a spring having a stiffness of 3N/mm. Determine the Natural frequency of the system.	CO1	4
	c.	List the various dynamic loads and mention how the forces are transmitted to the building.	CO1	4
	d.	Find the natural frequency of the system shown in the figure. Take K1=k2= 2000 N/m and K3 = 3000N/m. m=10kg. 	CO2	10
3.	a.	Derive the equation of motion of a damped single degree of freedom system and explain the conditions	CO1	6
	d.	A vibrating system consisting of a weight of 1200 kN and a spring stiffness of 100 kN/m is viscously damped so that the ratio of two consecutive amplitudes is 1 to 0.80. determine a) logarithmic decrement, b) natural frequency, c)damping ratio, d) damping coefficient and e) damped natural frequency	CO1	14
		(OR)		
4.	a.	What is relation between logarithmic decrement and damping ratio?	CO1	3
	b.	What is meant by critical damping coefficient? How is it calculated?	CO1	3
	c.	A SDOF system consists of a mass of 350kg and a spring stiffness of 250kN/m. By testing it was found that a force of 80N produces a relative velocity 10 cm/s. Find a) Damping ratio b) logarithmic decrement , c) ratio of two consecutive amplitudes	CO1	14
5.	a.	A column of length 3.0 m is fixed at both ends. E= 2 x 10^5 N/mm^2, I= 1.8 x 10^6 mm^4. Determine the stiffness of the column.	CO1	2
	b.	Differentiate steady state and transient vibration.	CO1	4

	c.	A SDOF system consists of a mass of 25kg, a spring of stiffness 2500 N/m and a damping coefficient of 70Ns-m is subjected to a harmonic excitation of F=225 sin 5t. Calculate the steady state response.	CO1	**14**
		(OR)		
6.	a.	Why the response reduction factor for special RC moment resisting frame is higher than for ordinary moment resisting frame?	CO2	**2**
	b.	What is the zone factor for Delhi? Mention its zone.	CO2	**2**
	c.	Name the types of plate boundaries	CO2	**2**
	d.	A generator of 0.8 ton weight is placed on a concrete plank of width 450mm and length 2 m and thickness 100mm. Find the static and dynamic deflection of generator running at 1850 rpm. Use M20 concrete. Assume damping ratio as 5% of critical	CO1	**14**
7.	a.	Describe briefly the different seismic waves	CO2	**8**
	b.	Determine the natural frequency and mode shapes of the two degree of freedom system shown in figure 	CO2	**12**
		(OR)		
8.	a.	Draw the response spectrum curve as per IS1893:2002. Explain the salient features	CO2	**2**
	b.	What is meant by ductility? How is it measured?	CO2	**4**
	c.	Explain briefly how ductile detailing is done as per IS codes.	CO3	**14**
		Compulsory:		
9.	a.	Explain the concepts of bracings and base isolation.	CO3	**8**
	b.	A three storey RC school building is located in Mumbai with the following data Plan dimensions - 8.5 m Storey height - 3.5m Weight of I, II floors- 1600kN Weight of terrace – 900kN The structure is resting on medium soil. Determine the total base shear and lateral loads at each floor level for 5% of damping using seismic coefficient method.	CO2	**12**

ALL THE BEST