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[M19CAD1105]
I M. Tech I Semester (R19) Regular Examinations
MECHANICAL VIBRATIONS
Department of Mechanical Engineering
MODEL QUESTION PAPER

TIME: 3Hrs. **Max. Marks: 75 M**

Answer **ONE Question** from **EACH UNIT.**
All questions carry equal marks.
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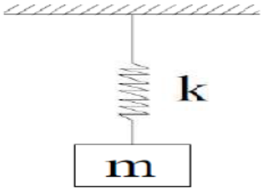
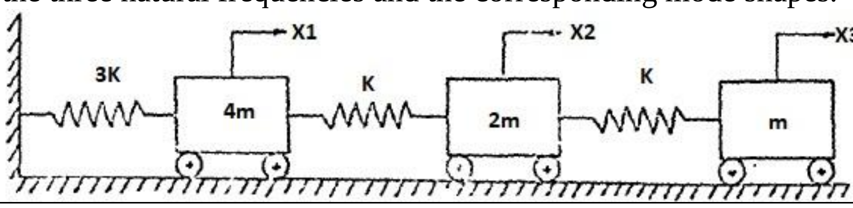
			CO	KL	M
		UNIT-I			
1.	a).	Determine the differential equation of a spring mass system (shown in the figure below) and its natural frequency by using (i). D' Alembert's principle and (ii). Rayleigh's method. 	1	3	8
	b).	Explain the classifications of vibration with examples.	1	2	7
		OR			
2.	a).	Write short notes on vibration isolation and transmissibility	1	2	7
	b).	Derive the expression for vibration response of a single degree of freedom system if the damping provided is under damped system.	1	3	8
		UNIT-II			
3.		Write short notes on convolution integral and shock spectrum.	2	2	15
		OR			
4.		Obtain the response equation for a system subjected to unit step and unit ramp functions.	2	3	15
		UNIT-III			
5.		For the three degree of freedom system shown in figure below, obtain the three natural frequencies and the corresponding mode shapes. 	3	3	15
		OR			
6.		Determine the natural frequency of torsional vibrations of a shaft with two circular discs of uniform thickness at the ends. The masses of the discs are M1 = 500 kg and M2 = 1000 kg and their outer diameters are D1 = 125 cm and D2 = 190 cm. The length of the shaft is 300 cm and	3	3	15

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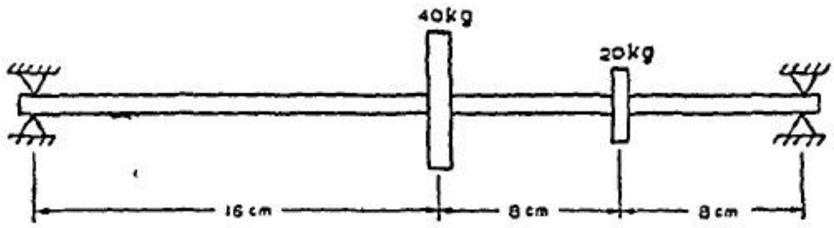
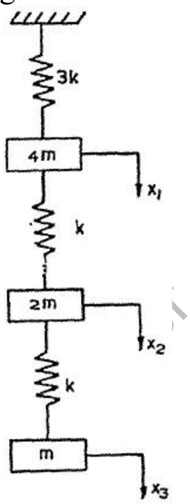
		its diameter is 10 cm. Take the Modulus of rigidity for the material of shaft is $G = 0.83 \times 10^{11}$ N/m^2.			
		UNIT-IV			
7.		Find the lowest natural frequency of transverse vibrations for the system shown in figure below by Rayleigh's method. Take $E=1.96 \times 10^{11}$ N/m^2 and $I=10^{-6}$ m^4.  	4	3	15
		OR			
8.		For the three degree of freedom system shown in figure below find the lowest natural frequency using Stodola's method.  	4	3	15
		UNIT-V			
9.		Calculate the whirling speed of shaft supported by long bearing so as to give zero slope at both ends of the shaft.	5	3	15
		OR			
10.		Prove that the critical speed of whirling speed for a rotating shaft is same as the frequency of natural transverse vibration.	5	3	15

CO-CRSE TCOME **KL-KNOWLEDGE LEVEL** **M-MARKS**

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