Exam. Code: 0942
Sub. Code: 33874

2015

B.E. (Mechanical Engineering)-Sixth Semester

MEC-603: Mechanical Vibrations

Time allowed: 3 Hours **Max. Marks: 50**

NOTE: ***Attempt five questions in all, including Question No. I which is compulsory and selecting two questions from each Section.***

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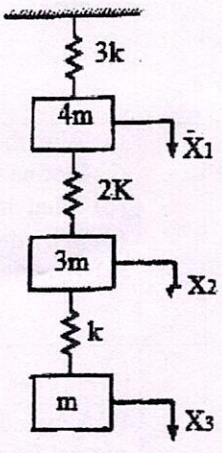
1	(a) Why the study of vibration is necessary in engineering? (b) Define vibration isolation. (c) What are principal coordinates? What is their use? (d) Why the measurement of vibration is necessary? (e) What is the difference between discrete system and continuous system?	(2×5)
	Section A(Attempt any two questions)	
2	(a)A cylinder of mass M and radius r rolls without slipping on a cylindrical surface of radius R. Find the natural frequency for small oscillations about the lowest point. (b) A light cantilever of length L has a mass M fixed at its free end. Find the frequency of lateral vibrations in the vertical plane.	5 5
3	(a) A mass of 1 kg is to be supported on a spring having a stiffness of 9800 N/m. The damping coefficient is 4.9 N-sec/m. Determine the natural frequency of the system. Find also the logarithmic decrement and the amplitude after three cycles if the initial displacement is 0.30 cm. (b) Explain critical damping Co-efficient.	6 4
4	(a) A ratio set of 20 kg mass must be isolated from a machine vibration with an amplitude of 0.05 mm at 500 rpm. The set is mounting on four isolators, each having a spring scale of 31400N/m and damping factor of 392 N-sec/m. (i) What is the amplitude of vibration of the radio? (ii) What is the dynamic load on each isolator due to vibration? (b) Draw a neat sketch of dry friction damper and explain its working.	6 4
	Section B(Attempt any two questions)	
5	(a) Write a short note on (i) Vibration absorber (ii) Vibration Isolation (b) Calculate the natural frequency of a shaft of diameter 10 cm and length 300 cm carrying two discs of diameters 125 cm and 200 cm respectively at its ends and weighing 480 N and 900 N respectively. Modulus of rigidity of the shaft may be taken as 1.96×10^{11} N/m^2.	5 5

P.T.O.

6.	Determine the natural frequencies and mode shapes of the system shown in the Fig-1, by matrix iteration method.  Fig-1	10
7	A uniform string is tightly stretched between x = 0 and x = l and is plucked at x = l/4, through a distance h and then released from rest. Find its subsequent displacement	10

x-x-x