Exam.Code:0942
Sub. Code: 7060

(27)

1059

B.E. (Mechanical Engineering)

Sixth Semester

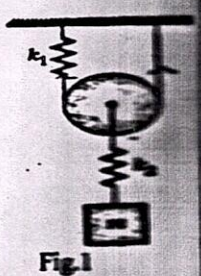
MEC-603: Mechanical Vibrations

Time allowed: 3 Hours

Max. Marks: 50

NOTE: *Attempt five questions in all, including Question No. 1 which is compulsory and selecting two questions from each Section.*

x-x-x

1	(a) Why the study of vibration is necessary in engineering? (b) Define the hysteresis damping constant. (c) What is longitudinal vibration? (d) What is orthogonality principle? (e) What is the difference between energy method and Rayleigh method?	10
	Section A(Attempt any two questions)	
2	(a)A body is subjected to two harmonic motions as given below: $X_1 = 15\cos(\omega t+\Pi/6)$ $X_2 = 8\cos(\omega t+\Pi/3)$ What extra harmonic motion should be given to the body to bring it to static equilibrium?	5
	(b) The motion of a particle is represented by the equation x=4 sin ωt. Sketch roughly, the variation of the maximum values of (i) displacement (ii) velocity (iii) acceleration (iv) jerk, with the change in exciting frequency.	5
3	(a) Determine the natural frequency of the mass m=15 kg as shown in Fig.1 assuming that the cords do not stretch and slide over the pulley rim. Assume that the pulley has no mass. Given $K_1 = 8 \times 10^3$ N/m, $K_2 = 6 \times 10^3$ N/m  Fig.1	5
	(b) 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.	5
4	(a) A compressor weighing 600 N and operating at 1000 rpm, is mounted on six parallel springs of stiffness 6000 N/m each. Determine the maximum permissible unbalance in order to limit the steady state deflection to 2.5 mm peak-to-peak	5
	(b) Draw a neat sketch of dry friction damper and explain its working.	5

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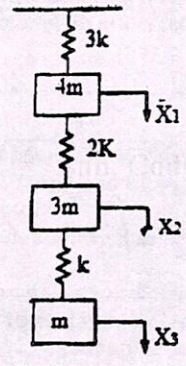
	Section B(Attempt any two questions)	
5	(a) Write a short note on (i) Vibration absorber (ii) Vibration Isolation	5
	(b) Calculate the natural frequency of a shaft of diameter 10 cm and length 300 cm carrying two discs of diameters 125 cm and 200 cm respectively at its ends and weighing 480 N and 900 N respectively. Modulus of rigidity of the shaft may be taken as 1.96×10^{11} N/m^2.	5
6.	Determine the natural frequencies and mode shapes of the system shown in Fig.2 by matrix iteration method.  Fig.2	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