Exam.Code:0942
Sub. Code: 7060

2062

B.E. (Mechanical Engineering)
Sixth Semester
MEC-603: Mechanical Vibrations

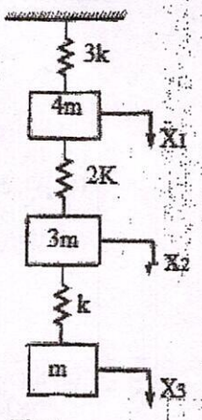
Time allowed: 3 Hours | Max. Marks: 50

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

x-x-x

1	(a) Write the name of the different parts of a vibrating system. (b) Define vibration isolation. (c) What is longitudinal vibration? (d) What do you mean by Co-ordinate coupling? (e) What is the difference between discrete system and continuous system?	10
	Section A	
2	(a) Show that two simple harmonic motions with frequency p and 2p when added will result in a periodic function of frequency p. Generalize the above for a number of harmonic functions with frequencies p,2p.....np etc.	5
	(b) A steel wire with $E=1.96\times10^{11}$ N/m^2 is of 2mm diameter and is 30mm long. It is fixed at the upper end and carries a mass M kg at its lower end. Find M so that frequency of longitudinal vibration is 4 cycle/sec.	5
3	(a) A shock absorber is to be designed so that its overshoot is 10% of the initial displacement when released. Determine the damping factor. If the damping factor is reduced to one half this value, what will be the overshoot?	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 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?	6
	(b) Draw a neat sketch of dry friction damper and explain its working.	4
	Section B	
5	(a) Explain semi-definite system. Derive the equation of motion and also find the natural frequency of the system.	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

P.T.O.

6.	Determine the natural frequencies and mode shapes of the system shown in Fig.1 by matrix iteration method.  Fig.1	10
7	Drive governing second order partial differential equation of the stretched string in transverse vibrations using Hamilton's principle.	10

x-x-x