Total No. of Questions : 8]

SEAT No. :

P4647

[Total No. of Pages :2

[4860]-1029
M.E. (Civil) (Structures)
STRUCTURAL DYNAMICS
(2013 Pattern)

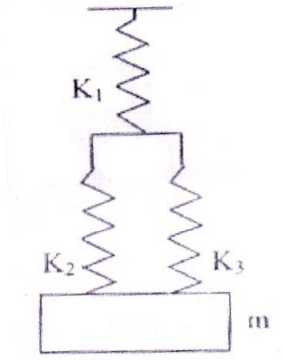
Time : 3 Hours] *[Maximum Marks : 50*

Instructions to the candidates:

1) ***Answer any five questions.***
2) ***Figures to the right indicate full marks.***
3) ***If necessary, assume suitable data and indicate clearly.***
4) ***Use of electronic pocket calculator is allowed.***

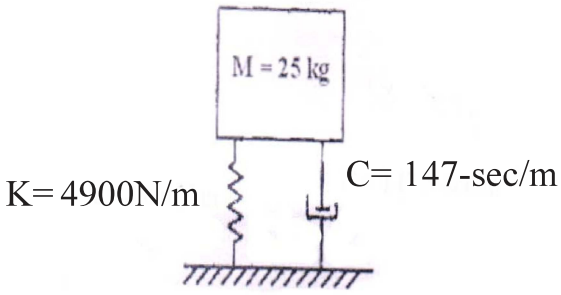
Q1) a) Derive an expression for equivalent spring constants for springs arranged in series and in parallel for representing stiffness K. **[5]**

b) Find the natural frequency of the system shown in figure 1. Given $K_1=K_2=1500N/m$, K3=2000N/m and m= 5kg. **[5]**



Q2) a) Derive an expression for free vibrating undamped single degree of freedom system. **[5]**

b) A 25 kg mass is resting on a spring of 4900 N/m and dashpot of 147 N-se/m in parallel. If a velocity of 0,10 m/sec is applied to the mass at the rest position, what will be its displacement from the equilibrium position at the end of first second? **[5]**



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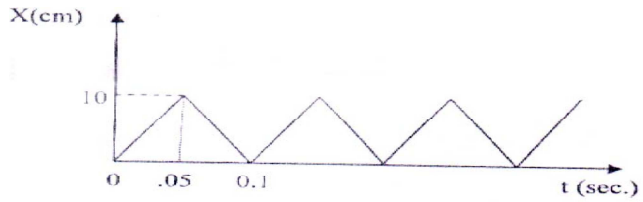
Q3) a) Using Duhamel's integral determine Dynamic loading factor for Step force applied undamped oscillator. **[5]**

b) A machine part of mass 2.5 Kgs vibrates in a viscous medium. A harmonic exciting force of 30 N acts on the part and causes resonant amplitude of 14 mm with a period of 0.22 sec. Find the damping coefficient. **[5]**

Q4) A periodic motion observed on the oscilloscope is shown in figure 3 represent the displacement equation by harmonic series. **[10]**

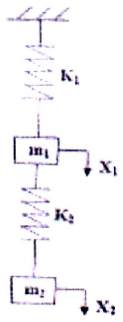


Q5) a) Write short note on Newmark's method. **[5]**

b) Derive the expression for multidegree of freedom system and application of Eigen vector and Eigen value for determining natural frequency and mode shapes. **[5]**

Q6) a) Show that modes are orthogonal to each other. **[3]**

b) Obtain the frequency equation for the system shown in figure. Also determine the natural frequencies and mode shapes when K1 = 4K, K2 = 3K, ml = 2m, m2 = 3m. **[7]**



Q7) a) Write a note on mode superposition method for MDOF system. **[5]**

b) Write short note on Non linear analysis using Wilson Theta. **[5]**

Q8) Derive an expression for natural frequency of simply supported beam which resembles a continuous system. **[10]**

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