M18002066

Registration No: | | | | | | | | | | |

Total Number of Pages : 02 **M.TECH**

M.TECH 2ND SEMESTER REGULAR EXAMINATIONS, MAY 2018
STRUCTURAL DYNAMICS
Branch: SE, Subject Code:MSEPC2020
Time: 3 Hours
Max Marks : 70

PART-A (10 X 2=20 MARKS)

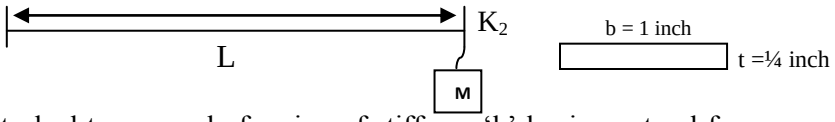
1. Answer the following questions.

a. Define *time period* and *frequency* of vibration. CO1
b. What is the standard percentage of damping value considered in structural vibration? CO1
c. Distinguish between *free vibration* and *forced vibration*. CO1
d. State Hamilton's principle. CO4
e. If two springs are in series to each other and their resultant is parallel to a 3rd spring, Find the equivalent spring factor. K value for each spring is same. CO1
f. What do you mean by Eigen value? CO3
g. State the differential equation for rod fixed at one end. CO2
h. What does the 'transient response' of a system mean? CO4
i. Explain, with a neat sketch, the relation between external force and mass, stiffness, damping of a linearly elastic system. CO1
j. What do you mean by dynamic response factor? CO4

PART-B (5 X 10=50 MARKS)

Answer any five questions from the following.

2. a. Determine the natural frequency of system as shown in figure below. Consisting of weight 50.72b attached to horizontal cantilever beam through the coil spring K_2. The cantilever beam has a thickness t = ¼ inch and width b = 1 inch. E =$30x10^6$ psi, l = 12.5 inches. K_2 = 10.69 pound/inch. (5) CO1



b. An unknown mass 'm' is attached to one end of spring of stiffness 'k' having natural frequency of 6Hz. When 1 kg mass is attached with m, the natural frequency of the system is lowered by 20%. Determine the value of unknown mass 'm' and stiffness 'k'. (5) CO1

3. a. An object of mass 0.25 kg is suspended by a spring having stiffness of 0.1533 N/mm. determine the natural frequency in cycles/sec. also find it's statically deflection. (5) CO1
b. Derive the differential equation of motion by the principle of conservation of energy (5) CO2

4. a. Discuss various types of motion with schematic graph. (5) CO1
b. Show that the logarithmic decrement is given by the equation § = $\frac{1}{n}\ln(\frac{xo}{xn})$, where x_n represents the amplitude after n cycles. (5) CO2

5. a. The following data given for vibrating system with damping. CO3
W (wt) = 10 lb
K = 30 lb/inch
C = 0.12 lb/inch/sec.
Determine the logarithmic decrement and ration of any two successive amplitude. (5)

b. Determine the magnification force of forced vibration produced by an oscillation fixed at the middle of the beam. The speed is 60 rpm. The weight concentrated at the middle of the beam is 500N and produces a static deflection of beam 0.025cm. Neglect the weight of the beam and assume the damping is equivalent to force. (5) CO2

CO2

6. a. Derive the equation for longitudinal vibration of rod. (5) CO2

b. Derive the equation for transverse vibration of Euler beam. (5)

7. a. Determine the natural frequency of vibration of uniform beam clamped at one end and free at other end. (5) CO1

b. How to evaluate the damping motion by Bandwidth method? (5) CO1

CO4

8. Write Short Notes (5 x 2) CO4

a. Rayleigh equation

b. Characteristics of curve

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