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M.TECH

Total Number of Pages :2

M.TECH 1ST SEMESTER SUPPLE EXAMINATIONS, DECEMBER 2018
MACHINE VIBRATION

Branch: MD, Subject Code:MMDPC1030
(Regulations 2017)

Time: 3 Hours

Max Marks : 70

Question Code: SD18002059

PART-A (10 X 2=20 Marks)

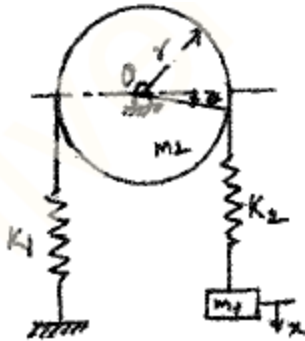
1. Answer the following questions.

- What is Rayleigh's method, write its applications.
- Define Force vibration.
- What is meant by viscous damping.
- Using Rayleigh's energy method find the natural frequency of cantilever beam due to its own weight?
- Explain static and dynamic balancing of rotor?
- Differentiate between vibrometer and accelerometer?
- What is the difference between a vibration absorber and a vibration isolator?
- What methods are available for solving the governing equations of a vibration problem?
- What are the causes and effect of vibration.
- What do you mean by Dynamic Response?

PART-B (5 X 10=50 Marks)

Answer any five questions from the following.

- In a forced vibration with degree of freedom=1; the exciting Force is given by $F=100\sin(2t)$ Newton where t is time in second stiffness constant $K=500$ N/m; $m=100$ kg, damping coefficient $c=0.2$ N. sec/m, Determine: Natural frequency and Damping Ratio [5]
- Find the natural frequencies of system shown in figure. Assume that there is no slip between the cord and the cylinder. $K_1=40$ N/m, $K_2=60$ N/m, $m_1=2$ Kg, $m_2=10$ Kg. [5]

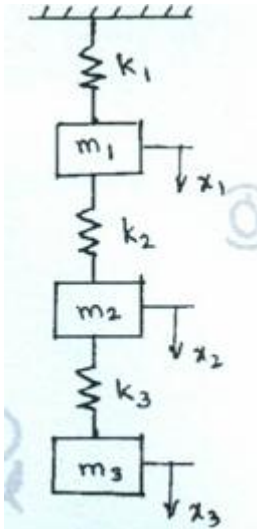


- A harmonic motion is given by $x(t) = 10 \sin(30t - \pi/3)$ mm where t is in seconds and phase angle radians. Find [5]

- frequency and the period of motion. [5]
- the maximum displacement, velocity and acceleration.



4. For a single degree of freedom forced undamped system, stiffness is 500 N/m, mass = 10 kg and applied maximum force(F) = 40 N. The forcing function has a circular frequency of 18 rad/sec. The initial displacement is 0.01 m and initial velocity is 1 m/s. Determine : [5]
a) the frequency ratio [5]
b) the amplitude of forced vibration, the displacement at time(t) = 5 sec.
- 5.a) Derive the fundamental equation for the lateral vibration of Beams and determine the natural frequency of a simply supported beam. [5]
b) Determine the normal functions for free longitudinal vibration of a bar of length L and uniform cross-section. One end of the bar is fixed and the other free. [5]
- 6a) Compare vibration absorber and a vibration isolator? [4]
b) Find the total response of a single degree freedom system with $m=10\text{kg}$, $c= 50 \text{ N.s/m}$. and $k=2000 \text{ N/m}$ under the action of harmonic force $F=F_0 \sin \omega t$ with $F_0=200 \text{ N}$ and $\omega= 31.416 \text{ rad /s}$. The initial condition are initial displacement is 0.01 and initial displacement=5 m/s at $t=0$. [6]
7. a) Find the first natural frequency for the system shown in Fig. by matrix iteration method. [5]
b) draw the mode shape for the system shown in Fig. by matrix iteration method. [5]
Take $k_1= k_2= k_3 = k$ and $m_1 = m_2 = m_3= m$.



8. Write short notes on
a. Rayleigh's energy method [5]
b. Static and dynamic coupling [5]