GIET UNIVERSITY, GUNUPUR – 765022

RD19MTECH032

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

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

AR-19

M.TECH 1ST SEMESTER EXAMINATIONS NOV/DEC 2019

MD, MPCMD1020

MACHINE VIBRATION

Time: 3 Hours **Max Marks : 70**

The figures in the right hand margin indicate marks.

PART-A (10 X 2=20 MARKS)

1. Answer the following questions.

a) Explain material damping mechanism?
b) What is logarithmic decrement? Explain through graph?
c) Using Rayleigh's energy method find the natural frequency of cantilever beam due to its own weight?
d) Define the term magnification factor?
e) What is the difference between discrete and continuous system?
f) What is the equivalent stiffness of spring connected in series having stiffness k1 and k2
g) What is node? Describe with neat sketch.
h) Differentiate between vibrometer and accelerometer?
i) State and explain D' Alembert's Principle and its significance
j) Give the comparison between Interfacial damping and Coulomb damping

PART-B (5 X 10=50 MARKS)

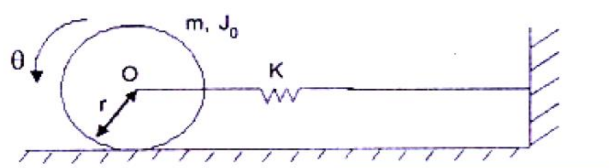
Answer any five questions from the following.

2. A spring mass damper system is defined by the following parameters m=3Kg, K=100N/m, C=3N-S/m. Determine

i) The critical damping constant.
ii) Damping ratio.
iii) Frequency of damped oscillation
iv) Logarithmic decrement
v) No of cycles after which the initial amplitude is reduced to 20%

3.

a) A cylinder of mass m and mass moment of inertia j_o is free to roll without slipping but is restrained by the spring. Determine the natural frequency of oscillation.

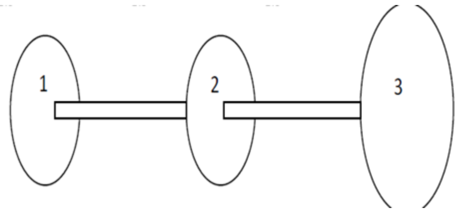


b) What is the static and dynamic coupling? How can you eliminate coupling of the equation of motion?

4. Explain the free response behavior of single degree of freedom of vibration under following condition.

i) Over damped
ii) Critical damped
iii) Under damped

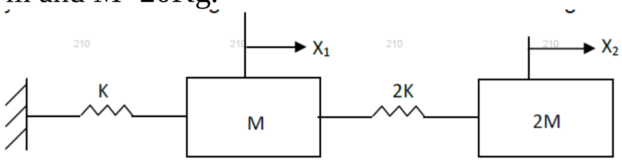
5. Determine the natural frequencies and mode shapes of the system as shown in fig by using Holzer's method.



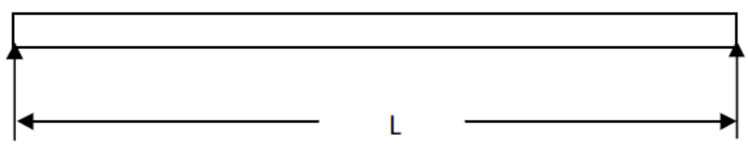
$K_1 = 0.10 \times 10^6$ N-m/ rad
$K_2 = 0.20 \times 10^6$ N-m/rad
J1= 5.5 Kg-m^2
J2 = 11.0 Kg-m^2
J3 = 22.0 Kg-m^2

6. A rotating machine of mass 650kg, operating at a constant speed of 1500rpm, has an unbalance of 0.12kg-m. If the damping in the isolation is given by damping ratio of ε= 0.08, determine stiffness of the isolators so that the transmissibility at the operating speed is less than or equal to 0.15. Determine also the magnitude of the force transmitted.

7 Find the natural frequencies, amplitude ratios and mode shapes of the system as shown in fig. When K=1000N/m and M=20Kg.



8. Find the natural frequencies and mode shapes for the transverse vibration of a beam simply supported at both the ends as shown figure.



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