

Roll No

ME-703 (GS)

B.E. VII Semester

Examination, November 2018

Grading System (GS)

Mechanical Vibration and Noise Engineering

Time : Three Hours

Maximum Marks : 70

- Note:** i) Attempt any five questions.
ii) All questions carry equal marks.

1. a) What are longitudinal, transverse and torsional vibrations? Give one practical example of each. 3
b) What is beats phenomena? 3
c) Add two harmonic motions represented by $X_1 = 4\cos(\omega t + 10)$ and $X_2 = 6\sin(\omega t + 60)$ where ω is angular frequency. 8
2. A spring mass system having mass m and stiffness k has natural frequency f . Determine stiffness k' of another spring which when,
 - a) Connected in series with spring k , will lower the natural frequency of system by 15%. 7
 - b) Connected in parallel with spring k , will raise the natural frequency of system by 15%. 7
3. a) What are underdamped and overdamped vibrations? 3
b) What is critical damping coefficient? 3

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- c) A vibratory system is defined by $m=3$ kg, $K=100$ N/m and $c=3$ Ns/m

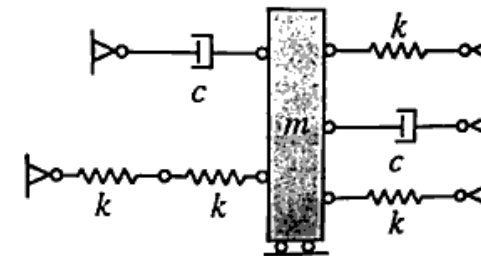
Determine

8

- i) Damping factor
- ii) Damped Natural Frequency
- iii) Logarithmic Decrement

4. a) Explain types of damping briefly. 3
b) Static Test of a vehicle chassis gives deflection of 1.5 mm. What should be the amount of damping needed so that the chassis is critically-damped? Mass of chassis is 500 kg. https://www.rgpvonline.com 3

c)



Find out the natural frequency and damping factor of the system in terms of m , k and c . 8

5. a) Write mathematical expression for Forced vibration of single degree of freedom system. 4
b) A dynamic system having mass 1 kg is suspended by a spring of stiffness 1000 N/m and it is subjected to harmonic excitation of 10 N. Determine: 10
 - i) Resonance frequency
 - ii) Amplitude at resonance
 - iii) Damped frequency if $c=40$ Ns/m and assume viscous damping.

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6. a) What is critical speed of rotors? Explain briefly. 4
- b) The weight of an electric motor is 125 kg and it runs at 1500 rpm. The armature weighs 35 kg and its CG lies 0.5 mm from the rotation axis. The motor is mounted on five springs so that the force transmitted is one eleventh of the applied force. Assume that weight is distributed evenly on all springs and no damping is there. Determine: 10
- i) Stiffness of each spring
- ii) Force transmitted to base at operating speed
- iii) Natural frequency of the system
7. a) What is meant by lumped system and continuous system? 4
- b) Explain the principle of dynamic vibration absorber. What is tuned absorber? 10
8. a) What is noise and how it can be measured? 3
- b) What is Decibel Scale and what is its use? 3
- c) Write a short note on Noise Control Techniques. 8

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