Total No. of Questions : 8]

SEAT No. :

PB2361

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B.E. (Mechanical Engineering)

DYNAMICS OF MACHINERY

(2019 Pattern) (Semester - VII) (402042)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Use of logarithmic tables, slide rule, and electronic pocket calculator is allowed.***
4) ***Figures to the right indicate full marks.***
5) ***Assume suitable data, if necessary.***

Q1) a) A combination of seven number of identical springs, each having a stiffness of 'K', supports a mass 'm' as shown in figure 1.Find the natural frequency of oscillations of mass 'm'. **[8]**

Figure 1.

b) Explain with a neat diagram mathematical model of a Motor Bike. **[5]**

c) Explain the following terms used in vibration **[4]**

i) Natural Frequency

ii) Amplitude

iii) Time period

iv) Resonance

OR

P.T.O.

Q2) a) A body of 5 kg is supported on a spring of stiffness 1960 N/m & has a dashpot connected to it, which produces a resistance of 1.96 N at a velocity of 1 m/sec. In what ratio will be amplitude of vibration reduced after 5 cycles? **[8]**

b) Derive the expression for Logarithmic decrement. **[5]**

c) Define the following terms used in vibration **[4]**

i) Critical Damping coefficient

ii) Coulomb damping

Q3) a) A vibrating system having a mass of 1 kg is suspended by a spring of stiffness 1000 N/m. It is put to harmonic excitation of 10 N. Assuming viscous damping, determine **[10]**

i) resonant frequency

ii) the phase angle at resonance

iii) amplitude of resonance

iv) frequency corresponding to peak amplitude

v) damped frequency. Take C = 40 N-S/m.

b) Explain Transmissibility Vs. frequency ratio curve for different amounts of damping. **[8]**

OR

Q4) a) The springs of an automobile trailer are compressed 0.1m under its own weight. Find the critical speed when the trailer is passing over a road with a profile of sine-wave whose amplitude is 80 mm and the wavelength is 14 m. Find the amplitude of vibration at a speed of 60 km/hr. **[10]**

b) Derive an expression for deflection of vertical shaft carrying a single rotor without damping. **[8]**

Q5) a) Find the natural frequency of the system shown in figure 2. **[10]**

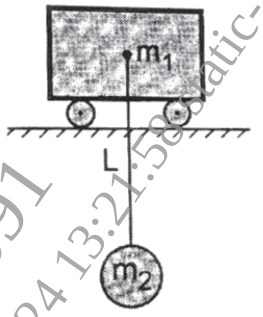

Figure. 2

b) Derive the equation for the length of Torsionally Equivalent Shaft. **[8]**

OR

Q6) a) Using Matrix Method, determine only the natural frequencies of the system shown in figure. 3 **[10]**

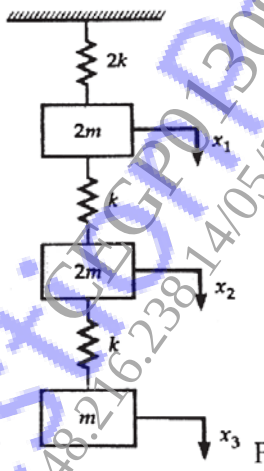

Figure 3.

b) Explain free vibrations of a two rotor system using following parameters **[8]**

i) neat diagram

ii) frequency equations

iii) Position of node

iv) amplitude ratios of two rotors.

Q7) a) Differentiate Time domain and frequency domain Analysis. Explain how frequency spectrum can be used to detect vibration related faults in a system. **[8]**

b) Write a short note on piezoelectric accelerometer. **[5]**

c) Explain any one vibration isolator with a neat sketch. **[4]**

OR

Q8) a) Derive a relation between sound intensity level and sound pressure level. **[8]**

b) Explain anechoic chamber and reverberant chamber. **[5]**

c) Define the following terms **[4]**

i) Sound absorption coefficient.

ii) Sound transmission coefficient.