Total No. of Questions : 8]

SEAT No. :

PA-961

[Total No. of Pages : 3

[5927]-413
B.E. (Mechanical)
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 whenever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if nessacary.***

UNIT - I

Q1) a) A vibrating system is defined by the following parameters m=3kg, K=100N/m, C=3N-sec/m. Determine (i) Damping factor (ii) Natural frequency of damped vibration (iii) Logarithmic decrement (iv) Ratio of two consecutive amplitude and (v) Number of cycles after which the original amplitude is reduced to 20 percent. **[8]**

b) Derive the differential equation of motion for undamped free torsional vibration. **[5]**

c) What are the causes of vibration? Explain the advantages of vibration. **[4]**

OR

Q2) a) A spring mass system has spring stiffness 'K' N/m and a mass of 'm' kg it has a natural frequency of vibration as 112Hz. An extra 2kg mass is coupled to 'm' and the natural frequency is reduced by 2Hz. Find the values of 'K' and 'm'. **[8]**

b) By using energy method find the natural frequency of undamped free longitudinal vibrations. **[5]**

c) List the different types of damping and explain in detail any one type of damping? **[4]**

P.T.O.

UNIT - II

Q3) a) Explain critical speed of shaft carrying single rotor. **[8]**

b) A machine of mass 1000kg is acted upon by an external force of 2450N in 1500rpm. To reduce the effect of vibration, isolators of rubber having a static deflection of 2mm under machine weight and an estimated damping factor of 0.2 are used. Determine. **[10]**

i) Amplitude of vibration of machine.

ii) Force transmitted to the foundation.

iii) Phase lag

iv) Phase angle between transmitted force and exciting force.

v) Speed at which the maximum amplitude of vibration would occur.

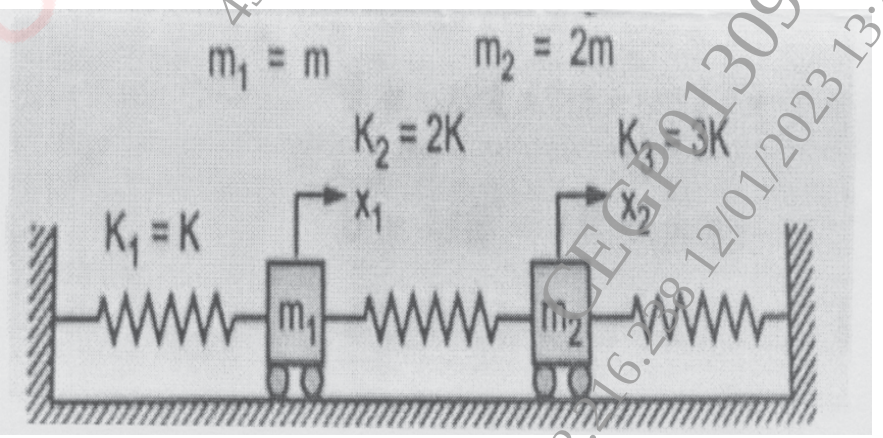
OR

Q4) a) Explain the significance of frequency response curves. **[8]**

b) An electric motor running at 1500 rpm is mounted on five springs and the force transmitted is one eleventh of the impressed force. The weight of the motor is 125 N while the armature weighs 35 N with its center of gravity 0.05 cm from the rotational axis. Determine: (i) Stiffness of each spring, (ii) Natural frequency of the system, (iii) Dynamic force transmitted to the base at operating speed. **[10]**

UNIT - III

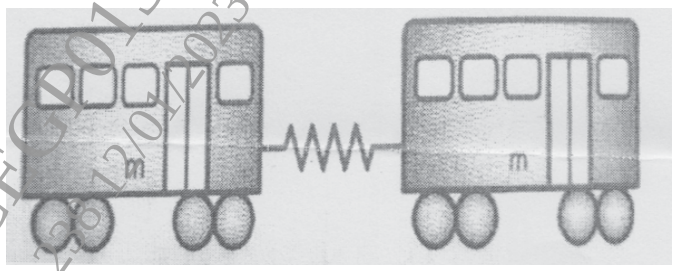
Q5) a) An electric motor running at 1500 rpm is mounted on five springs and the force transmitted is one eleventh of the impressed force. The weight of the motor is 125 N while the armature weighs 35 N with its center of gravity 0.05 cm from the rotational axis. Determine: (i) Stiffness of each spring, (ii) Natural frequency of the system, (iii) Dynamic force transmitted to the base at operating speed. **[10]**



b) Explain the concept of torsionally equivalent shaft and derive the equation for its equivalent length. **[8]**

OR

Q6) a) Two subway cars as shown in Fig. have 2000 kg mass each and are connected by a coupler. The coupler can be modelled as a spring of stiffness k = 280 kN/m. Write down the equations of motion and determine the natural frequencies and mode shapes. **[10]**



b) Explain the combined rectilinear and angular modes of vibration. **[8]**

UNIT - IV

Q7) a) What are various frequency measuring instruments? Explain any one in detail. **[8]**

b) Explain in brief various sources of noise. **[5]**

c) Explain anechoic chamber and reverberant chamber? **[4]**

OR

Q8) a) What is meant by time domain and frequency domain analysis? Explain how frequency spectrum can be used to detect vibration related faults. **[8]**

b) Write short note on "Noise control in industries". **[5]**

c) Write short note on Condition monitoring of machines. **[4]**

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