Total No. of Questions : 6]

SEAT No. :

P200

[Total No. of Pages : 3

Oct./BE/Insem.-516

B.E. (Mechanical)

DYNAMICS OF MACHINERY

(2015 Pattern) (Semester - I) (402043)

Time : 1 Hour] *[Max. Marks : 30*

Instructions to the candidates:

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6.***
2) ***Draw Neat diagrams wherever necessary.***
3) ***Use of scientific calculator is allowed.***
4) ***Assume suitable data wherever necessary.***
5) ***Figures to the right indicate full marks.***

Q1) a) A vibratory system is defined by following parameter m = 3 kg, k = 100 N/m, C = 3 N-sec/m **[6]**

Determine

i) Critical damping

ii) Damping factor

iii) Natural frequency of damped vibration

iv) Logarithmic decrement

v) The ratio of two consecutive amplitudes

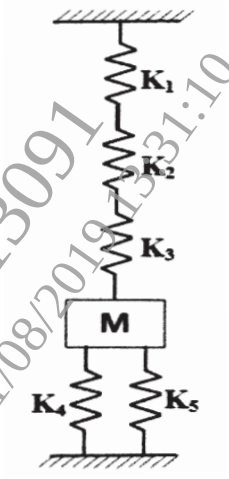
vi) The no of cycle after which the original amplitude is reduced to 20 percent

b) Explain with neat diagram mathematical model of a quarter car. **[4]**

OR

P.T.O.

Q2) a) For the system shown in following Fig., k_1 = 2000 N/m, k_2 = 1500 N/m, k_3 = 3000 N/m and $k_4 = k_5$ = 500 N/m. Find mass (M), such that the system has a natural frequency of 10 Hz. **[6]**



b) What is damping factor? Draw Displacement versus Time curve for different damping conditions. **[4]**

Q3) a) A 75 kg machine is mounted on springs of stiffness 11.76×10^5 N/m with damping factor of 0.2. A 2 kg of piston within the machine has a reciprocating motion with a stroke of 0.08m and a speed of 3000 cycles per minutes. Assuming the motion of the piston to be harmonic, determine the amplitude of vibration of the machine and the vibratory force transmitted to the foundation. **[6]**

b) Explain frequency response curves with neat diagram. **[4]**

OR

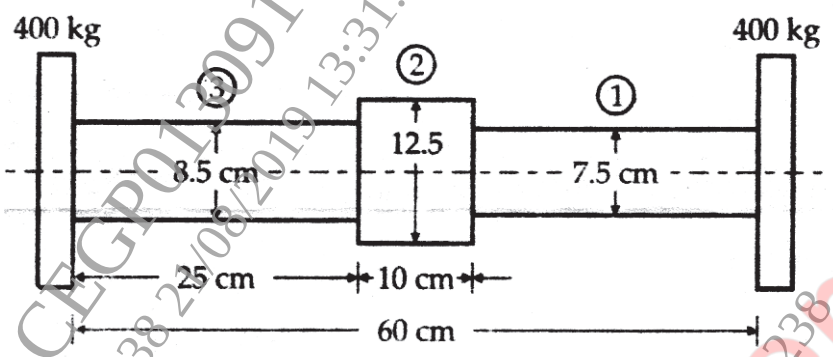
Q4) a) A vibrating system having mass 1 kg is suspended by a spring of stiffness 1000 N/m and it is put to harmonic excitation of 10 N. Assuming viscous damping, determine **[6]**

i) the resonant frequency
ii) the phase angle at resonance
iii) the amplitude at resonance
iv) the corresponding to the peak amplitude and
v) damped frequency

Take damping coefficient, C = 40 N-S/m.

b) Draw transmissibility curves for different damping conditions? Give the significance of these curves. **[4]**

Q5) Two equal masses of weight 400 N each and radius of gyration 40 cm are keyed to the opposite ends of a shaft 60 cm long. The shaft is 7.5 cm diameter for the first 25 cm of its length, 12.5 cm diameter for the next 10 cm and 8.5 cm diameter for the remaining of its length. Find the frequency of free torsional vibrations of the system and position of node. Assume G = 0.84×10^{11} N/m^2. **[10]**



OR

Q6) What is Semi definite system? Find Natural frequencies and mode shapes for the system shown. **[10]**

Consider m_1 = 25 kg, m_2 = 20 kg and k = 2000 N/m