Total No. of Questions : 6]

SEAT No. :

P5813

[Total No. of Pages : 3

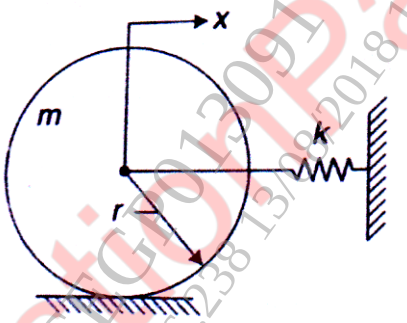
BE/Insem./Oct.-516
B.E. (Mechanical)
DYNAMICS OF MACHINERY
(2015 Pattern) (Semester - I)

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

Instructions to the candidates:

1) *Solve Q.1 or Q.2, Q.3 or Q.4, Q5 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) Determine the natural frequency of following system as shown in figure. **[6]**



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

OR

Q2) a) A vibrating system is defined by the following parameters as mass, m = 3 Kg. Stiffness, k = 100 N/m, damping coefficient c = 3 N-Sec/m. **[6]**

Determine :

i) Critical Damping Coefficient
ii) damping factor.
iii) the natural frequency of damped vibration.
iv) logarithmic decrement.
v) the ratio of two consecutive amplitudes.
vi) the number of cycles after which the original amplitude is reduced to 20 %.

b) Explain with neat diagram mathematical model of a motor cycle. **[4]**

P.T.O.

Q3) a) An electric motor weighs 25 kg and is mounted on a rubber pad which deflects by 1 mm due to motor weight. The rotor weighs 5 kg and has an eccentricity of 0.1 mm and rotates at 1500 rpm. Find the amplitude of vibration of motor and the force transmitted to the foundation. Assume damping factor as 0.1. **[6]**

b) Explain Critical speed of shaft carrying single rotor. **[4]**

OR

Q4) A single cylinder vertical petrol engine of total mass 400 kg is mounted upon a steel chassis frame and causes a vertical static deflection of 2.5 mm. The reciprocating parts of the engine have a mass of 5 kg and move through a vertical stroke of 120 mm with SHM. A dashpot provided, the damping resistance of which is directly proportional to the velocity and amounts to 20 kN at 1 m/s. if a steady state vibrations has been reached, **[10]**

determine :

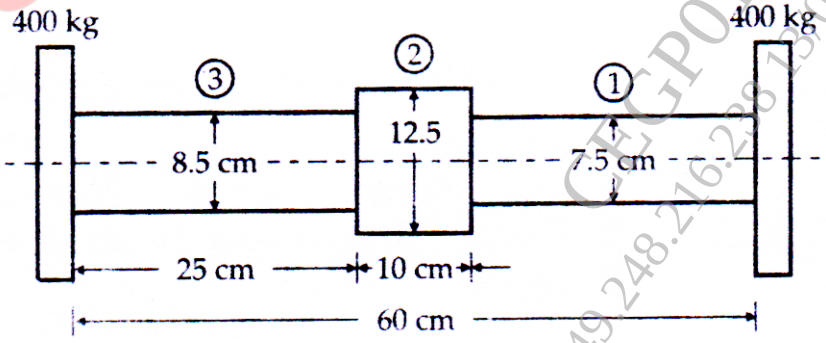
a) The amplitude of forced vibrations when the driving shaft of engine rotates at 540 rpm

b) The maximum dynamic force transmitted to the ground through chassis frame (which behaves as a spring), through the dashpot and through the chassis frame and dashpot together

c) The driving shaft speed at which resonance will occur.

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.

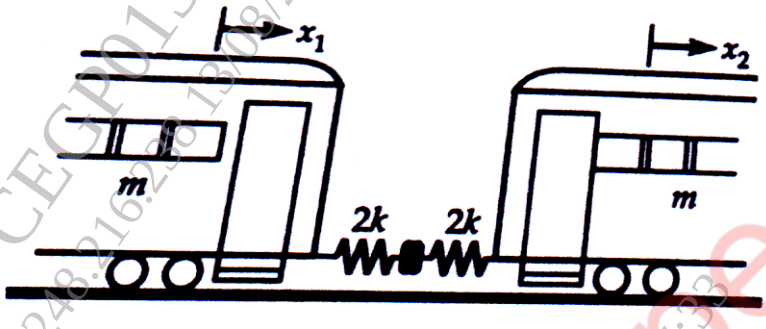
Assume $G = 0.84 \times 10^{11}$ N/m^2. **[10]**



OR

Q6) What do you mean semi definite system? An electric train made of two cars each of mass 2000 kg is connected by couplings of stiffness equal to 40×10^6 N/m as shown in figure.

Determine the natural frequency of the system. **[10]**



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