

# Dronacharya College of Engg. , Khentawas

## Mech. Engg. Deptt.

Subject: MECHANICAL VIBRATIONS

Subject Code: ME- 409-F

Semester: VII

### IMPORTANT QUESTIONS

1. What is vibration? What is natural frequency & its importance?
2. What are the Types of vibration? What is harmonic motion?
3. What is Lissajous figure? And its importance? What is Lissajous figure in case of misalignment?
4. What is Fourier's series and how it can be useful to vibration? What is Fourier transformation and its uses?
5. What is Campbell diagram? What is Engine Order?

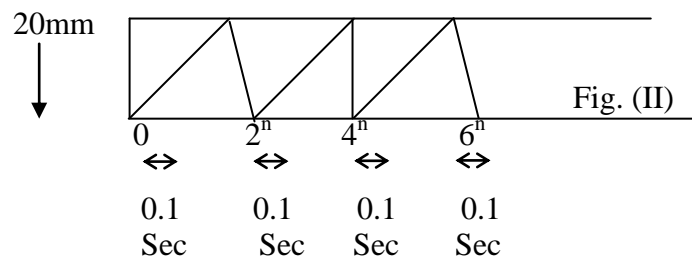
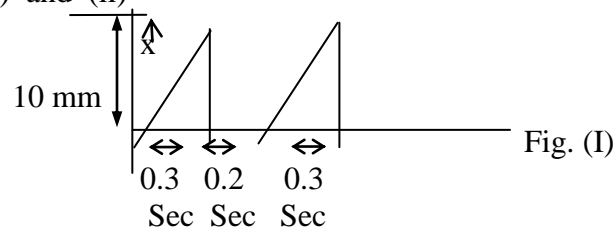
6. (a)

What is difference between oscillation and vibration? Discuss.

(b)

Represent the periodic motions by harmonic series for Fig.

(i) and (ii)



7.

A body is subjected to the two harmonic motion as  $X_1 = 15 \sin (wt + \pi/6)$

$$X_2 = 8 \cos(\omega t + \pi/3)$$

What extra motion should be given to the body to bring it to the static equilibrium?

8. What is the vibration equation based on energy method? What is natural frequency
  9. How to find out the natural frequency of the system by Rayleigh's method?
  10. What is the equivalent spring stiffness in series and in parallel?
  11. What is bending critical speed of rotating shaft?
- (a) Discuss the D' Alembert's principle on basis of equilibrium; Static and dynamic type. Explain with required diagrams etc.
- (b) Determine the natural frequency of the spring-mass-pulley system shown Fig. 3 Use energy method and De Alembert's principle both.

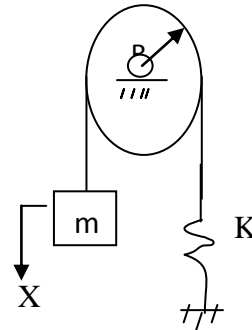
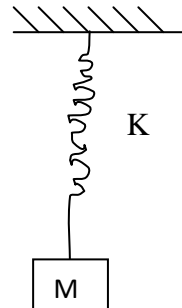


Fig. 3

12. A spring mass system has spring constant of  $k$  kg/cm and the weight of mass  $w$  kg. it has natural frequency of vibration as 12 c.p.s. an extra 2 kg weight is coupled to  $w$  and natural frequency reduces by 2 c.p.s. find  $k$  and  $w$ .
13. Using Rayleigh's method find the natural frequency of a cantilever beam due to its weight only.
14. What is the damped natural frequency of the system?
15. What is coulomb damping & structural damping?
16. What is damping ratio? What is the use of critical damping?
17. What is the importance of Logarithmic decrement?
18. What is the frequency of damping oscillation?

19. What do you understand by the excitation and demands integral?
20. What do you mean by critical damping coefficient? Derive the relation for displacement for a spring mass dashpot system which consist of a spring of stiffness 343 N/m. The mass is displaced 2 cm to the equilibrium position and released .Derive the relations and the question of motion for the system, if the damping coefficient of the dashpot is (a) 137; (b) 68.6 and (c) 13.72 N-sec/m respectively.
21. During the installation of a 4-pole,50 cycle induction motor of mass 250kg. it is determine by means of level that the deflection of the foundation under the motor is 0.12 mm. would you consider this foundation safe? Explain your answer
22. Determine the effect of the mass of the spring on the natural frequency of the system shown in Fig. 13



23. What is the equation of motion with harmonic force?
24. What is amplitude ratio? What do you understand by support motion?
25. What do you understand by displacement transmissibility?
26. What do you understand by Accelerometer & Seismometer?
27. What do you understand by Transmissibility & vibration isolation?
28. A machine weighing 75 kg is mounted on springs and is fitted with a dashpot to damp out vibrations. There are three springs each of stiffness 10 kg per cm and it is found that the amplitude of vibration diminishes from 3.84 cm to 0.64 cm in two complete oscillations. Assuming that the damping force varies as velocity, find the resistance of the dashpot at unit velocity and compare the frequency of damped vibration with the frequency when dashpot is not in operation.