Lukhdhirji Engineering College, Morbi

Department of Mechanical Engineering

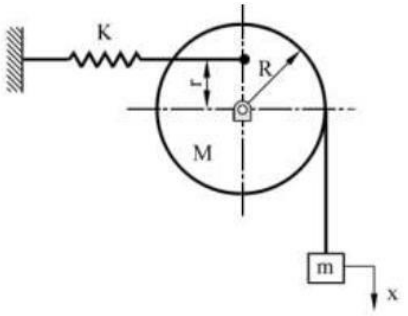
Student Assignment- Free Vibration

(GTU MID SEM Marks less than 15)

Subject: DYNAMICS OF MACHINERY (3151911) **Semester : 5th**

Year : 2022-23

1. Write down detail Classification of vibrations.
2. Define: (1) Time Period (2) Stiffness of Spring (3) Damped Vibration (4) Equivalent Damper in series.
3. If two springs of stiffness K_1 and K_2 are connected in series and mass m is attached to it. Find its natural frequency of the longitudinal vibration.
4. Define: steady state and transient vibrations.
5. Derive an expression for natural frequency of cantilever beam subjected to point load at the end.
6. Define: "Resonance & Damping", "Undammed Free Vibration", "Critical Damping Coefficient" (C_C), "Forced Vibrations", 'Force Transmissibility' (T_r)
7. Explain Equilibrium method to find the frequency of vibratory system.
8. Write short note on types of damping method. (or What is damping? What are its types? Discuss any one of them.)
9. The equation of motion for a spring mass system is given by $m\ddot{x} + c\dot{x} + kx = F \sin \omega t$. Find steady state response of the system.
10. Derive an expression for logarithmic decrement.
11. Write short notes on: a) Frequency Response Curve, b) Vibration Isolation
12. The mass 'm' is hanging from a chord attached to the circular homogeneous disc of mass 'M' and radius 'R' as shown in Figure. The disc is restrained from rotating by a spring attached at radius 'r' from the centre. If the mass is displaced downwards from rest position, determine the frequency of oscillations.



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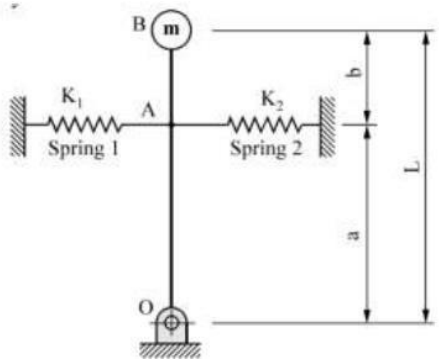
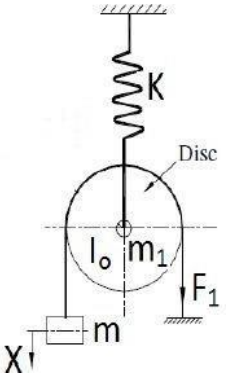
13. Find the natural frequency of system shown in Figure. If m, K_1, K_2, L are fixed, find the value of 'b' for whichthe system will not vibrate.



14. What is equivalent spring stiffness?
15. Define node in torsional vibration.
16. When do you say a vibrating system is under damped?
17. Derive the differential equation of motion for a free damped vibration.
18. Derive the expression for equivalent damping coefficient, when two dampers with damping coefficients C_1 and C_2 are connected in series and in parallel.
19. Derive the equation of motion for a disc having mass moment of inertia 'I' suspended on wire of length 'L' with diameter 'd' ,when the disc was given an angular twist of 'Ɵ'.
20. Determine the equation for the natural frequency of the spring mass vibratingsystem shown in figure.



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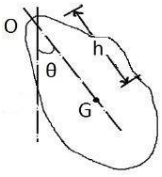
21. Find the equation for natural frequency of a spring mass vibrating system by using Equilibrium method and Rayleigh's method.
22. Determine equation for the natural frequency of vibration of the compound pendulum shown in figure.



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