B

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

FIRST SEMESTER M.TECH DEGREE EXAMINATION, MARCH 2016

Mechanical Engineering

(Machine Design)

04ME 6503 Theory of Vibration

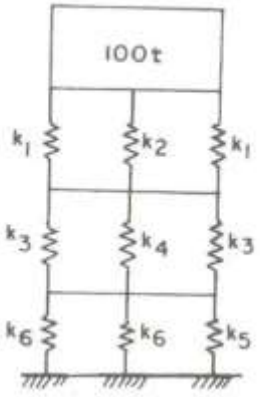
Max. Marks: 60 Duration: 3 Hours

Part A (8x3=24 marks)

1. Define harmonic motion.
2. Explain various classifications of damped systems.
3. Define transmissibility
4. Obtain the characteristic equation for a single degree of freedom system applied with a general force.
5. Explain Convolution integral?
6. Explain Dirac delta function.
7. What is natural frequency and resonance?
8. What is influence co efficient?

Part B (6x6=36marks)

9. Find the natural frequency of system shown in figure (k1=k2=k3=k4=k5=k6=k=1000N/m)



OR

10. Derive the expression for natural frequency of a single degree of freedom system shown in Fig 2.

    k_1= 5 N/m, k_2= 3 N/m, m = 2 kg, r = 15cm

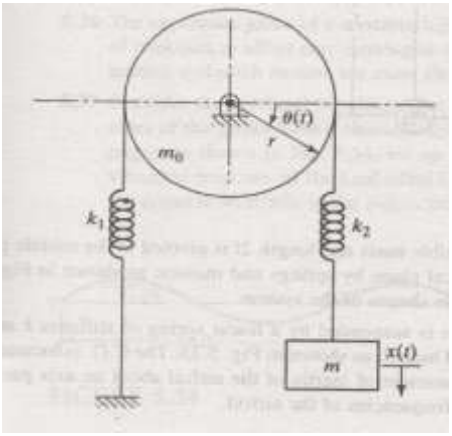


Fig: 2

11. What is logarithmic decrement? Obtain the expression.

OR

12. Derive the expression for the response of a single degree of freedom underdamped system.

13. Write short notes on vibration and frequency measuring instruments.

OR

14. A spring mass system with m= 10 kg and k= 5000 N/m is subjected to a harmonic force of amplitude 250 N and frequency ω. If the maximum amplitude of mass is observed to be 100 mm. Find the value of ω.

15. Derive the response of a general periodic force using Fourier series.

OR

16. Obtain the forcing function of the given triangular wave using Fourier series.

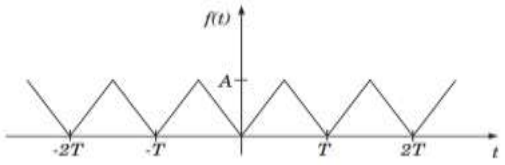


Fig: 3

17. Using convolution integral, obtain the response of a single degree of freedom undamped system with Natural frequency ω_n and mass m, which is forced by a constant force F_0. Take the initial boundary conditions as zero.

OR

18. Obtain the response due to an impulse force of a spring mass damper system.

19. Find the natural frequencies and mode shapes of a spring mass system having two masses which is constrained to move in one direction only.

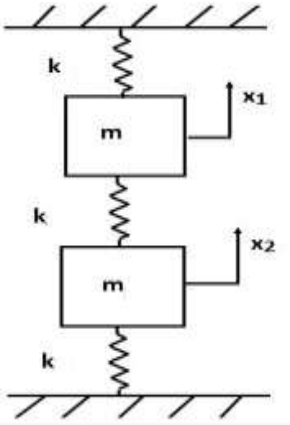


Fig: 3

OR

20. Explain the method of obtaining stiffness influence co-efficients for the analysis of Multi degree of freedom systems.