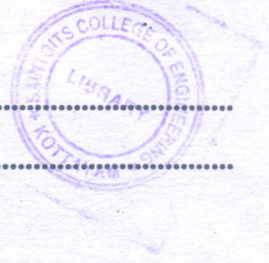


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Reg. No.....

Name.....



**B.TECH. DEGREE EXAMINATION, MAY 2015**

**Seventh Semester**

Branch : Mechanical Engineering

ME 010 702—DYNAMICS OF MACHINES (ME)

(New Scheme—2010 Admission onwards)

[Improvement/Supplementary]

Time : Three Hours

Maximum : 100 Marks

**Part A**

*Answer all questions.*

*Each question carries 3 marks.*

1. State the conditions for dynamic balancing.
2. Discuss a method to find out the equivalent stiffness.
3. Define the terms coefficient of damping and critical damping coefficient.
4. Write a note on Laplace transformation.
5. Discuss tolerance levels of human ear in industrial context.

(5 × 3 = 15 marks)

**Part B**

*Answer all questions.*

*Each question carries 5 marks.*

6. Differentiate between Balancing of rotating masses and Reciprocating masses.
7. Find an expression for logarithmic decrement in terms of damping factor.
8. Explain the working of Centrifugal pendulum damper with a neat sketch.
9. Write a note on hard spring and soft spring.
10. Discuss the key parameters of acoustic measurements. Discuss an acoustic impedance filter.

(5 × 5 = 25 marks)

**Part C**

*Answer all questions.*

*Each full question carries 12 marks.*

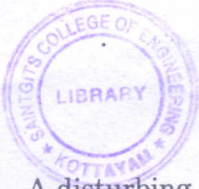
11. Discuss in detail Dalby's method of balancing of several masses rotating in several planes.

(12 marks)

Or

Turn over





12. A disturbing mass of 600 kg is attached to a shaft. The shaft is rotating at a uniform velocity of  $\omega$  rad/sec. The distance of centre of gravity of the disturbing mass from the axis of rotation is 270 mm. The disturbing mass is to be balanced by two masses in two different planes. The distances of the centre of gravity of the balancing masses from the axis of rotation is 450 mm each. The distances between the two planes of the balancing masses is 1.5 m and the distance between the plane of the disturbing mass and one of the planes of the balancing masses is 300 mm. Determine :
- (i) the distance between plane of disturbing mass and the planes of the balancing masses. (6 marks)
  - (ii) the magnitude of balancing masses when :
    - (a) the planes of balancing masses are on the same side of the plane of disturbing mass.
    - (b) the planes of balancing masses are on either side of the plane of disturbing mass. (6 marks)
13. A coil of spring stiffness 4 N/mm supports vertically a mass of 20 Kg at the free end. The motion is resisted by the oil dashpot. It is found that the amplitude at the beginning of the fourth cycle is 0.8 times the amplitude of previous vibration. Determine the damping force per unit velocity. Also, find the ratio of frequency of damped and undamped vibrations. (12 marks)

Or

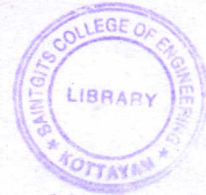
14. Explain Critically damped system and Underdamped system. (12 marks)
15. The moment of inertia of 3 rotors A, B and C are respectively 0.3, 0.6 and 0.8 kg-m<sup>2</sup>, the distance between A and B is 1.5 m and B and C is 1 m, the shaft is 70 mm in diameter and modulus of rigidity for the shaft material is  $84 \times 10^9$  N/m<sup>2</sup>. Find :
- (a) Frequencies of torsional vibrations. (4 marks)
  - (b) Position of nodes. (4 marks)
  - (c) Amplitude of vibrations. (4 marks)

Or

16. Derive expressions for dynamic behaviour of :
- (i) distributed mass system ;
  - (ii) lumped mass system when the DOF of the system is more than two. (12 marks)
17. A Structure supporting rotating machinery vibrates excessively at an excitation frequency of 18 Hz. It is proposed to attach a vibration absorber tuned to this frequency. What should be absorber mass and stiffness so that the resulting 2 natural frequencies are at least 20% away from the excitation frequency ? The effective mass of the structure is 1 tonne and the natural frequency is 16Hz. (12 marks)

Or





18. Discuss the response of a transient vibration system, when the input signal is :

- (a) Step wave form ;
- (b) Impulsive. Derive the equations of motion.

(12 marks)

19. Discuss the methods, equipments and criteria for recording and reproduction of sound. Explain the entire process with a flow chart.

(12 marks)

*Or*

20. In the same area of a warehouse there are four large machines. M/C 1 produces a sound power of 1 W. M/Cs 2, 3 and 4 produce an acoustical power of 0.5, 0.75 and 1.25 W respectively. What is the total power level generated in the area by the four machines ?

(12 marks)

[5 × 12 = 60 marks]