GIET MAIN CAMPUS AUTONOMOUS,
GUNUPUR - 765022

**Registration No:** | | | | | | | | | | | **M.TECH**

**Total Number of Pages : 2**

**M.TECH 1ST SEMESTER REGULAR EXAMINATIONS, DECEMBER 2018**
**MACHINE VIBRATION**
**Branch: MD, Subject Code:MMDPC1020**
**(Regulations 2018)**

**Time: 3 Hours** **Max Marks : 70** **Question Code: RD18002046**

PART-A (10 X 2=20 Marks)

1. Answer the following questions.
   a. What is meant by logarithmic decrement?
   b. What is basic assumption is deriving Dunkerlay's formula?
   c. What is meant by natural vibration?
   d. Compare and contrast between over damping and under damping through graphical representation?
   e. How can we make a system to vibrate in one of its natural made?
   f. What happens to the response of an undamped system at resonance?
   g. Explain the static and dynamic coupling of two degree of freedom of system?
   h. Define co-ordinate coupling and explain static and dynamic coupling through diagram.
   **i.** Define normal mode vibration of multi degree freedom of system?
   j. What is node? Describe with neat sketch.

PART-B (5 X 10=50 Marks)
Answer any five questions from the following.

2. In a forced vibration with degree of freedom=1; the exciting Force is given by F=100Sin (2 t) Newton where t is time in second stiffness constant K=500 N/m; m=100 kg, damping coefficient c=0.2N. sec/m, Determine:
   a) natural frequency and Damping Ratio [5]
   b) equation of position [5]

3. A rotating machine of mass 650kg, operating at a constant speed of 1500rpm, has an unbalance of 0.12kg-m. If the damping in the isolation is given by damping ratio of ε= 0.08,
   a) Determine stiffness of the isolators so that the transmissibility at the operating speed is less than or equal to 0.15. [5]
   b) Determine also the magnitude of the force transmitted. [5]

4. For a single degree of freedom forced undamped system, stiffness is 500 N/m, mass = 10 kg and applied maximum force(F) = 40 N. The forcing function has a circular frequency of 18 rad/sec. The initial displacement is 0.01 m and initial velocity is 1 m/s. Determine :
   a) the frequency ratio [5]
   b) the amplitude of forced vibration, the displacement at time(t) = 5 sec. [5]

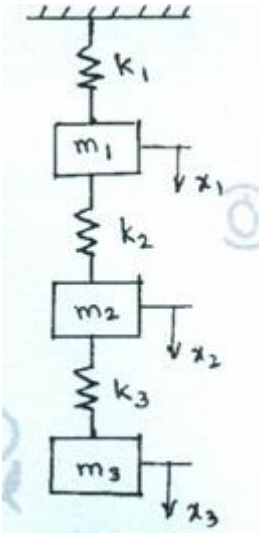
5. a) Derive the fundamental equation for the lateral vibration of Beams and determine the natural frequency of a simply supported beam. [5]
   b) Determine the normal functions for free longitudinal vibration of a bar of length L and uniform cross-section. One end of the bar is fixed and the other free. [5]

6. A harmonic motion is given by $x(t) = 10 \sin(30t - \pi/3)$ mm where t is in seconds and phase angle radians. Find

a) frequency and the period of motion, [5]

b) the maximum displacement, velocity and acceleration. [5]

7. a) Find the first natural frequency for the system shown in Fig. by matrix iteration method. [5]
b) Draw the mode shape for the system shown in Fig. by matrix iteration method. [5]
Take k1= k2 = k3 = k and m1 = m2 = m3= m.




**8.** Write short notes on

a. Seismic instrument [5]
b. Critical speed of shaft [5]

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