

GUJARAT TECHNOLOGICAL UNIVERSITY

M. E. Mechatronics (Branch Code - 47)

Year – II (Semester – III) (W.E.F. July 2013)

Subject: Dynamics of Machines (734703)

Sr. No.	Content	Hours
1.	Fundamentals of mechanical vibrations: Sources of vibration, Free Vibration, Forced vibration, Simple harmonic motion, Campbell diagram, Fourier analysis	04
2.	Single degree of freedom system-Free Vibrations: Natural frequency, Equivalent system, Energy method, Response to an initial disturbance, Phase plane method, Duhamel's integral, Stiffness modeling, Non linear stiffness	08
3.	Single degree of freedom system-Damped vibrations: Damped models, single degree of freedom system with viscous damping, Logarithmic decrement, General excitation- Duhamel's integral	06
4.	Single degree of freedom system-Forced Vibrations: Harmonic excitation, Mechanical Impedance, System identification from frequency response	05
5.	Two Degree of Freedom Systems: Free vibration of spring coupled system, Two degrees of freedom mass coupled systems, Forced vibrations of undamped system, Undamped vibration absorbers, Forced damped vibrations, Vibration Isolation	05
6.	Multi degree of freedom systems: Closed couple systems, Far coupled systems, Orthogonality of mode shapes, Modal analysis, Forced vibration, Using Lagrange's equation to derive equation of motion	08
7.	Numerical methods: Approximate methods for fundamental frequency, Dunkerley's lower bound approximation, Rayleigh's upper bound approximation, Matrix method	06
8.	Continuous systems: System governed by wave equation, solution of wave equation for free and forced vibrations, Free and forced vibration of beams	06
9.	Experimental methods in vibration analysis Vibration instruments, signal analysis techniques, types of vibration tests with example	05
10.	Introduction of Random vibration: Description of random process, Correlation and power spectral density	03
Total		56

Text Book:

1. Theory and Practice of Mechanical Vibrations
J. S. Rao, K. Gupta, New Age International Publishers

2. Mechanical Vibrations
S. S. Rao, Pearson Education

Reference Book:

1. Mechanical Vibrations
S. G. Kelly, McGraw-Hill International editions
2. Engineering Vibration
D. J. Inman, Prentice Hall