

ME314 Mechanical Vibrations										
L	T	P	Credit	Area		CWS	PRS	MTE	ETE	PRE
3	0/1	2/0	4	DEC/GEC		15/25	25	20/25	40/50	-

**Objective:** To enable the students to understand the fundamentals of vibration, Mathematical modeling of vibrating systems and degree of freedom. To understand and use of Vibration measuring Instruments and balancing of rotors.

Syllabus			Contact Hours
Unit-1	Introduction: Basics of vibration, Mathematical modeling of vibrating systems- Discrete and Continuous systems, Conservative and Non conservative system with reference to Vibrations.		8
Unit-2	Single degree of freedom systems: Force-Balance and Moment- Balance methods, damping factor, Governing equations for different types of Damping and for different types of applied forces, Lagrange's equations.		8
Unit-3	Single Degree of freedom systems subjected to periodic excitations: Response to Harmonic Excitation, frequency-response function, System with rotating Unbalanced masses, system with base excitation.		6
Unit-4	Single Degree of Freedom system subjected to Transient Excitation: Response to impulse Excitation, response to: Step input, Ramp input, Spectral Energy of the responses, Response to: Rectangular pulse excitation, Half- sine wave pulses.		8
Unit-5	Two degree of Freedom systems: Free undamped vibrations, Static and dynamic coupling, Principal modes of vibration, dynamic vibration absorber, centrifugal absorber, Vehicle suspension system response.		6
Unit-6	Introduction to Vibration measuring Instruments: Vibration meters, vibration signatures, standards, vibration testing equipment, balancing of rotors.		6
	Total		42

Reference Book:	
1	Fundamentals of vibrations; Balachandran, Magrab, Cengage Learning.
2	Mechanical vibrations; Rao.S.S, Pearson Education.
3	Mechanical Vibrations; Srinivas P, Tata Mcgraw Hill company Limited.
4	Fundamentals of Vibrations; Roger A A, Amerind Publisher Company Pvt Ltd.
5	Engineering Vibration; Daniel J Inman, Prentice Hall, New Jersey.
6	Mechanical Vibrations: T. Thomson

**Course Outcomes**

CO1	Explain basics of sound, noise and vibration; as well as their control strategies.
CO2	Derive equations of motion for undamped one-dimensional vibrations, and solve problems of damped free vibrations.
CO3	Analyse and solve problems of forced vibrations involving frequency response curves, phase angle plots, vibration isolation and transmissibility.
CO4	Analyse and solve problems involving vibrations of systems having more than one degree of freedom.
CO5	Perform free-vibration analysis of one, two, and multi degree of freedom systems.
CO6	Design simple mechanical systems for vibrations and vibration measuring instruments

**CO-PO/PSO Matrix**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	2	2	0	0	0	0	0	0	2	2	1	1
CO2	3	3	2	3	1	0	0	0	0	0	0	1	2	1	1
CO3	3	3	3	3	1	0	0	0	0	0	0	2	3	3	2
CO4	3	3	3	3	1	0	0	0	0	0	0	1	3	3	2
CO5	2	2	2	2	2	0	0	0	0	0	0	1	2	2	2
CO6	3	3	3	2	2	0	0	0	0	0	0	2	2	1	1