MECHANICALVIBRATIONS

Course Code	194601B	**Year**	III	**Semester**	II
Course Category:	Program Elective	**Branch**	ME	**Course Type**	Theory
Credits:	3	**L – T – P**	3 – 0 – 0	**Prerequisites:**	Nil
Continuous Evaluation:	30	**Semester End Evaluation:**	70	**Total Marks:**	100

Course Outcomes		
Upon successful completion of the course, the student will be able to		
CO1	Analyze single degree freedom system for its natural frequency and vibration response.	L3
CO2	Analyze single degree freedom system for its natural frequency and damped vibration response	L3
CO3	determine response of Single degree freedom systems under harmonic excitations	L3
CO4	Determine the response of Two-degree freedom systemsunder free and forcedvibrations	L3
CO5	Derive the equation of motion and find the natural frequencies mode shapes of a multi degree offreedom system	L3

Course Articulation Matrix:

	Contribution of Course Outcomes towards achievement of Program Outcomes Strength of correlations (3: High, 2: Moderate, 1: Low)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	1	1									3	1
CO2	3	3	1	1									3	1
CO3	3	3	1	1									3	1
CO4	3	3	1	1									3	1
CO5	3	3	1	1									3	1

Course Content		**Mapped CO s**
UNIT-1	**Undamped free vibrations of SDOF Systems:** Introduction, basic concepts of vibration, importance of vibration study, elements of a vibrating system,types of vibration,methods of vibration analysis, harmonic motion,Equationof motion, free vibration of undamped translational system, freevibration of undamped torsionalsystem, Raleigh's energy method.	**CO1**
UNIT-2	**Damped free vibrations of SDOF Systems:** introduction, types of damping, free vibration with viscous and coulomb damping, logarithmic decrement.	**CO 2**
UNIT-3	**Harmonically ExitedVibrations:** Introduction, equations of motion, response of undamped and damped systems under harmonic excitation, response of a damped system under harmonic motion of the base,	**CO3**

	response of a damped system under rotating unbalance, vibration, measuring instruments-vibrometer and accelerometer, critical speed	
UNIT-4	**Two Degree of Freedom Systems:** Introduction, equations of motion for forced vibration, free vibration analysis of an undamped system, torsional system, coordinate coupling and principal coordinates, forced vibration analysis. Dynamic vibration absorber	**CO4**
UNIT-5	**Multi-degree of Freedom Systems**: Introduction, modeling of continuous systems as multi degree of freedom systems, using Newton's second law to derive equations of motion, influence coefficients, Determination of natural frequencies and mode shapes.	**CO5**

Learning Resources	
Text Books:	1. S.S.Rao,MechanicalVibrations,5/e,PearsonEducationInc.,2011. G. K. Grover, Mechanical Vibrations, 8/e, Nem Chand & Bros
Reference Books:	1. L.Meirovich,ElementsofVibrationAnalysis,2/e.TataMcGrawHill,2007. 2. J.S.RaoandK.Gupta,IntroductoryCourseonTheoryandPracticeofMechanicalVibrations,2/e,NewAgeInternational,1999.
E-Resources & other digital Material:	1. https://nptel.ac.in/courses/112/103/112103112/ 2.https://nptel.ac.in/courses/112/103/112103111/