

Department of Mechanical Engineering			
Mechanical Vibrations (67414)			
Total Credits	3		
major compulsory			
Prerequisites	P1 : Theory of Machines (67310) OR Dynamics (67210) OR Mechanics of Machinery (67323) P2 : Engineering Mathematics (21202) OR Differential Equations (21203)		
Course Contents			
Properties of oscillatory motion. Derivation of governing differential equations. Free and damped vibrations. Harmonically excited motion, rotating and reciprocating unbalance, support motion. Vibration measurements. Vibration isolation. Transient vibrations. Free and forced vibrations in multi-degrees-of-freedom systems. Introduction to vibration absorbers and continuous systems.			
Intended Learning Outcomes (ILO's)		Student Outcomes (SO's)	Contribution
1	Ability in developing governing differential equations of motion of vibratory systems using Newtons second law of motion, Lagranges equations, principle of virtual work, and influence coefficients.	A	40 %
2	Solving governing equations for single- and multi-degree of freedom systems. This includes the natural frequencies, mode shapes, time responses, and frequency responses of systems subjected to initial disturbances and forced excitations.	E	40 %
3	3. Analyzing the effects of system parameters on its behavior to control the response of the system	C	20 %
Textbook and/ or References			
1. Daniel J. Inman (2001). Engineering Vibration, Second Edition, Prentice-Hall, InC, 2001. 2. S.S. Rao, Mechanical Vibrations, 4th edition, Pearson Education International, 2004. 3. W. T. Thomson, Theory of Vibration with Applications, 4th edition, Prentice Hall, 1993.			
Assessment Criteria		Percent (%)	
First Exam		20 %	
Second Exam		20 %	
Homeworks		10 %	
Final Exam		50 %	
Course Plan			
Week	Topic		
1,2	Fundamentals of Vibration		
3,4	Free Vibration of Single Degree of Freedom Systems		
5,7	Forced Vibration of Single Degree of Freedom Systems		
8,9	Forced and Free Vibration of Two Degree of Freedom Systems		
10,15	Forced and Free Vibrations of Multi-degree of Freedom Systems		
16	Review, Final Exam		