

Annexure ‘B’

Proposed Elective Course

Course Title	Design for Vibration Control	Course No	(To be allotted by Office)		
Specialization	Mechanical Engineering	Structure (IPC)	3	0	3
Offered for	M. Des. (MDS) / PhD	Status (Core / Elective)	Elective		
Pre-requisite	----	To take effective from			
Objectives	To learn the fundamentals of vibration theory, to model real-world mechanical vibration problems, and to design various vibration control systems.				
Course Outcomes	<ol style="list-style-type: none"> 1. Ability to mathematically model vibration problems and to mitigate vibration effects 2. Understand free and forced vibration of single, two and multi degree of freedom systems and continuous systems 3. Understand the working principle of vibration measuring instruments 4. Ability to design and develop vibration absorbers, dampers and vibration isolators 5. Ability to design passive, semi-active, and active vibration control systems 				
Contents of the course	<p>Single Degree of Freedom Systems: Undamped and damped free vibration, harmonic excitation, vibration measurements, Time domain and frequency domain methods. (6)</p> <p>Two and Multi-Degree of Freedom Systems: Free and forced vibration of linear multi- degree of freedom system. Introduction to modal analysis, Eigen value problem. Natural frequencies and natural modes. Modal superposition. Application to two degree of freedom systems. (8)</p> <p>Continuous Systems: Vibration of strings, rod, shaft, beams and membranes. (8)</p> <p>Design for Passive Vibration Control: Excitation reduction at source, factors affecting vibration level, dynamic properties of structural and viscoelastic materials. Design of vibration isolators and absorbers, Unconstrained and constrained damping layers treatment. (10)</p> <p>Design of Semi-Active and Active Vibration Control Systems: State –Space representation, Introduction to classical, modern and optimal control of linear systems. Actuators and sensors. Vibration control using smart materials. (10)</p>				
Textbooks	<ol style="list-style-type: none"> 1. A. K. Mallik and S. Chatterjee, Principles of Passive and Active Vibration Control, 1st edition, Affiliated East West Press, 2014, ISBN: 9788176710985. 2. W. T. Thomson, M. D. Dahleh and C. Padmanabhan, Theory of Vibrations with Applications, 5th edition, Pearson Education, 2008, ISBN: 9788131704820. 				
References	<ol style="list-style-type: none"> 1. S. S. Rao, Mechanical Vibrations, 6th edition, Pearson Education, 2017, ISBN: 9780134361307. 2. L. Meirovitch, Fundamentals of Vibrations, Reissue edition, Waveland Pr Inc, 2010, ISBN: 9781577666912. 3. C. Sujatha, Vibration and Acoustics, 1st edition, Tata McGraw-Hill Education, 2010, ISBN: 9780070148789. 4. A. Preumont, Vibration Control of Active Structures-An Introduction, Springer, 3rd edition, 2011, ISBN: 9789400720329. 5. D. J. Mead, Passive Vibration Control, 1st edition, John Wiley & Sons, 1998, ISBN: 9780471942030. 				