INDIAN INSTITUTE OF INFORMATION TECHNOLOGY
DESIGN AND MANUFACTURING (IIITDM) KANCHEEPURAM

<table>
<tr><td>Course Title</td><td colspan="2">Principles of Vibrations</td><td>Course Code</td><td colspan="4">MEXXXX</td></tr>
<tr><td>Dept./
Specialization</td><td colspan="2">Mechanical Engineering</td><td>Structure (LTPC)</td><td>3</td><td>1</td><td>0</td><td>4</td></tr>
<tr><td>To be offered for</td><td colspan="2">UG / PG</td><td>Status</td><td colspan="2">Core ☐</td><td colspan="2">Elective ■</td></tr>
<tr><td>Faculty Proposing the course</td><td colspan="2">Dr. Siva Prasad AVS</td><td>Type</td><td colspan="2">New ■</td><td colspan="2">Modification ☐</td></tr>
<tr><td colspan="3">Recommendation from the DAC - Yes</td><td>Date of DAC</td><td colspan="4">01 – 06 – 2021</td></tr>
<tr><td>External Expert(s)</td><td colspan="6">Prof. S Narayanan, IIITDM Kancheepuram</td></tr>
<tr><td>Pre-requisite</td><td colspan="2">Engineering mechanics, Kinematics and Dynamics of Machinery</td><td colspan="2">Submitted for approval</td><td colspan="2">46th Senate</td></tr>
<tr><td>Learning Objectives</td><td colspan="6">To learn the fundamentals of vibration theory and develop mathematical models representing the real-world mechanical vibration problems.</td></tr>
<tr><td>Learning Outcomes</td><td colspan="6">● Understand free and forced vibration of single, two and multi degree of freedom systems and continuous systems
● Ability to mathematically model vibration problems in real engineering structures.</td></tr>
<tr><td>Contents of the course
(With approximate break-up of hours for L/T/P)</td><td colspan="6">Single Degree of Freedom Systems: Undamped and damped free vibration, viscous, Rayleigh and other damping types, harmonic excitation, rotating unbalance/base excitation, General excitation – impulse response, step and pulse types forces, shock response spectrum, vibration measurements, Time domain and frequency domain methods. (L12+T4)

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, Approximation methods–Rayleigh Ritz and Galerkin based solutions. (L17+T6)

Continuous Systems: Vibration of strings, rod, shafts, beams and membranes. (L9+T3)

Engineering problems in structural systems (L4+T1)</td></tr>
<tr><td>Text Book</td><td colspan="6">1. S. S. Rao, Mechanical Vibrations, 6th edition, Pearson Education, 2017.
2. W. T. Thomson, M. D. Dahleh and C. Padmanabhan, Theory of Vibrations with Applications, 5th edition, Pearson Education, 2008.</td></tr>
<tr><td>Reference Books</td><td colspan="6">1. L. Meirovitch, Fundamentals of Vibrations, Reissue edition, Waveland Pr Inc, 2010
2. C. Sujatha, Vibration and Acoustics, 1st edition, Tata McGraw-Hill Education, 2010
3. Jimin He and Zhi-Fang Fu, Modal Analysis, 1st edition, Butterworth-Heinmann (Elsevier publishers), 2001.</td></tr>
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