RECOMMENDED BOOK(S)

Mechanical Vibrations, 5/E by Singiresu S. Rao, Prentice Hall

REFERENCE BOOK(S)

Mechanical Vibrations: Theory & Applications by W. T. Thompson, Prentice Hall Elements of Vibration Analysis by L. Meirovitch, McGraw Hill Vibration for Engineers by EndrewDimargonas, Prentice Hall

COURSE OBJECTIVES

Students will have a good understanding of the modelling of vibratory motion of mechanical systems using both single and multiple degree of freedom concepts. Students will be able to design simple vibration isolation systems. They will understand the concepts of natural frequencies and mode shapes and their significance in the solution of multiple degree of freedom problems. Students will have an introduction to the use of Laplace Transforms as a solution to differential equations of motion. They will be able to complete basic system modelling tasks. Students will acquire the ability to: Formulate mathematical models of problems in vibrations using Newton's second law or energy principles. Determine a complete solution to the modelled mechanical vibration problems. Correlate results from the mathematical model to physical characteristics of the actual system. Design of a mechanical system using fundamental principles developed in the class.

| | DOMAIN | PLO |
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| Analyze the type of vibration (desirable or undesirable) its attributes | C4 | 02 |
| Apply the knowledge to different mechanical translational, rotational and other applications | C3 | 04 |
| Design and analyze the system response by using the different techniques of Mechanical Vibrations with the application of mathematical modeling. | C4, C5 | 03 |
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COURSE CONTENTS

Introduction to vibrations, history and its importance, Basic concept of vibrations, its classification and terminology, vibration analysis procedure, Elements of vibration systems, Harmonic Motion, Harmonic Analysis, Free vibration of an undamped translational system, Free vibrations of damped Systems, Undamped harmonically excited vibrations, Damped harmonically excited vibrations, Forced harmonic vibrations, Vibration isolation, Vibration measuring instruments, Free vibration Analysis of 2DoF undamped system, Free vibration Analysis of 2DoF damped system, Vibration Absorber and dampers, Vibration measurements and applications, Free and forced vibration of uniform bar and thin beam, Torsional Vibration of shaft and critical speed, Machine condition monitoring