MANIPAL UNIVERSITY JAIPUR

School of Automobile Mechanical and Mechatronics Engineering
Department of Mechanical Engineering
Course Hand-out
Mechanical Vibration | ME 1707 | 4 Credits | 3 1 0 4
Session: July18 – Dec 18 | Faculty: Prof. N.N. Sharma/Mr. Arpit Khandelwal/ Mr. Rakesh Kumar/B.Tech VII Sem.

Course Outcomes: At the end of the course, students will be able to

[1707.1] Describe and identify causes and effects of vibration in mechanical systems

[1707.2] Construct linear vibratory models of different dynamic systems (e.g. linear and torsional) with different complexities like SDOF, MDOF

[1707.3]. Develop the differential equation of motion of vibratory systems using different approaches and solve the equations to get modes and mode shapes

[1707.4]. Analyse of free and forced (harmonic, periodic) vibration for single and multi-degree using different methods

[1707.5]. Develop skills for mathematical modelling of continuous system using MATLAB (e.g. string and rod)

A. SYLLABUS

Introduction to vibration, Longitudinal, Lateral and torsional vibration systems, Single degree of freedom, Free and forced Vibration: Equation of motion, Viscous and Coulomb damped vibration, whirling of shaft. Harmonic forced vibration, Rotary and reciprocating unbalance, Vibration isolation, Periodic and impulse vibration, Two degrees of freedom systems, Equation of motion using classical methods, Modal analysis using Eigen method, Vibration absorber. Multi degree freedom systems, Flexibility and stiffness matrices, Iterative methods: Holzer method, Matrix iteration, Rayleigh and Dunkerley's methods for modal analysis. Torsional vibration: Multi Degree of Freedom system, Geared system. Introduction to continuous systems.

B. TEXT BOOKS

i. S.S.Rao, Mechanical Vibration, Pearson Education, Delhi, 4t h Edition
ii. G.K. Groover, Mechanical Vibration, Nem Chand & Bros, 8t h edition

REFERENCE BOOKS

i. W.T.Thomson, Theory of Vibrations with Applications, Chapman and Hall, 4th Edition, 1993
ii. J.D.Imnan, Engineering Vibration, Prentice Hall, New Delhi, 2001
iii. S. Graham Kelly, Mechanical Vibration: Theory and Application, Global Engineering.