ME 313 Dynamics of Machinery (2-1-0-6)

Prerequisite: ME224 Kinematics of Machinery or equivalent

Static and dynamic force analysis; Flywheel; inertia forces and their balancing for rotating and reciprocating machines; Gyroscope and gyroscopic effects; Governers: types and applications; Vibrations of one degree of freedom systems; Free and Force vibrations; Transverse and torsional vibrations of two and three rotor systems; critical speeds; Vibration isolation and measurements; two-degree of freedom systems; Geared system; Introduction to Multi-degree of Freedom System :normal mode vibration, coordinate coupling, forced harmonic vibration, vibration absorber (tuned, and centrifugal pendulum absorber), vibration damper; Properties of vibrating system, flexibility matrix, stiffness matrix, reciprocity theorem, eigenvalues and eigenvectors, orthogonal properties of eigenvectors, modal matrix, Rayleigh damping, Normal mode summation.

Texts:

[1] J. J. Uicker (Jr), G. R. Pennock, and J. E. Shigley, Theory of Machines and Mechanisms, 3rd Ed., Oxford International Student Edition, 2014
[2] J S Rao and R V Dukkipat, Mechanism and Machine Theory, 2nd Ed., New Age Intl., 2008

References:

[1] S. S. Rattan, Theory of Machines, 3rd Ed., Tata McGraw Hill, 2009.
[2] T. Bevan. Theory of Machines, CBS Publishers and Distributors, 1984.
[3] L. Meirovitch, Elements of Vibration Analysis, McGraw Hill, 1998.
[4] W. T. Thomsom and M.D. Dahleh, Theory of Vibration with Applications, 5th Ed., Pearson Education, 1999.
[5] Kenneth J. Waldron, Gary L. Kinzel, Sunil K. Agarwal, Kinematics, Dynamics, and Design of Machinery, 3rd Edition, John Wiley & Sons, Ltd., 2016.
[6] Robert L. Norton, Kinematics and Dynamics of Machinery, 2nd Edition, McGraw Hill, 2013.