MANIPAL UNIVERSITY JAIPUR School of Automobile Mechanical and
Mechatronics Engineering
Department of Mechanical Engineering Course Hand-out
Dynamics of Machines| ME 1402 | 3 Credits | 3 0 0 3
Session: JAN 19 – MAY 19 | Faculty: Prof. N N Sharma/Dr.Ashish Sharma/Mr.Arpit Khandelwal
/B.Tech. IV Semester

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

ME1402.1 Identify the static and dynamics forces in different kinematic mechanism.

ME1402.2 Estimate the forces and their effects on four bar mechanism (IC engines).

ME1402.3 Construct the turning moment diagram of crank shaft for different cycles and manipulate the

diagram with the help of flywheel.

ME1402.4 Understanding the operations of different types of governors and their applications.

ME1402.5 Analyse the gyroscopic effects and applications of gyroscope.

ME1402.6 Develop employability skills for balancing of mechanical systems

A. Syllabus

Static forces in Machines: Conditions of static equilibrium of a member under action of two forces, three forces, four forces and forces and a couple, Analysis of slider crank mechanism and four bar mechanism, example of quick return mechanism, Virtual work . Dynamic force analysis: Inertia forces, D Alembert's Principle, Inertia forces of connecting rod, inertia forces in slider crank mechanism, four bar mechanism, dynamically equivalent system, forces in engines, turning moment diagram of single cylinder engines, multi cylinder engines, mass and size of flywheel. Balancing of rotating masses in machinery, Balancing in same plane, balancing in different planes, balancing of reciprocating masses, Primary balancing and Secondary balancing of multi cylinder engines, inline engines, V-engines, and radial engines using direct and revers cranks concept. Governors, Centrifugal governors such as Porter, Proell, Hartnell, and Wilson Hartnell. Characteristics of governors, stability, Sensitiveness, isochronism, hunting, controlling force, effort and power of governors. Gyroscope: Principle of Gyroscopic couple, Effect of gyroscopic couple and centrifugal force on vehicle taking a turn, Stabilization of sea vessels, Condition for stability of a four wheeler and two wheelers.

F. TEXT BOOKS

i.S. S. Rattan, "Theory of machines" Tata McGraw Hill, 4th Edition, 2014.

ii.Amitabha Ghosh & Asok Kumar Mallik, "Theory of Mechanisms and Machines" East West Press, 3rd Edition, 2006

REFERENCE BOOKS

I. Hamilton H. Mabie and Charles, "Mechanisms and dynamics of machinery" John Wiley and sons, 4th Edition 1987.

ii. J.E.Shigley and Jr.Uicker, "Theory of Machines and Mechanisms" Oxford University press, 4th Edition, 2011.

ii.   R L Norton, "Kinematics and Dynamics of Machinery" Tata McGraw-Hill Education, 1st Edition in SI unit, 2009.