

DYNAMICS OF MACHINERY

Course Code	20ME3601	Year	III	Semester	II
Course Category	Program Core	Branch	ME	Course Type	Theory
Credits	3	L-T-P	3-0-0	Pre-requisites	Kinematics of Machinery
Continuous Internal Evaluation	30	Semester End Evaluation	70	Total Marks	100

Course outcomes: At the end of the course, the student will be able to:

CO	Statement	Skill	BTL	Units
CO1	Understand the functional details of balancing of rotating and reciprocating parts, gyroscope, flywheel, governors, and vibration phenomenon of single degree of freedom systems.	Understand	L2	1,2,3, 4,5
CO2	Compute natural frequencies of undamped free & forced vibrations for a single degree of freedom system.	Apply	L3	4,5
CO3	Perform balancing of rotating and reciprocating masses and analyze the gyroscopic effects in aero planes and naval	Analyse	L4	1,2
CO4	Analyze the forces acting on the slider-crank mechanism, governors, and flywheels.	Analyse	L4	2,3

Contribution of Course outcomes towards achievement of programme outcomes & Strength of correlations (High:3, Medium: 2, Low:1)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2				2			1		2	3	2
CO2	3	3	2				2			1		2	3	2
CO3	3	3	2				2			1		2	3	2
CO4	3	3	2				2			1		2	3	2

Syllabus

Unit	Contents	Mapped CO
I	Balancing of Rotating Masses: Introduction, Static balancing, Dynamic balancing, Balancing of single unbalanced rotating mass, Balancing of Several Masses in the same planes, Balancing of Several Masses in Different planes. Balancing of Reciprocating Masses: Introduction to Primary and Secondary balancing. Balancing of Multi cylinder in-line and radial engines	CO1, CO3
II	Gyroscope: Introduction to Precession, Gyroscopic Couple and its effect on an aero planes and Naval Ships Dynamic Force Analysis: Introduction, D-Alembert's Principle, Angular velocity and Angular acceleration of the Piston and Connecting rod, Forces on the Reciprocating parts of an Engine, Equivalent Dynamical system, Inertia force and Inertia Torque in a reciprocating Engine	CO1, CO3 CO4
III	Turning Moment Diagram: Introduction, Turning moment diagram for Multi cylinder Engine, Fluctuation of energy. Coefficient of fluctuation of Speed, Energy Stored in a Flywheel, Flywheel in Punching Press Governors: Introduction, Watt, Porter, Proell Governors, Hartnell, Hartung	CO1, CO4

	Governors, Sensitiveness of a Governor, Hunting, Isochronisms, Stability.	
IV	Free Vibrations of Single Degree of Freedom Systems: Introduction, Definitions, types of vibrations and causes of vibrations, Basic features of Vibrating system, Degree of freedom, D'Alembert's Principle, Energy method, Un damped free longitudinal, transverse and torsional vibrations of single degree of freedom systems, equivalent stiffness	CO1, CO2
V	Harmonically Excited Vibrations: Introduction, equations of motion, response of undamped systems under harmonic excitation.	CO1, CO2

Learning Resources

Text Book(s):

1. Theory of Machines, (3rd Edition) by S.S.Rattan, Tata Mc.Graw Hill, New Delhi, 2012
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References:

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| 1 Theory of Machines: Kinematics & Dynamics, by P.L. Ballaney, I.K.International Pvt. Ltd., New Delhi, 2010
2. Theory of Machines, by B.V.R. Guptha, Khanna Publications, New Delhi, 11 th Edition, 1980
3. Theory of Machines, (5th Edition) by R.K.Bansal, Laxmi Publications(p) ltd. New Delhi, 2010 |
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