

CODE: ME2201

DYNAMICS OF MACHINERY

Externals: 60 Marks

L-T-P-C*

Internals: 40 Marks

4-0-0-4

Objectives:

- To find static and dynamic forces on planar mechanisms.
- To know the causes and effects of unbalanced forces in machine members.
- To determine natural frequencies of undamped, damped and forced vibrating systems of one, two and multi degree freedom systems.

UNIT – I

STATIC AND DYNAMIC:

Static Force Analysis: Reciprocating Engine Mechanism, Quick Return Mechanism, Four Link Mechanism, Friction in Linkages, Slider in Equilibrium under the Action of Concurrent Forces, Slider in Equilibrium under the Action of Non concurrent Forces, Friction in Turning Pairs.

Inertia Force Analysis: Inertia Forces of a Reciprocating Engine Mechanism, Four Link Mechanism, Quick Return Mechanism. Correction Torque.

UNIT –II

PRECESSION: Gyroscopes, effect of precession motion on the stability of moving vehicles such as motor car, motor cycle, aero planes and ships.

FRICTION: Inclined plane, friction of screw and nuts, pivot and collar, uniform pressure, uniform wear, Friction circle and friction axis: lubricated surfaces, boundary friction, film lubrication.

UNIT – III

TURNING MOMENT DIAGRAM AND FLY WHEELS:

Turning moment diagrams for steam engine, I.C. Engine and multi cylinder engine. Crank effort - coefficient of Fluctuation of energy, coefficient of Fluctuation of speed – Fly wheels and their design.

GOVERNORS: Watt, Porter and Proell governors. Spring loaded governors – Hartnell and Hartung governors with auxiliary springs. Sensitiveness, isochronism and hunting –effort and power of a governor.

UNIT – IV

BALANCING: Balancing of rotating masses - single and multiple – single and different planes.

BALANCING OF RECIPROCATING MASSES: Primary, Secondary and higher balancing of reciprocating masses. Analytical and graphical methods. Unbalanced forces and couples – V, multi cylinder, in -line and radial engines for primary and secondary balancing, locomotive balancing – Hammer blow, Swaying couple, variation of tractive force.

UNIT – V

VIBRATION: Free Vibration of mass attached to vertical spring – oscillation of pendulums, centers of oscillation and suspension. Transverse loads, vibrations of beams with concentrated and distributed loads. Dunkerly's method, Raleigh's method. Whirling of shafts, critical speeds, torsional vibrations, two and three rotor systems. Simple problems on forced, damped vibration, Vibration Isolation & Transmissibility

TEXT BOOKS:

1. Theory of Machines / S.S Rattan/ Mc. Graw Hill Publ.
2. Theory of machines / Khurmi/S.Chand.

REFERENCES:

1. Mechanism and Machine Theory / JS Rao and RV Dukkipati / New Age
2. Dynamics of Machinery/Balleney/Dhanpat Rai
3. Theory of Machines / Thomas Bevan / CBS Publishers
4. Theory of Machines / Jagadish Lal & J.M.Shah /Metropolitan.