UNIVERSITY OF ENGINEERING & MANAGEMENT, JAIPUR

Syllabus for Mechanical Engineering (2019-20)

Title of Course: Kinematics &Theory of Machines
Course Code: MEC408T **Semester: IV**
L-T Scheme: 3-0 **Course Credits: 3**

Course Contents:

Unit 1:
Introduction to mechanisms, Difference between Machine and Mechanism; Classification of Pairs of Elements, Kinematic chain, types of joints in a chain; Four-bar linkage: motions of links, Grashof's criterion of movability. Degrees of freedom for plane Mechanisms, Gruebler's criterion for plane mechanism, Kinematic inversions – four Inversions of a Slider-Crank Chain.

Velocity analysis in Mechanisms: Relative velocity method – slider crank mechanism, four bar mechanism, Crank and slotted lever mechanism; Instantaneous centre method –kennedy's theorem; Acceleration analysis: Acceleration Images, Klein's construction.

Unit 2:
Belt-drive – introduction; Law of belting, Length of flat belt for open and cross belt connections; Stepped pulley for open flat belt; Tension in flat belt and V-belts; Power transmitted in belt drive, centrifugal effects on belt, initial tension, creep.

Unit 3:
Gear terminology, Laws of gearing, types of gears – Spur, Bevel, Helical, Worm; tooth profile, interference; Gear trains – simple, compound, epicyclic gear train; Speed-torque analysis of gear trains.

Unit 4:
Classification of Cams and followers; Radial Cam, Analysis of knife-edge, roller and flat face follower motion – constant velocity, simple harmonic, constant acceleration & deceleration, cycloidal; Offset follower.

Unit 5:
Study of lower pair Mechanisms- Pantograph, Parallel linkage mechanisms, Straight line mechanism, Automobile steering mechanism, Hooks joint.

Kinematic Synthesis: Introduction to problems of function generation, path generation and rigid body guidance; Type, Number and Dimensional Synthesis; Two and three position synthesis of four bar mechanism and slider –crank mechanism: Graphical – pole, Relative pole and Inversion method; Analytical solution - Freudenstein's Method.

TEXT BOOKS:

1. S S Rattan," Theory of Machines", Tata McGraw Hill Education Pvt. Ltd., New Delhi.
2. Sadhu Singh : Theory of Machines, "Kinematics of Machine", Third Edition, Pearson Education.
3. Khurmi, R.S., "Theory of Machines",14th Edition, S Chand Publications.

REFERENCES:

1. Robert L. Norton, "Kinematics and Dynamics of Machinery", Tata McGraw-Hill.
2. Ghosh. A and Mallick, A.K., "Theory of Mechanisms and Machines", Affiliated East-West Pvt. Ltd., New Delhi.