**Lesson Plan**

**Subject : Theory of Machine**

Lesson plan Duration : 15 Weeks

Work load (lecture/Practical) per week (in hours): Lectures:3 hours, Practical:2 hours

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| **Lecture No** | **Theory** | **Practical** |
| **Practical Day** | **Topic** |
| 1 | Simple Mechanism: Introduction to mechanism and machine | 1 | To study inversions of 4 bar mechanisms, single and double slider crank mechanisms. |
| 2 | Kinematic links, pairs and chains |  |
| 3 | Mobility of mechanisms |  |
| 4 | Equivalent mechanisms | 2 | To determine the ratio of times and tool velocities of Whitworth quick-return mechanism. |
| 5 | Four bar chain, Inversion of four bar chain |  |
| 6 | Slider crank chain and inversions |  |
| 7 | Velocity Analysis: Determination of link velocities | 3 | To plot slider displacement, velocity and acceleration against crank rotation for single slider crank mechanism. |
| 8 | Relative velocity method |  |
| 9 | Velocities in four bar mechanism |  |
| 10 | Velocities Slider crank mechanism | 4 | To find out experimentally the Coriolis component of acceleration and compare with theoretical value. |
| 11 | Crank and slotted lever mechanism  |  |
| 12 | Quick return motion mechanism |  |
| 13 | Instantaneous center method: Types & location of instantaneous centers | 5 | To determine the moment of inertia of a flywheel. |
| 14 | Arnold Kennedy theorem, methods of locating instantaneous centers |  |
| 15 | steering gear mechanisms. Problems. |  |
| 16 | Acceleration Analysis: Acceleration of a point on a link | 6 | To plot follower displacement v/s cam rotation for various cam follower systems. |
| 17 | Four bar mechanism and slider crank mechanism |  |
| 18 | Coriolis component of acceleration, Klein’s construction, Problems |  |
| 19 | Cams and Followers: Classification & terminology | 7 | To find gyroscopic couple on motorized gyroscope and compare with applied couple |
| 20 | Cam profile by graphical methods with knife edge and radial roller follower for uniform velocity |  |
| 21 | Simple harmonic, constant acceleration and deceleration and cycloidal motion of followers, Problems. |  |
| 22 | Static and Dynamic Force Analysis:constraints and applied forces, static equilibrium, equilibrium of two and three-force member | 8 | To calculate the torque on planet carrier and torque on internal gear using epicycle gear train and holding torque apparatus. |
| 23 | Equilibrium of four-forces and torque, free body diagrams |  |
| 24 | Dynamic Force Analysis:D’Alembert’sprinciple, equivalent offset interia force |  |
| 25 | Dynamic analysis of four-link | 9 | To determine the coefficient of friction between belt and pulley and plot a graph between log 10 T1/T2 v/s θ |
| 26 | Dynamic analysis of slider-crank mechanisms |  |
| 27 | velocity and acceleration of piston, angular velocity and angular acceleration of connecting rod |  |
| 28 | turning moment on crank shaft, turning moment diagrams, fluctuation of energy, flywheels | 10 | To study the different types of centrifugal and inertia governor with demonstration. |
| 29 | Balancing: rotating masses: Static and Dynamic Balancing |  |
| 30 | Single Rotating mass, Many Masses rotating in same plane and in different planes.  |  |
| 31 | Analytical method for balancing of rotating masses. | 11 | To study different types of brakes and dynamometers with demonstration |
| 32 | Reciprocating masses: Balancing of reciprocating engine,  |  |
| 33 | Balancing of Multi-cylinder in line engines, balancing machines |  |
| 34 | Belts and Chain Drives: classifications of belt, law of belting | 12 | To study various types of steering mechanisms. |
| 35 | Length of open and cross flat belt, Ratio of tensions, Centrifugal tension, power transmission |  |
| 36 | condition for maximum power transmission, creep of belt, V-belt drives: driving tensions,  |  |
| 37 | Chain drives: classifications, terminology of chains, kinematics of chains, Problems. |  |  |
| 38 | Gears and Gear Trains:Classification & terminology, Law of gearing |  |  |
| 39 | Tooth forms & comparisons, Length of path of contact, Contact ratio |  |  |
| 40 | Interference & undercutting in involute gear teeth  |  |  |
| 41 | Minimum number of teeth on gear and pinion to avoid interference.  |  |  |
| 42 | Gear Trains: Simple, Compound gear train |  |  |
| 43 | Reverted and Planetary gear trains  |  |  |