Department of Mechanical Engineering

III B.Tech I Semester Course Structure & Syllabus (ACE-R22 Regulations)

ACE Engineering College
Ankushapur(V), Ghatkesar(M), Medchal Dist - 501 301
(An Autonomous Institution, Affiliated to JNTUH ,Hyderabad)

Department of Mechanical Engineering
B.Tech. in Mechanical Engineering
COURSE STRUCTURE & SYLLABUS (ACE-R22 Regulations)
Applicable from A.Y. 2022-23 Batch

III YEAR I SEMESTER

S. No.	Course Code	Course Title	L	T	P	Credits
1.	ME501PC	Dynamics of Machinery	3	0	0	3
2.	ME502PC	Design of Machine Elements	3	0	0	3
3.	ME503PC	Metrology & Machine Tools	3	0	0	3
4.	SM504MS	Business Economics & Financial Analysis	3	0	0	3
5.	ME505PC	Steam Power & Jet Propulsion	3	0	0	3
6.	ME506PC	CAD/CAM	2	0	0	2
7.	ME507PC	Thermal Engineering Laboratory	0	0	2	1
8.	ME508PC	Metrology & Machine Tools Laboratory	0	0	2	1
9.	ME509PC	Kinematics & Dynamics Laboratory	0	0	2	1
10.	*MC510	Intellectual Property Rights	3	0	0	0
		Total Credits	**20**	**0**	**6**	**20**

ME501PC DYNAMICS OF MACHINERY

B.Tech. III Year, I Sem.

L	T	P	C
3	0	0	3

Pre-requisite: Kinematics of Machinery

Course Objectives:

- To study the inertia forces, torques and energy involved in different machine members
- To learn the theory involved in the analysis of clutches, brakes, dynamometers, governors and flywheels
- To Understand the balancing of reciprocating and rotary parts
- To be Aware of situations like speed fluctuations, rotor imbalance and machine vibrations in industries
- To Understand the importance of resonance and critical speed

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

- **CO1:** Analyze the effect of a gyroscope on ships, aeroplanes and automobile
- **CO2:** Explain the inertia forces in the working of important machine elements like flywheels, connecting rod etc.
- **CO3:** Understand the types of brakes and the roll of friction
- **CO4:** Understand the working of governers and estimate the unbalanced forces in a multi-cylinder reciprocating engine
- **CO5:** Estimate the longitudinal, transverse and torsional vibrations so as to avoid resonance

UNIT – I:

Precession: Gyroscopes – effect of precession – motion on the stability of moving vehicles such as motorcycle – motorcar – aeroplanes and ships.

Static and Dynamic Force Analysis: Static force analysis of planar mechanisms – Analytical Method – Dynamic Force Analysis – D'Alembert's principle, Dynamic Analysis of 4-link mechanism, Slider Crank Mechanism.

UNIT – II:

Turning Moment Diagram and Flywheels: Engine Force Analysis – Piston Effort, Crank Effort, etc., Inertia Force in Reciprocating Engine – Graphical Method - Turning moment diagram –fluctuation of energy – flywheels and their design - Inertia of connecting rod- inertia force in reciprocating engines – crank effort and torque diagrams.-.

UNIT – III:

Friction: pivots and collars – uniform pressure, uniform wear – friction circle and friction axis: lubricated surfaces – boundary friction – film lubrication. Clutches – Types – Single plate, multi-plate and cone clutches. **Brakes and Dynamometers:** Types of brakes: Simple block brake, band and block brake- internal expanding shoe brake-effect of braking of a vehicle. Dynamometers – absorption and transmission types. General description and methods of operation.

UNIT – IV:

Governors: Types of governors - Watt, Porter and Proell governors. Spring loaded governors – Hartnell and Hartung with auxiliary springs. Sensitiveness, isochronisms and hunting **–** stability – effort and power of the governors.

Balancing: Balancing of rotating masses- Primary, Secondary, and higher balancing of reciprocating masses. Analytical and graphical methods. Unbalanced forces and couples. Examination of "V" and multi cylinder in-line and radial engines for primary and secondary balancing- locomotive balancing – Hammer blow – Swaying couple – variation of tractive effort.

UNIT – V:

Vibrations: Free Vibration of mass attached to vertical spring- Damped free vibrations– Transverse loads – vibrations of beams with concentrated and distributed loads. Dunkerly's method – Raleigh's method. Whirling of shafts – critical speed – torsional vibrations – one, two and three rotor systems.

TEXT BOOKS:

1. Theory of Machines,S. S. Rattan ,Mc Graw Hill, 2017
2. Theory of Machines /Sadhu Singh/ Pearson.

REFERENCE BOOKS:

1. Theory of Machines and Mechanisms, Joseph E. Shigley, Fifth Edition, Oxford University Press
2. Mechanism and Machine Theory, Rao, J.S & R.V. Duggipati, New Age
3. Bansal R.K, Brar J.S, Theory of Machines, Lakshmi Publications (P) Ltd, 2016 Edition

ME502PC DESIGN OF MACHINE ELEMENTS

B.Tech. III Year I Sem.

L	T	P	C
3	0	0	3

Note: Design Data books are not permitted in the Examinations. The design must not only satisfy strength criteria but also rigidity criteria.

Pre-requisites: Engineering mechanics, mechanics of solids, manufacturing processes, metallurgy and material science.

Course Objectives:

- To understand the general design procedures and principles in the design of machine elements.
- To study different materials of construction and their properties and factors determining the selection of material for various applications.
- To determine stresses under different loading conditions.
- To learn the design procedure of different fasteners, joints, shafts and couplings.

Course Outcomes:

- The student acquires the knowledge about the principles of design, material selection, component behavior subjected to loads, and criteria of failure.
- Understands the concepts of principal stresses, stress concentration in machine members and fatigue loading.
- Design on the basis of strength and rigidity and analyze the stresses and strains induced in a machine element.

UNIT – I:

Introduction: General considerations in the design of Engineering Materials and their properties – selection –Manufacturing consideration in design. Tolerances and fits –BIS codes of steels. **Design for Static Strength:** Simple stresses – Combined stresses – Torsional and Bending stresses – Impact stresses – Stress strain relation – Various theories of failure – Factor of safety – Design for strength and rigidity – preferred numbers. The concept of stiffness in tension, bending, torsion and combined situations.

UNIT – II:

Design for Fatigue Strength: Stress concentration–Theoretical stress Concentration factor– Fatigue stress concentration factor- Notch Sensitivity – Design for fluctuating stresses – Endurance limit – Estimation of Endurance strength – Gerber's curve– Goodman's line– Soderberg's line.

UNIT – III:

Riveted, Welded and Bolted Joints: Riveted joints- methods of failure of riveted joints-strength equations-efficiency of riveted joints-eccentrically loaded riveted joints.

Welded joints-Design of fillet welds-axial loads-circular fillet welds under bending, torsion. Welded joints under eccentric loading.

Bolted joints – Design of bolts with pre-stresses – Design of joints under eccentric loading – locking devices – bolts of uniform strength.

UNIT – IV:

Keys, Cotters and Knuckle Joints: Design of keys-stresses in keys-cottered joints-spigot and socket, sleeve and cotter, Gib and cotter joints-Knuckle joints.

UNIT – V:

Shafts: Design of solid and hollow shafts for strength and rigidity – Design of shafts for combined bending and axial loads – Shaft sizes – BIS code. - Gaskets and seals (stationary & rotary)

Shaft Couplings: Rigid couplings – Muff, Split muff and Flange couplings. Flexible couplings –

Flange coupling (Modified).

TEXT BOOKS:

1. Design of Machine Elements, V B Bhandari, Fifth Edition, McGraw-Hill
2. Machine Design, Jindal, Pearson

REFERENCE BOOKS:

1. Design of Machine Elements, V. M. Faires, Macmillan.
2. Design of Machine Elements-I, Annaiah, M.H, New Age International Publishers

ME503PC METROLOGY & MACHINE TOOLS

B.Tech. III Year I Sem.

L	T	P	C
3	0	0	3

Course Objectives:

- To impart the fundamental aspects of the metal cutting principles and their application in studying the behavior of various machining processes.
- To train in knowing the fundamental parts of various machine tools and their kinematic schemes.
- To improve problem solving skills by determining the machining time of various machining processes.
- To provide technical understanding of basic concepts of engineering metrology and its practice in the industry.
- To make the student to improve applications aspect in the measurements and control of a process in manufacturing.

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

- **CO1:** Explain the principles of metal cutting and working of lathe machine tools.
- **CO2:** Understand working of drilling, boring, shaping, slotting, planning machine tools and estimation of machining time.
- **CO3:** Describe the Principles of working and operations performed on milling and grinding machines.
- **CO4:** Explain the use of various measuring instruments, gauges and system of limits, fits and tolerances.
- **CO5:** Describe the process of measuring the surface roughness, screw thread parameters & principles of coordinate measuring machines.

UNIT – I:

Metal cutting: Introduction, elements of cutting process – Geometry of single point tool, Chip formation and types of chips, tool materials, tool life, tool wear, cutting fluids, Analysis of orthogonal cutting- Merchant's force diagram, Machinability.

Engine lathe – Principle of working, types of lathes, specifications, operations on lathe, Taper turning methods, Lathe attachments. Capstan and Turret lathe – Single spindle and multi-spindle automatic lathes – tool layouts.

UNIT – II:

Drilling and Boring Machines – Geometry of twist drill, Principles of working, specifications, types, operations performed, machining time calculations, Types of Boring machines and applications. Shaping, slotting and planing machines –Principles of working, specifications, types of operations performed, applications, quick return mechanisms, machining time calculations.

UNIT – III:

Milling machines – Principles of working – Types of milling machines – Geometry of milling cutters methods of indexing. Grinding – theory of grinding – classification of grinding machines. Types of abrasives, bonds. Selection of a grinding wheel. Lapping, honing and broaching machines, comparison and Constructional features, machining time calculations

UNIT – IV:

Introduction to Metrology: Need, Types, Terminology, Methods of measurements, Selection of measuring Instruments Linear Measurement: Line and end standard, slip gauges, micrometers, spirit level.

Limits, fits and tolerances- Types of Fits - Unilateral and bilateral tolerance system, hole and shaft basis system. Interchangeability and selective assembly.

Limit Gauges: Taylor's principle, Design of GO and NO-GO gauges.
Measurement of angles using Bevel protractor and Sine bar. Measurement of flatness using straight edges, surface plates, optical flat and auto collimator.

UNIT – V:
Surface Roughness Measurement: Factors affecting the surface roughness, reasons for controlling the surface texture, elements of surface texture-Roughness, Waviness, evaluation of surface roughness-CLA, RMS, Rz Values. Methods of measurement of surface finish, Talysurf. Screw thread measurement, Gear measurement; Machine Tool Alignment Tests on lathe, milling and drilling machines. Coordinate Measuring Machines: Types and Applications of CMM.

TEXT BOOKS:

1. Machine Tool Practices/ Kibbe, Johne. Neely, T. White, Rolando O. Meyer/ Pearson
2. Engineering Metrology/ R.K. Jain/ Khanna Publishers.

REFERENCE BOOKS:

1. Gupta I.C., Engineering Metrology, Dhanpat Rai Publications (P) Ltd, 2021 Edition.
2. Principles of Machine Tools, Bhattacharyya A and Sen.G.C / New Central Book Agency.
3. Fundamentals of Dimensional Metrology / Connie Dotson / Thomson
4. Fundamentals of Metal Machining and Machine Tools / Geoffrey Boothroyd / McGraw Hill
5. Principles of Engineering Metrology/ Rega Rajendra/ Jaico Publishers.
6. Metrology and Measurement/ Bewoor & Kulkarni/ Tata Mc Graw Hill.

SM504MS BUSINESS ECONOMICS & FINANCIAL ANALYSIS

B.Tech. III Year I Sem.

L	T	P	C
3	0	0	3

Course Objective: To learn the basic Business types, impact of the Economy on Business and Firms specifically. To analyze the Business from the Financial Perspective.

Course Outcome: The students will understand the various Forms of Business and the impact of economic variables on the Business. The Demand, Supply, Production, Cost, Market Structure, Pricing aspects are learnt. The Students can study the firm's financial position by analysing the Financial Statements of a Company.

UNIT – I: Introduction to Business and Economics

Business: Structure of Business Firm, Theory of Firm, Types of Business Entities, Limited Liability Companies, Sources of Capital for a Company, Non-Conventional Sources of Finance.

Economics: Significance of Economics, Micro and Macro Economic Concepts, Concepts and Importance of National Income, Inflation, Money Supply in Inflation, Business Cycle, Features and Phases of Business Cycle. Nature and Scope of Business Economics, Role of Business Economist, Multidisciplinary nature of Business Economics.

UNIT – II: Demand and Supply Analysis

Elasticity of Demand: Elasticity, Types of Elasticity, Law of Demand, Measurement and Significance of Elasticity of Demand, Factors affecting Elasticity of Demand, Elasticity of Demand in decision making, Demand Forecasting: Characteristics of Good Demand Forecasting, Steps in Demand Forecasting, Methods of Demand Forecasting.

Supply Analysis: Determinants of Supply, Supply Function & Law of Supply.

UNIT – III: Production, Cost, Market Structures & Pricing

Production Analysis: Factors of Production, Production Function, Production Function with one variable input, two variable inputs, Returns to Scale, Different Types of Production Functions.

Cost analysis: Types of Costs, Short run and Long run Cost Functions.

Market Structures: Nature of Competition, Features of Perfect competition, Monopoly, Oligopoly, Monopolistic Competition.

Pricing: Types of Pricing, Product Life Cycle based Pricing, Break Even Analysis, Cost Volume Profit Analysis.

UNIT – IV: Financial Accounting: Accounting concepts and Conventions, Accounting Equation, Double-Entry system of Accounting, Rules for maintaining Books of Accounts, Journal, Posting to Ledger, Preparation of Trial Balance, Elements of Financial Statements, Preparation of Final Accounts.

UNIT – V: Financial Analysis through Ratios: Concept of Ratio Analysis, Liquidity Ratios, Turnover Ratios, Profitability Ratios, Proprietary Ratios, Solvency, Leverage Ratios (simple problems).

Introduction to Fund Flow and Cash Flow Analysis (simple problems).

TEXT BOOKS:

1. D. D. Chaturvedi, S. L. Gupta, Business Economics - Theory and Applications, International Book House Pvt. Ltd. 2013.
2. Dhanesh K Khatri, Financial Accounting, Tata McGraw Hill, 2017.
3. Geethika Ghosh, Piyali Gosh, Purba Roy Choudhury, Managerial Economics, 2e, Tata McGraw Hill Education Pvt. Ltd. 2017

REFERENCE BOOKS:

1. Paresh Shah, Financial Accounting for Management 2e, Oxford University Press, 2019.
2. S. N. Maheshwari, Sunil K Maheshwari, Sharad K Maheshwari, Financial Accounting, 5e, Vikas Publications, 2013.

ME505PC STEAM POWER & JET PROPULSION

B.Tech. III Year I Sem.

L	T	P	C
3	0	0	3

Note: Steam Table book Permitted.
Pre-requisite: Thermodynamics

Course Objective: To apply the laws of Thermodynamics to analyze steam and gas turbine cycles and to perform analysis of the major components of steam and gas turbine plants and their applications.

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

- **CO1:** Develop state – space diagrams based on the schematic diagrams of process flow of steam and gas turbine plants
- **CO2:** Apply the laws of Thermodynamics to analyze thermodynamic cycles
- **CO3:** Differentiate between vapour power cycles and gas power cycles
- **CO4:** Infer from property charts and tables and to apply the data for the evaluation of performance parameters of the steam and gas turbine plants
- **CO5:** Understand the functionality of major components of steam and gas turbine plants and to do the analysis of these components

UNIT – I:

Steam Power Plant: Rankine cycle - Schematic layout, Thermodynamic Analysis, Concept of Mean Temperature of Heat addition, Methods to improve cycle performance – Regeneration & reheating.

Boilers – Classification – Working principles with sketches including H.P. Boilers – Mountings and Accessories – Working principles- Boiler horse power, Equivalent Evaporation, Efficiency and Heat balance – Draught- Classification – Height of chimney for given draught and discharge- Condition for maximum discharge- Efficiency of chimney.

UNIT – II:

Steam Nozzles: Stagnation Properties- Function of nozzle – Applications and Types- Flow through nozzles- Thermodynamic analysis – Assumptions -Velocity of nozzle at exit-Ideal and actual expansion in nozzle- Velocity coefficient- Condition for maximum discharge- Critical pressure ratio- Criteria to decide nozzle shape- Super saturated flow, its effects, Degree of super saturation and Degree of under cooling - Wilson line.

UNIT – III:

Steam Turbines: Classification – Impulse turbine; Mechanical details – Velocity diagram – Effect of friction – Power developed, Axial thrust, Blade or diagram efficiency – Condition for maximum efficiency. De-Laval Turbine - its features- Methods to reduce rotor speed-Velocity compounding and Pressure compounding- Velocity and Pressure variation along the flow – Combined velocity diagram for a velocity compounded impulse turbine.

Reaction Turbine: Mechanical details – Principle of operation, Thermodynamic analysis of a stage, Degree of reaction –Velocity diagram – Parson's reaction turbine – Condition for maximum efficiency.

UNIT – IV:

Steam Condensers: Requirements of steam condensing plant – Classification of condensers – Working principle of different types – Vacuum efficiency and Condenser efficiency – Air leakage, sources and its affects, Air pump- Cooling water requirement.

Gas Turbines: Simple gas turbine plant – Ideal cycle, essential components – Parameters of performance – Regeneration, Inter cooling and Reheating –Closed and Semi-closed cycles – Merits and Demerits- Combustion chambers and turbines of Gas Turbine Plant- Brief Concepts, combined cycle.

UNIT – V:

Jet Propulsion: Principle of Operation –Classification of jet propulsive engines – Working Principles with schematic diagrams and representation on T-S diagram - Thrust, Thrust

Power and Propulsion Efficiency – Turbo jet engines – Needs and Demands met by Turbo jet – Schematic Diagram, Thermodynamic Cycle, Performance Evaluation Thrust Augmentation – Methods.

Rockets: Application – Working Principle – Classification – Propellant Type – Thrust, Propulsive Efficiency – Specific Impulse – Solid and Liquid propellant Rocket Engines.

TEXT BOOKS:

1. Thermal Engineering / Mahesh M Rathore/ Tata Mc Graw Hill
2. Gas Turbines – V. Ganesan /Tata Mc Graw Hill

REFERENCE BOOKS:

1. Gas Turbine Theory/ Saravanamuttoo, Cohen, Rogers, Straznicky, Nix / Pearson
2. Fundamentals of Engineering Thermodynamics / Rathakrishnan/ PHI.
3. Thermal Engineering/ R.K. Rajput/ Lakshmi Publications.

ME506PC CAD/CAM

B.Tech. III Year I Sem.

L	T	P	C
2	0	0	2

Pre-requisites: To learn the importance and use of computer in design and manufacture

Course objectives: To provide an overview of how computers are being used in design, development of manufacturing plans and manufacture. To understand the need for integration of CAD and CAM

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

- **CO1:** Understand geometric transformation techniques in CAD.
- **CO2:** Develop mathematical models to represent curves and surfaces.
- **CO3:** Model engineering components using solid modeling techniques.
- **CO4:** Develop programs for CNC to manufacture industrial components.
- **CO5:** Understand the application of computers in various aspects of Manufacturing viz., Design, Proper planning, Manufacturing cost, Layout & Material Handling system.

UNIT – I:

Fundamentals of CAD/ CAM, Application of computers for Design and Manufacturing, Benefits of CAD/ CAM - Computer peripherals for CAD/ CAM, Design workstation, Graphic terminal, CAD/ CAM software- definition of system software and application software, CAD/ CAM database and structure. **Geometric Modeling:** Wire frame modeling, wire frame entities, Interpolation and approximation of curves, Concept of parametric and non-parametric representation of curves, Curve fitting techniques, definitions of cubic spline, Bezier, and B-spline.

UNIT – II:

Surface modeling: Algebraic and geometric form, Parametric space of surface, Blending functions, parametrization of surface patch, Subdividing, Cylindrical surface, Ruled surface, Surface of revolution Spherical surface, Composite surface, Bezier surface. B-spline surface, Regenerative surface and pathological conditions.

Solid Modelling: Definition of cell composition and spatial occupancy enumeration, Sweep representation, Constructive solid geometry, Boundary representations.

UNIT – III:

NC Control Production Systems: Numerical control, Elements of NC system, NC part programming: Methods of NC part programming, manual part programming, Computer assisted part programming, Post Processor, Computerized part program, SPPL (A Simple Programming Language). CNC, DNC and Adaptive Control Systems.

UNIT – IV:

Group Technology: Part families, Parts classification and coding. Production flow analysis, Machine cell design.

Computer aided process planning: Difficulties in traditional process planning, Computer aided process planning: retrieval type and generative type, Machinability data systems.

Computer aided manufacturing resource planning: Material resource planning, inputs to MRP, MRP output records, Benefits of MRP, Enterprise resource planning, Capacity requirements planning

UNIT – V:

Flexible manufacturing system: F.M.S equipment, FMS layouts, Analysis methods for FMS benefits of FMS.

Computer aided quality control: Automated inspection- Off-line, On-line, contact, Non-contact; Coordinate measuring machines, Machine vision.

Computer Integrated Manufacturing: CIM system, Benefits of CIM

TEXT BOOKS:

1. CAD/CAM Concepts and Applications / Alavala / PHI
2. CAD/CAM Principles and Applications / P. N. Rao / Mc Graw Hill
3. CAD/CAM : Computer Aided Design and manufacturing , Groover M.P., Zimmers / Pearson

REFERENCE BOOKS:

1. CAD/CAM/CIM/ Radhakrishnan and Subramanyam / New Age

ME507PC THERMAL ENGINEERING LAB

B.Tech. III Year I Sem.

L	T	P	C
0	0	2	1

Pre-Requisite: Thermodynamics & Thermal Engineering - I

Objective: To understand the working principles of IC Engines, Compressors.

List of Experiments

1. I.C. Engines Valve / Port Timing Diagrams
2. I.C. Engines Performance Test for 4 Stroke SI engines
3. I.C. Engines Morse, Retardation, Motoring Tests
4. I.C. Engine Heat Balance – CI/SI Engines
5. I.C. Engines Economical speed Test on a SI engine
6. I.C. Engines effect of A/F Ratio in a SI engine
7. Performance Test on Variable Compression Ratio Engine
8. IC engine Performance Test on a 4S CI Engine at constant speed
9. Volumetric efficiency of Air – Compressor Unit
10. Dis-assembly / Assembly of Engines
11. Study of Boilers

Note: Perform a minimum of any 9 out of the 11 Exercises.

ME508PC METROLOGY & MACHINE TOOLS LAB

B.Tech. III Year I Sem.

L	T	P	C
0	0	2	1

Prerequisites: Theoretical exposure to Metrology and machine tools.

Course Objectives:

1. To import practical exposure to the metrology equipment & Machine Tools
2. To conduct experiments and understand the working of the same.

Course Outcomes: After completion of the course, the student will be able to

- **CO1:** Identify parts of Lathe and perform different operations on Lathe
- **CO2:** Identify parts of drilling machine and perform operations on drilling machine
- **CO3:** Identify parts of Milling Shaping and Planning machine and perform operations on Milling, Shaping and Planning machine
- **CO4:** Identify various measuring instruments and use them appropriately.
- **CO5:** Measure surface finish of machined components.

List of Experiments:

1. Step turning on lathe machine
2. Taper turning on lathe machine
3. Thread cutting and knurling on lathe machine (2 exercises)
4. Measurement of cutting forces on lathe
5. Machining of holes using Drilling and boring machines.
6. Gear cutting on the Milling machine
7. Grinding of Tool angles using Cylindrical / Surface Grinding
8. Measurement of lengths, heights, diameters by vernier calipers, micrometers.
9. Measurement of Diameter of bores by internal micrometers and dial bore indicators.
10. Use of gear teeth vernier calipers for checking the chordal addendum and chordal height of the spur gear.
11. Angle and taper measurements by bevel protractor and sine bars.
12. Thread measurement by 2-wire and 3-wire methods.
13. Surface roughness measurement by Tally Surf.
14. Use of mechanical comparator

Note: Perform a minimum of any 10 out of the 14 Exercises.

ME509PC KINEMATICS & DYNAMICS LAB

B.Tech. III Year I Sem.

L	T	P	C
0	0	2	1

Pre-requisites: Prerequisites for the graduate-level course are Kinematics, Dynamics, differential equations, motion simulation, displacement, velocity, acceleration, force, torque, power, Newton's motion laws, vibration, Gyroscopic Effect, Cams, Bearings.

Course Objectives: The objective of the lab is to understand the kinematics and dynamics of mechanical elements such as linkages, gears, cams and learn to design such elements to accomplish desired motions or tasks.

Course Outcomes: Upon successful completion of this lab, students should be able to:

- Understand types of motion
- Analyze forces and torques of components in linkages
- Understand static and dynamic balance
- Understand forward and inverse kinematics of open-loop mechanisms

List of Experiments: (A Minimum of 10 experiments are to be conducted)

1. To determine the state of balance of machines for primary and secondary forces
2. To determine the frequency of torsional vibration of a given rod
3. Determine the effect of varying mass on the centre of sleeve in porter and proell governor
4. Find the motion of the follower if the given profile of the cam
5. The balance masses statically and dynamically for single rotating mass systems
6. Determine the critical speed of a given shaft for different n-conditions
7. For a simple pendulum determine time period and its natural frequency
8. For a compound pendulum determine time period and its natural frequency
9. Determine the effect of gyroscope for different motions
10. Determine time period, amplitude and frequency of undamped free longitudinal vibration of single degree spring mass systems.
11. Determine time period, amplitude and frequency of damped free longitudinal vibration of single degree spring mass systems.

Note: Perform a minimum of any 10 out of the 11 Exercises.

*MC510 INTELLECTUAL PROPERTY RIGHTS

B.Tech. III Year I Sem.

L	T	P	C
3	0	0	0

Course Objectives:

- Significance of intellectual property and its protection
- Introduce various forms of intellectual property

Course Outcomes:

- Distinguish and Explain various forms of IPRs.
- Identify criteria to fit one's own intellectual work in particular form of IPRs.
- Apply statutory provisions to protect particular form of IPRs.
- Appraise new developments in IPR laws at national and international level

UNIT – I

Introduction to Intellectual property: Introduction, types of intellectual property, international organizations, agencies and treaties, importance of intellectual property rights.

UNIT – II

Trade Marks: Purpose and function of trademarks, acquisition of trade mark rights, protectable matter, selecting, and evaluating trade mark, trade mark registration processes.

UNIT – III

Law of copyrights: Fundamental of copyright law, originality of material, rights of reproduction, rights to perform the work publicly, copyright ownership issues, copyright registration, notice of copyright, International copyright law.

Law of patents: Foundation of patent law, patent searching process, ownership rights and transfer

UNIT – IV

Trade Secrets: Trade secret law, determination of trade secret status, liability for misappropriations of trade secrets, protection for submission, trade secret litigation.

Unfair competition: Misappropriation right of publicity, false advertising.

UNIT – V

New development of intellectual property: new developments in trade mark law; copyright law, patent law, intellectual property audits.

International overview on intellectual property, international – trade mark law, copyright law, international patent law, and international development in trade secrets law.

TEXT BOOK:

1. Intellectual property right, Deborah. E. Bouchoux, Cengage learning.

REFERENCE BOOK:

1. Intellectual property right – Unleashing the knowledge economy, prabuddha ganguli, Tata McGraw Hill Publishing company ltd.