

**Department of Automobile Engineering**

**PEO**

1. Develop within our graduates, the technical proficiency to successfully apply the knowledge of Automobile Engineering to meet industry needs as well as to pursue higher studies.
2. Develop within our graduates, effective communication skill, professional and ethical attitude and multidisciplinary approach to meet societal needs.
3. Develop within our graduates scientific & technical proficiency to pursue research & consultancy.
4. Develop within our graduates, the leadership qualities, team work and commitment towards lifelong learning.
5. Develop within our graduates the awareness towards public interest, safety & environment.

**PO**

- a) Graduates will be able to apply knowledge of mathematics, automotive and mechanical engineering.
- b) Graduates will demonstrate an ability to identify, formulate and solve engineering and management problems.
- c) Graduates will have an ability to analyze and interpret data by carrying out the experiments.
- d) Graduates will be able to design the vehicle and automotive components as per the specifications and needs of automotive industries.
- e) Graduates will be able to diagnosis, troubleshoot and maintain the various automobile systems.
- f) Graduates will demonstrate skills to use statistical tools, modeling and analysis software in research and development.
- g) Graduates will demonstrate an ability to work with multidisciplinary tasks related to mechanical engineering, production engineering electronics engineering
- h) Graduates will be able to communicate effectively in both verbal and written form and demonstrate knowledge of professional and ethical responsibilities in the profession.
- i) Graduates will show the understanding of impact of engineering solutions on the society and also will be aware of contemporary issues at global context.
- j) Graduates will develop confidence for entrepreneurship, self-education and ability for life-long learning in Automobile field and management.
- k) Graduates will demonstrate an ability to participate and succeed in competitive examinations like GATE and CAT.
- l) Graduates will be able to apply engineering knowledge for sustainability of environment.

**PSO**

1. Will be able to design and develop engine and chassis systems in a view to meet the needs of the society by harnessing the potential of electronic systems and modern software tools.
2. Will be able to explore possibilities of viable alternate fuels and to develop emission control technologies and safety systems
3. Will be able to work in an industry as a team member as well as an individual with professional qualities and evolve oneself for lifelong learning.

# Department of Automobile Engineering

## COURSE OUTCOMES

**Class: S. E. Automobile**

**Semester: ODD**

Name of the Course	COURSE OUTCOMES
1) Engineering Mathematics-III Course Code: AEC 301	On successful completion of course learner/student will be able to: <ol style="list-style-type: none"><li>1. Apply the concept of Laplace transform to solve the real integrals in engineering problems.</li><li>2. Apply the concept of inverse Laplace transform of various functions in engineering problems.</li><li>3. Expand the periodic function by using Fourier series for real life problems and complex engineering problems.</li><li>4. Find orthogonal trajectories and analytic function by using basic concepts of complex variable theory.</li><li>5. Apply Matrix algebra to solve the engineering problems.</li><li>6. Solve Partial differential equations by applying numerical solution and analytical methods for one dimensional heat and wave equations</li></ol>
2) Strength of materials Course Code: AEC 302	On successful completion of course learner/student will be able to: <ol style="list-style-type: none"><li>1. Demonstrate fundamental knowledge about various types of loading and stresses induced.</li><li>2. Draw the SFD and BMD for different types of loads and support conditions.</li><li>3. Analyse the stresses induced in basic mechanical components.</li><li>4. Estimate the strain energy in mechanical elements.</li><li>5. Analyse the deflection in beams.</li><li>6. Analyse buckling and bending phenomenon in columns, struts and beams.</li></ol>
3) Production Process Course Code: AEC 303	On successful completion of course learner/student will be able to: <ol style="list-style-type: none"><li>1. Demonstrate understanding of casting process.</li><li>2. Illustrate principles of forming processes</li><li>3. Demonstrate applications of various types of welding processes.</li><li>4. Differentiate chip forming processes such as turning, milling, drilling, etc.</li><li>5. Illustrate the concept of producing polymer components and</li></ol>

	<p>ceramic components.</p> <p>6. Illustrate principles and working of non-traditional manufacturing</p> <p>7. Understand the manufacturing technologies enabling Industry 4.0</p>
<p>4) Materials and Metallurgy <b>Course Code:</b> AEC 304</p>	<p>On successful completion of course learner/student will be able to:</p> <ol style="list-style-type: none"> <li>1. Identify the various classes of materials and comprehend their properties</li> <li>2. Apply phase diagram concepts to engineering applications</li> <li>3. Apply particular heat treatment for required property development</li> <li>4. Identify the probable mode of failure in materials and suggest measures to prevent them</li> <li>5. Choose or develop new materials for better performance</li> <li>6. Decide an appropriate method to evaluate different components in service</li> </ol>
<p>5) Thermodynamics <b>Course Code:</b> AEC 305</p>	<p>On successful completion of course learner/student will be able to:</p> <ol style="list-style-type: none"> <li>1. Demonstrate application of the laws of thermodynamics to a wide range of systems.</li> <li>2. Compute heat and work interactions in thermodynamic systems</li> <li>3. Demonstrate the interrelations between thermodynamic functions to solve practical problems.</li> <li>4. Compute thermodynamic interactions using the steam table and Mollier chart</li> <li>5. Compute efficiencies of heat engines, power cycles.</li> <li>6. Apply the fundamentals of compressible fluid flow to the relevant systems</li> </ol>
<p>6) Material Testing <b>Course Code:</b> AEL 301</p>	<p>On successful completion of course learner/student will be able to:</p> <ol style="list-style-type: none"> <li>1. Prepare metallic samples for studying its microstructure following the appropriate procedure.</li> <li>2. Identify effects of heat treatment on microstructure of medium carbon steel and hardenability of steel using Jominy end Quench test</li> <li>3. Perform Fatigue Test and draw S-N curve</li> <li>4. Perform Tension test to Analyze the stress - strain behaviour of materials</li> <li>5. Measure torsional strength, hardness and impact resistance of the material</li> <li>6. Perform flexural test with central and three point loading conditions</li> </ol>
<p>7) Machine Shop Practice <b>Course Code:</b> AEL 302</p>	<p>On successful completion of course learner/student will be able to:</p> <ol style="list-style-type: none"> <li>1. Know the specifications, controls and safety measures related to machines and machining operations.</li> <li>2. Use the machines for making various engineering jobs.</li> <li>3. Perform various machining operations</li> <li>4. Perform Tool Grinding</li> </ol>

	5. Perform welding operations
8) Skill Based Lab- CAD Modeling <b>Course Code:</b> AESBL 301	On successful completion of course learner/student will be able to: 1. Illustrate basic understanding of types of CAD model creation. 2. Visualize and prepare 2D modeling of a given object using modeling software. 3. Build solid model of a given object using 3D modeling software. 4. Visualize and develop the surface model of a given object using modeling software. 5. Generate assembly models of given objects using assembly tools of a modeling software 6. Perform product data exchange among CAD systems.
9) Mini Project –A <b>Course Code:</b> AESBL 301	1. Identify problems based on societal /research needs. 2. Apply Knowledge and skill to solve societal problems in a group. 3. Develop interpersonal skills to work as member of a group or leader. 4. Draw the proper inferences from available results through theoretical/ experimental/simulations. 5. Analyse the impact of solutions in societal and environmental context for sustainable development. 6. Use standard norms of engineering practices 7. Excel in written and oral communication. 8. Demonstrate capabilities of self-learning in a group, which leads to life long learning. 9. Demonstrate project management principles during project work.

**Class: T. E. Automobile**

**Semester: ODD**

<b>Name of the Course</b>	<b>COURSE OUTCOMES</b>
1) Mechanical Measurement and Control <b>Course Code:</b> AEC 501	1. Handle, operate and apply the precision measuring instruments / equipment's. 2. Analyze simple machined components for dimensional stability & functionality. 3. Classify various types of static characteristics and types of errors occurring in the system. 4. Classify and select proper measuring instrument for displacement, pressure, flow and temperature measurements. 5. Design mathematical model of system/process for standard input responses and analyse error and differentiate various types of control systems and time domain specifications 6. Analyse the problems associated with stability
2) Internal Combustion Engine <b>Course Code:</b> AEC 502	1. Explain the actual engine operation. 2. Analyse the combustion process in IC engines. 3. Illustrate different power boosting methods in IC Engines 4. Analyse operating parameters & performance of IC Engines. 5. Illustrate emission norms and emission control techniques. 6. Comprehend the recent trends in fuels and engines
3) Machine Desgn <b>Course Code:</b> AEC 503	1. Demonstrate understanding of various design considerations 2. Illustrate basic principles of machine design

		<ol style="list-style-type: none"> <li>3. Design machine elements for static as well as dynamic loading</li> <li>4. Design machine elements based on strength/ rigidity concepts</li> <li>5. Use design data books in designing various components</li> <li>6. Acquire skill in preparing production drawings of various designs</li> </ol>
4)	<p>Finite Element Analysis</p> <p><b>Course Code:</b> AEC 504</p>	<ol style="list-style-type: none"> <li>1. Solve differential equations using weighted residual methods.</li> <li>2. Develop the finite element equations to model engineering problems governed by second order differential equations.</li> <li>3. Apply the basic finite element formulation techniques to solve engineering problems by using one dimensional elements.</li> <li>4. Apply the basic finite element formulation techniques to solve engineering problems by using two dimensional elements.</li> <li>5. Apply the basic finite element formulation techniques to find natural frequency of single degree of vibration system.</li> <li>6. Use commercial FEA software, to solve problems related to mechanical engineering.</li> </ol>
5)	<p>Design Of Experiment</p> <p><b>Course Code:</b> AEDLO 5012</p>	<ol style="list-style-type: none"> <li>1. Plan, design, and conduct experimental investigations efficiently and effectively;</li> <li>2. Understand strategy in planning and conducting experiments;</li> <li>3. Choose an appropriate experimentation scheme to evaluate a new product design or process improvement through experimentation strategy, data analysis, and interpretation of experimental results.</li> </ol>
6)	<p>Measurement and Engine Testing Lab</p> <p><b>Course Code:</b> AEL 501</p>	<ol style="list-style-type: none"> <li>1. Overhaul and Assemble engine components.</li> <li>2. Perform load test/speed test on engine setup.</li> <li>3. Calculate performance of multi cylinder engine.</li> <li>4. Analyse engine performance and draw heat balance sheet.</li> <li>5. Perform exhaust gas analysis.</li> <li>6. Get acquainted with Calibration of sensors.</li> </ol>
7)	<p>Machine Design</p> <p><b>Course Code:</b> AEL 502</p>	<ol style="list-style-type: none"> <li>1. Design Knuckle Joint and cotter joint</li> <li>2. Design shaft under various conditions.</li> <li>3. Design rigid and flexible flange couplings.</li> <li>4. Design helical compression spring and leaf spring.</li> <li>5. Use design data books in designing various components.</li> <li>6. Report uncertainties associated with potential failure modes inherited from the component design.</li> </ol>
8)	<p>Finite Element Analysis</p> <p><b>Course Code:</b> AEL 503</p>	<ol style="list-style-type: none"> <li>1. Select appropriate element for given problem</li> <li>2. Select suitable meshing and perform convergence test</li> <li>3. Select appropriate solver for given problem</li> <li>4. Interpret the result</li> <li>5. Apply basic aspects of FEA to solve engineering problems</li> <li>6. Validate FEA solution</li> </ol>
9)	<p>Professional Communication and Ethics – Course Code:IIAESBL501</p>	<ol style="list-style-type: none"> <li>1. Plan and prepare effective business/ technical documents which will in turn provide solid foundation for their future managerial roles.</li> <li>2. Strategize their personal and professional skills to build a professional image and meet the demands of the industry.</li> <li>3. Emerge successful in group discussions, meetings and result-oriented agreeable solutions in group communication situations.</li> <li>4. Deliver persuasive and professional presentations.</li> <li>5. Develop creative thinking and interpersonal skills required for effective professional communication.</li> <li>6. Apply codes of ethical conduct, personal integrity and norms of organizational behaviour.</li> </ol>
10)	<p>Mini Project 2-A</p>	<ol style="list-style-type: none"> <li>1. Identify problems based on societal /research needs.</li> </ol>

<b>Course Code -</b> AEPBL501	2. Apply Knowledge and skill to solve societal problems in a group. 3. Develop interpersonal skills to work as member of a group or leader. 4. Draw the proper inferences from available results through theoretical/experimental/simulations. 5. Analyse the impact of solutions in societal and environmental context for sustainable development. 6. Use standard norms of engineering practices 7. Excel in written and oral communication. 8. Demonstrate capabilities of self-learning in a group, which leads to life long learning. 9. Demonstrate project management principles during project work.
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**Class: B. E. Automobile**

**Semester: ODD**

<b>Name of the Course</b>	<b>COURSE OUTCOMES</b>
<b>1) Chassis Body Engineering</b> <b>Course Code: AEC 701</b>	1. Able to list, state and describe chassis, body, body material, various aerodynamic forces, moments and loads on the vehicle. 2. Able to identify, classify, sketch and discuss types of structure, car, bus, and commercial vehicle body details and overall criteria for vehicle Comparison 3. Able to explain the design and requirements of vehicle visibility, vehicle safety, Driver seat, Passenger seat, child seat, preliminary design, Shear Panel Method and the latest trends in design, manufacturing, and materials. 4. Able to analyses and calculate drag, loading cases and various body optimization techniques for minimum drag.
<b>2) CAD/CAM/CAE</b> <b>Course Code: AEC 702</b>	1. Identify proper computer graphics techniques for geometric modeling. 2. Transform, manipulate objects and store and manage data. 3. CAM Tool path Creation and NC- G code output. 4. Use rapid prototyping and tooling concepts in any real life applications. 5. Identify the tools for Analysis of a complex engineering component.
<b>3) Automotive Design</b> <b>Course Code: AEC 703</b>	1. Design automotive component to meet desired needs. 2. Apply the fundamental knowledge of Applied Mechanics, Strength of Materials, Engineering Materials and Theory of Machine for actual design problems. 3. Answer oral questions/queries by examiner/evaluators and write

	assignments and answers in English.
4) Product Design & Development <b>Course Code:</b> AEC 704	<ol style="list-style-type: none"> <li>1. State and describe the concepts, functions and applications of chip formation, dynamometer, presses, indexing devices, NTM processes, Additive manufacturing etc.</li> <li>2. Compare, discuss and explain, Merchant's theory, tool forces, dynamometers, tool geometry economics of metal cutting, cutting tool materials, Sheet metal operations, jigs and fixtures.</li> <li>3. Compare, discuss and explain, Merchant's theory, tool forces, dynamometers, tool geometry economics of metal cutting, cutting tool materials, Sheet metal operations, jigs and fixtures.</li> <li>4. Differentiate sheet metal dies, Jig and Fixtures, EDM and ECM, AJM and WJM, AM and CNC machining and calculate total pressure, Scrap strip layout, other elements of press</li> <li>5. Answer oral questions/queries by examiner/evaluators and write assignments and answers in English.</li> </ol>
5) Transport Management Motor Industry <b>Course Code:</b> AEE 7017	<ol style="list-style-type: none"> <li>1. Demonstrate transport management systems</li> <li>2. Implement advance techniques in traffic management</li> <li>3. Demonstrate understanding of motor vehicle act.</li> <li>4. Interpret about vehicle insurance and taxation.</li> <li>5. Illustrate the knowledge of Passenger transport operation.</li> <li>6. Illustrate the knowledge of Goods transport operation.</li> </ol>

**Class: S. E. Automobile**

**Semester: EVEN**

<b>Name of the Course</b>	<b>COURSE OUTCOMES</b>
1) Engineering Mathematics- IV <b>Course Code:</b> AEC 401	<p>On successful completion of course learner/student will be able to:</p> <ol style="list-style-type: none"> <li>1. Apply the concept of Vector calculus to evaluate line integrals, surface integrals using Green's theorem, Stoke's theorem &amp; Gauss Divergence theorem.</li> <li>2. Use the concepts of Complex Integration for evaluating integrals, computing residues &amp; evaluate various contour integrals.</li> <li>3. Apply the concept of Correlation, Regression and curve fitting to the engineering problems in data science.</li> <li>4. Illustrate understanding of the concepts of probability and expectation for getting the spread of the data and distribution of probabilities.</li> <li>5. Apply the concept of probability distribution to engineering problems &amp; testing hypothesis of small samples using sampling theory.</li> <li>6. Apply the concepts of parametric and nonparametric tests for analyzing practical problems.</li> </ol>

<p>2) Fluid Mechanics <b>Course Code:</b> AEC 402</p>	<ol style="list-style-type: none"> <li>1. <b>Define</b> properties of fluids, <b>classify</b> fluids and <b>evaluate</b> hydrostatic forces on various surfaces.</li> <li>2. <b>Illustrate</b> understanding of dimensional analysis of Thermal and Fluid systems.</li> <li>3. <b>Differentiate</b> velocity potential function and stream function and solve for velocity and acceleration of a fluid at a given location in a fluid flow.</li> <li>4. <b>Formulate</b> and <b>solve</b> equations of the control volume for fluid flow systems and Apply Bernoulli's equation to various flow measuring devices.</li> <li>5. <b>Calculate</b> pressure drop in laminar and turbulent flow, evaluate major and minor losses in pipes.</li> <li>6. <b>Calculate</b> resistance to flow of incompressible fluids through closed conduits and over surfaces.</li> </ol>
<p>3) Kinematics of Machinery <b>Course Code:</b> AEC 403</p>	<p>Learner will be able to...</p> <ol style="list-style-type: none"> <li>1. Identify various components of mechanisms</li> <li>2. Develop mechanisms to provide specific motion</li> <li>3. Draw velocity and acceleration diagrams of various mechanisms</li> <li>4. Choose a cam profile for the specific follower motion</li> <li>5. Predict condition for maximum power transmission in the case of a belt drive</li> <li>6. Illustrate requirements for an interference-free gear pair</li> </ol>
<p>4) CAD CAM <b>Course Code:</b> AEC 404</p>	<p>Learner will be able to...</p> <ol style="list-style-type: none"> <li>1. Identify suitable computer graphics techniques for 3D modeling.</li> <li>2. Transform, manipulate objects &amp; store and manage data.</li> <li>3. Develop 3D model using various types of available biomedical data.</li> <li>4. Create the CAM Tool path for specific given operations.</li> <li>5. Build and create data for 3D printing of any given object using rapid prototyping and tooling processes.</li> <li>6. Illustrate understanding of various cost effective alternatives for manufacturing.</li> </ol>
<p>5) Industrial Electronics <b>Course Code:</b> AEC 404</p>	<ol style="list-style-type: none"> <li>1. Illustrate construction, working principles and applications of power electronic switches.</li> <li>2. Identify rectifiers and inverters for dc and ac motor speed control.</li> <li>3. Develop circuits using OPAMP and Timer IC 555.</li> <li>4. Identify digital circuits for industrial applications.</li> <li>5. Demonstrate the knowledge of basic functioning of microcontrollers.</li> <li>6. Analyze speed-torque characteristics of electrical machines for speed control.</li> </ol>
<p>6) Industrial Electronics <b>Course Code:</b> AEL 401</p>	<ol style="list-style-type: none"> <li>1. Demonstrate characteristics of various electrical and electronics components</li> <li>2. Develop simple applications built around these components</li> <li>3. Identify use of different logic gates and their industrial applications</li> <li>4. Built and demonstrate parameter measurements using microcontroller</li> <li>5. Test and Analyze speed-torque characteristics of electrical machines for speed control.</li> </ol>
<p>7) Kinematics of Machinery <b>Course Code:</b> AEL 402</p>	<ol style="list-style-type: none"> <li>1. Draw velocity diagram using Instantaneous Centre method</li> <li>2. Find velocity and acceleration of a point on a four-bar mechanism by using Relative method.</li> <li>3. Analyze velocity and acceleration of a specific link of a slider crank mechanism using graphical approach by Relative method.</li> <li>4. Plot displacement-time, velocity-time, and acceleration-time diagrams of follower motion.</li> <li>5. Draw cam profile for the specific follower motion.</li> </ol>



	6. Develop and build mechanisms to provide specific motion.
8) Python Programming Course Code: AEL 403	<ol style="list-style-type: none"> <li>1. Demonstrate understanding of basic concepts of python programming.</li> <li>2. Identify, install and utilize python packages</li> <li>3. Develop and execute python programs for specific applications.</li> <li>4. Develop and build python program to solve real-world engineering problems</li> <li>5. Prepare a report on case studies selected.</li> </ol>
9) CNC 3D-PRINTING Course Code: AESBL 401	<ol style="list-style-type: none"> <li>1. Develop and execute part programming for any given specific operation.</li> <li>2. Build any given object using various CNC operations.</li> <li>3. Demonstrate CAM Tool path and prepare NC- G code.</li> <li>4. Develop 3D model using available biomedical data</li> <li>5. Build any given real life object using 3D printing process.</li> <li>6. Convert 2D images into 3D model</li> </ol>
10) Mini Project 1-B Course Code: AEPBL 401	<ol style="list-style-type: none"> <li>1. Identify problems based on societal /research needs.</li> <li>2. Apply Knowledge and skill to solve societal problems in a group.</li> <li>3. Develop interpersonal skills to work as member of a group or leader.</li> <li>4. Draw the proper inferences from available results through theoretical/ experimental/simulations.</li> <li>5. Analyse the impact of solutions in societal and environmental context for sustainable development.</li> <li>6. Use standard norms of engineering practices</li> <li>7. Excel in written and oral communication.</li> <li>8. Demonstrate capabilities of self-learning in a group, which leads to life long learning.</li> <li>9. Demonstrate project management principles during project work.</li> </ol>

**Class: T. E. Automobile**

**Semester: EVEN**

<b>Name of the Course</b>	<b>COURSE OUTCOMES</b>
1) Automotive System and Design Course Code: AEC 601	<ol style="list-style-type: none"> <li>1. Identify different Automotive systems and components.</li> <li>2. Compare different types of Automotive systems and components.</li> <li>3. Understand the working of different types of Automotive systems and components</li> <li>4. Apply knowledge of Engineering Mechanics and Strength of materials to design different Automotive systems and components.</li> <li>5. Select materials for different Automotive systems and components for designing.</li> <li>6. Design the different Automotive systems and components by using a data book.</li> </ol>
2) Mechanical Vibrations Course Code: AEC 602	<ol style="list-style-type: none"> <li>1. Develop mathematical models to represent dynamic system.</li> <li>2. Estimate natural frequency of mechanical system using various methods.</li> <li>3. Analyze vibratory response of mechanical system under forced vibration.</li> <li>4. To estimate the natural frequencies and mode shapes of multi-degree of freedom system, using both exact and numerical methods.</li> <li>5. Balance an existing unbalanced system partially/completely.</li> </ol>
3) Vehicle Body Engineering and Safety Course Code: AEC 603	<ol style="list-style-type: none"> <li>1. Illustrate different types of Vehicle structures.</li> <li>2. Comprehend various loads acting on vehicle body.</li> <li>3. Classify different materials related to vehicle body.</li> </ol>

	<ol style="list-style-type: none"> <li>4. Discuss Aerodynamic concept related to vehicle body.</li> <li>5. Comprehend Vehicle design from safety point of view.</li> <li>6. Enumerate interrelation ship among occupant, restraint systems and vehicles in accidents.</li> </ol>
<b>4) Automation and Artificial Intelligence</b> <b>Course Code: AEC 604</b>	<ol style="list-style-type: none"> <li>1. Demonstrate understanding of fundamentals of industrial automation and AI.</li> <li>2. Design &amp; develop pneumatic / hydraulic circuits.</li> <li>3. Design and develop electro-pneumatic circuits and PLC ladder logics.</li> <li>4. Demonstrate understanding of robotic control systems and their applications.</li> <li>5. Demonstrate understanding of various AI and machine learning technologies.</li> </ol>
<b>5) Press Tool Design</b> <b>Course Code: AEDLO 6021</b>	<ol style="list-style-type: none"> <li>1. Demonstrate various press working operations for mass production of sheet metal parts</li> <li>2. Identify press tool requirements to build concepts pertaining to design of press tools</li> <li>3. Prepare working drawings and setup for economic production of sheet metal components</li> <li>4. Select suitable materials for different elements of press tools</li> <li>5. Illustrate the principles and blank development in bent &amp; drawn components</li> <li>6. understand safety aspects and automation in press working</li> </ol>
<b>6) Automotive System and Design</b> <b>Course Code: AEL 601</b>	<ol style="list-style-type: none"> <li>1. Identify Automobile systems and subsystems.</li> <li>2. Dismantle and assemble Clutch and gearbox</li> <li>3. Dismantle and assemble Propeller shaft</li> <li>4. Dismantle and assemble Steering Gearbox</li> <li>5. Dismantle and assemble Differential</li> <li>6. Demonstrate design calculations for various automotive components.</li> </ol>
<b>7) Mechanical Vibrations</b> <b>Course Code: AEL 602</b>	<ol style="list-style-type: none"> <li>1. Derive the differential equation of motion, frequency &amp; time-period, for the given single degree of freedom vibration system, for small oscillations.</li> <li>2. Perform experiments on physical vibration systems and compare the theoretical and experimental results, for validation and verification.</li> <li>3. Program using scientific mathematical software or using basic programming software, to obtain the necessary plots in time and frequency domains, and interpret the results thus obtained.</li> <li>4. Balance a rotating unbalanced system completely, by making use of analytical and/or graphical methods.</li> <li>5. Perform simulation of experiments through Sakshat Virtual Laboratory interface.</li> </ol>
<b>8) Measurements and Automation</b> <b>Course Code: AESBL 601</b>	<ol style="list-style-type: none"> <li>1. Apply inspection gauge to check or measure surface parameters.</li> <li>2. Measure surface parameters using precision measurement tools and equipment.</li> <li>3. Measure different mechanical parameters by using sensors.</li> <li>4. Analyse the response of a control systems.</li> <li>5. Demonstrate use of automated controls using pneumatic and hydraulic systems.</li> <li>6. Implement program on PLC system and demonstrate its application</li> </ol>
<b>9) Mini Project 2-B</b> <b>Course Code: AEPBL 601</b>	<ol style="list-style-type: none"> <li>1. Identify problems based on societal /research needs.</li> <li>2. Apply Knowledge and skill to solve societal problems in a group.</li> <li>3. Develop interpersonal skills to work as member of a group or leader.</li> <li>4. Draw the proper inferences from available results through theoretical/ experimental/simulations.</li> </ol>

	<p>5. Analyse the impact of solutions in societal and environmental context for sustainable development.</p> <p>6. Use standard norms of engineering practices</p> <p>7. Excel in written and oral communication.</p> <p>8. Demonstrate capabilities of self-learning in a group, which leads to life long learning.</p> <p>9. Demonstrate project management principles during project work.</p>
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**Class: B. E. Automobile**

**Semester: EVEN**

<b>Name of the Course</b>	<b>COURSE OUTCOMES</b>
<p><b>1)</b> Autotronics <b>Course Code:</b> AEC 801</p>	<ol style="list-style-type: none"> <li>1. To study basic and advance Automotive Electronics systems.</li> <li>2. To study working of different Automotive Electronics systems and subsystems.</li> <li>3. To study basic and advance electronics technologies like Battery, Fuel Cell, ECM etc.</li> <li>4. To have basic idea about how automotive electrical systems are developed.</li> </ol>
<p><b>2)</b> Vehicle Dynamics <b>Course Code:</b> AEC 802</p>	<ol style="list-style-type: none"> <li>1. Analyze the vehicle directional stability.</li> <li>2. Enumerate the suspension systems, tire dynamics &amp; directional stability of the vehicle.</li> <li>3. Develop physical and mathematical models to predict the dynamic response of vehicles</li> <li>4. Demonstrate the ride characteristic of the vehicle.</li> <li>5. Analyze the vehicle roll behavior</li> <li>6. Comprehend the various trends in Vehicle Dynamics.</li> </ol>
<p><b>3)</b> Vehicle Maintenance <b>Course Code:</b> AEC 803</p>	<ol style="list-style-type: none"> <li>1. Effectively use automotive diagnostic tools in industries.</li> <li>2. Improve existing vehicle maintenance practices in industries.</li> <li>3. Answer oral questions/queries by examiner/evaluators and write assignments and answers in English.</li> </ol>
<p><b>4)</b> Vehicle Safety <b>Course Code:</b> AEE 8022</p>	<ol style="list-style-type: none"> <li>1. Comprehend Vehicle design from safety point of view.</li> <li>2. Apply concepts of accident reconstruction analysis in real world.</li> <li>3. Enumerate interrelation ship among occupant, restraint systems and vehicles in accidents.</li> <li>4. Illustrate role and significance of seat in Rear crash safety</li> </ol>

	<p>5. Demonstrate different active and passive safety systems available in vehicles</p>
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	<p>6. Illustrate various standards related to vehicle safety.</p>
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## **Department of Computer Engineering**

### **PEO**

- Develop within our graduates the technical proficiency and apply fruitfully the knowledge of Computer Engineering.
- Develop within our graduates, the ability to communicate effectively, function ethically and legally to fulfill societal needs.
- Instill commitment into graduates towards life-long learning to remain updated in the profession.
- Develop within the graduates to protect public interest, safety and environment.

### **PO**

Our students in the computer engineering program should, at the time of their graduation, have:

- PO1: an ability to demonstrate mathematics, discrete structures, science fundamentals along with computer engineering principles in real time computer software and hardware problems.
- PO2: an ability to identify, formulate, and review literature's to analyze and solve complex computer engineering problems.
- PO3: an ability to design, implement, and evaluate a computer-based system, component, process or program to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability and sustainability..
- PO4: an ability to organize, analyze and interpret data in order to design and conduct experiments.
- PO5: an ability to use the techniques, skills and modern hardware and software tools necessary for computer engineering practices.
- PO6: the broad education necessary to understand the impact of computing in global, economic, environmental and societal context.
- PO7: an ability to understand contemporary issues related to social and environmental context for sustainable development of engineering solutions.
- PO8: an ability to understand professional, legal and ethical responsibilities as it pertains to computer engineering.
- PO9: an ability to function effectively as an individual, as a member or leader in diverse and multidisciplinary domains.
- PO10: an ability to effectively communicate technical information in speech, presentation and in writing.
- PO11: an ability to apply engineering principles and management skills in individual work and team work for project development in multidisciplinary domains.
- PO12: a recognition of the need for an ability to engage in lifelong learning.

### **PSO**

1. Understand and develop computer programs related to algorithms, database, system software, web designing and networking.
2. Apply the knowledge of computer engineering for providing solutions to real world problems by designing and developing software and hardware applications.

# Department of Computer Engineering

## COURSE OUTCOMES

Class: SE Computer

Sem:III

Name of the Course	COURSE OUTCOMES
<b>EM-III</b>	<ol style="list-style-type: none"><li>1. Able to find laplace &amp; inverse laplace transform of the given function, analytic function, orthogonal trajectories for the given family of curves, image of the given region under given transformation, bilinear transformation, fourier series, half range fourier series, complex form of the given function, correlation coefficient, lines of regression, equation of curve by using least square method, mean, variance and probability.</li><li>2. Able to prove properties of Laplace transform, orthogonal / orthonormal of the given set of functions, analyticity of the given function, harmonic function.</li><li>3. Able to evaluate definite integral by Laplace transform and inverse Laplace transform of the given function</li></ol>
<b>DM</b>	<ol style="list-style-type: none"><li>1. Understand the notion of mathematical thinking, mathematical proofs and to apply them in problem solving.</li><li>2. Ability to reason logically.</li><li>3. Ability to understand relations, Diagraph and lattice..</li><li>4. Ability to understand use of functions, graphs and their use in programming applications.</li><li>5. Understand use of groups and codes in Encoding-Decoding</li><li>6. Apply discrete structures into other computing problems such as formal specification, verification, artificial intelligence, cryptography, Data Analysis and Data Mining etc.</li></ol>
<b>DLDA</b>	<ol style="list-style-type: none"><li>1. To understand different number systems and their conversions.</li><li>2. To analyze and minimize Boolean expressions.</li><li>3. To design and analyze combinational circuits.</li><li>4. To design and analyze sequential circuits</li></ol>
<b>DS</b>	<ol style="list-style-type: none"><li>1. Students will be able to implement various linear and nonlinear data structures.</li><li>2. Students will be able to handle operations like insertion, deletion, searching and traversing on various data structures.</li><li>3. Students will be able to select appropriate sorting technique for given problem.</li><li>4. Students will be able to select appropriate searching technique for given problem.</li><li>5. Students will be able to apply the learned concepts in various domains like DBMS and Compiler Construction.</li><li>6. Students will be able to choose appropriate data structure for specified</li></ol>

	problem domain.
<b>ECCF</b>	<ol style="list-style-type: none"> <li>1. To understand the use of semiconductor devices in circuits and analyze them.</li> <li>2. To understand importance of oscillators and power amplifiers in communication system.</li> <li>3. To understand basic concepts of operational amplifier and their applications.</li> <li>4. To understand the fundamental concepts of electronic communication</li> <li>5. To apply knowledge of electronic devices and circuits to communication applications.</li> <li>6. To study basic concepts of information theory.</li> </ol>
<b>OOPM</b>	<ol style="list-style-type: none"> <li>1. To apply fundamental programming constructs.</li> <li>2. To illustrate the concept of packages, classes and objects</li> <li>3. To elaborate the concept of strings, arrays and vectors.</li> <li>4. To implement the concept of inheritance and interfaces..</li> <li>5. To implement the concept of exception handling and multithreading</li> <li>6. To develop GUI based application</li> </ol>

**Class: SE Computer**

**Sem:IV**

<b>Name of the Course</b>	<b>COURSE OUTCOMES</b>
EM-IV	<p>CO1 : Able to State Cayley Hamilton theorem, uses of Chi-square test, Explain Type I and Type II error, one tailed and two tailed test, Find Eigen values and Eigen vectors of matrix, probability, Use Cayley Hamilton theorem, Solve LPP and NLPP, obtain Laurent's &amp; Taylors series, find poles, residues &amp; singularities of the given function, Z-transform.</p> <p>CO2: Able to Show the matrix is diagonalizable, derogatory, Prove statement on function of square matrix.</p> <p>CO3: Able to Evaluate integral by Cauchy's integral formula &amp; Cauchy's residue theorem, Verify Cayley Hamilton theorem.</p> <p>CO4: Able to Test hypothesis for large, small samples, non-parametric test</p>
AOA	<ol style="list-style-type: none"> <li>1. Analyze the running time and space complexity of algorithms.</li> <li>2. Describe, apply and analyze the complexity of divide and conquer strategy.</li> <li>3. Describe, apply and analyze the complexity of greedy strategy.</li> <li>4. Describe, apply and analyze the complexity of dynamic programming strategy.</li> <li>5. Explain and apply backtracking, branch and bound and string matching techniques to deal with some hard problems.</li> <li>6. Describe the classes P, NP, and NP-Complete and be able to prove that a certain problem is NP-Complete.</li> </ol>
CG	<ol style="list-style-type: none"> <li>1. Understand the basic concepts of Computer Graphics.</li> <li>2. Demonstrate various algorithms for scan conversion and filling of basic objects and their comparative analysis.</li> </ol>

	<ol style="list-style-type: none"> <li>3. Apply geometric transformations, viewing and clipping on graphical objects.</li> <li>4. Explore solid model representation techniques and projections.</li> <li>5. Understand visible surface detection techniques and illumination models.</li> </ol>
COA	<ol style="list-style-type: none"> <li>1. To describe basic structure of the computer system.</li> <li>2. To demonstrate the arithmetic algorithms for solving ALU operations.</li> <li>3. To describe instruction level parallelism and hazards in typical processor pipelines.</li> <li>4. To describe superscalar architectures, multi-core architecture and their advantages</li> <li>5. To demonstrate the memory mapping techniques.</li> <li>6. To Identify various types of buses, interrupts and I/O operations in a computer system</li> </ol>
OS	<ol style="list-style-type: none"> <li>1. Understand the objectives, functions and structure of OS</li> <li>2. Analyze the concept of process management and evaluate performance of process scheduling algorithms. .</li> <li>3. Understand and apply the concepts of synchronization and deadlocks</li> <li>4. Evaluate performance of Memory allocation and replacement policies</li> <li>5. Understand the concepts of file management.</li> <li>6. Apply concepts of I/O management and analyze techniques of disk scheduling.</li> </ol>
MP	<ol style="list-style-type: none"> <li>1. Describe core concepts of x86 processors.</li> <li>2. Interpret the instructions of 8086 and write assembly and Mixed language programs.</li> <li>3. Identify the specifications of peripheral chip</li> <li>4. Design 8086 based system using memory and peripheral chips</li> <li>5. Appraise the architecture of advanced processors</li> <li>6. Understand hyperthreading technology</li> </ol>
SDLC	<ol style="list-style-type: none"> <li>1. To understand basic concepts in python and perl.</li> <li>2. To explore contents of files, directories and text processing with python</li> <li>3. To develop program for data structure using built in functions in python.</li> <li>4. To explore django web framework for developing python based web application.</li> <li>5. To understand file handling and database handling using perl.</li> <li>6. To explore basics of two way communication between client and server using python and perl</li> </ol>



Name of the Course	COURSE OUTCOMES
DBMS	<ol style="list-style-type: none"> <li>1. Understand the fundamentals of a database systems</li> <li>2. Design and draw ER and EER diagram for the real life problem.</li> <li>3. Convert conceptual model to relational model and formulate relational algebra queries.</li> <li>4. Design and querying database using SQL.</li> <li>5. Analyze and apply concepts of normalization to relational database design.</li> <li>6. Understand the concept of transaction, concurrency and recovery.</li> </ol>
CN	<ol style="list-style-type: none"> <li>1. Demonstrate the concepts of data communication at physical layer and compare ISO - OSI model with TCP/IP model.</li> <li>2. Demonstrate the knowledge of networking protocols at data link layer.</li> <li>3. Design the network using IP addressing and subnetting / supernetting schemes.</li> <li>4. Analyze various routing algorithms and protocols at network layer.</li> <li>5. Analyze transport layer protocols and congestion control algorithms.</li> <li>6. Explore protocols at application layer .</li> </ol>
TCS	<ol style="list-style-type: none"> <li>1. Identify the central concepts in theory of computation and differentiate between deterministic and nondeterministic automata, also obtain equivalence of NFA and DFA.</li> <li>2. Infer the equivalence of languages described by finite automata and regular expressions.</li> <li>3. Devise regular, context free grammars while recognizing the strings and tokens.</li> <li>4. Design pushdown automata to recognize the language.</li> <li>5. Develop an understanding of computation through Turing Machine.</li> <li>6. Acquire fundamental understanding of decidability and undecidability.</li> </ol>
MS	<ol style="list-style-type: none"> <li>1. To identify basics of multimedia and multimedia system architecture.</li> <li>2. To understand different multimedia components.</li> <li>3. To explain file formats for different multimedia components.</li> <li>4. To analyze the different compression algorithms.</li> <li>5. To describe various multimedia communication techniques.</li> <li>6. To apply different security techniques in multimedia environment.</li> </ol>

Name of the Course	COURSE OUTCOMES
SE	<ol style="list-style-type: none"> <li>1. Understand and demonstrate basic knowledge in software engineering.</li> <li>2. Identify requirements, analyze and prepare models.</li> <li>3. Plan, schedule and track the progress of the projects.</li> <li>4. Design &amp; develop the software projects.</li> <li>5. Identify risks, manage the change to assure quality in software projects.</li> <li>6. Apply testing principles on software project and understand the maintenance concepts.</li> </ol>
SPCC	<ol style="list-style-type: none"> <li>1. Identify the relevance of different system programs.</li> <li>2. Describe the various data structures and passes of assembler design.</li> <li>3. Identify the need for different features and designing of macros.</li> </ol>

	<p>4. Distinguish different loaders and linkers and their contribution in developing efficient user applications.</p> <p>5. Construct different parsers for given context free grammars.</p> <p>6. Justify the need synthesis phase to produce object code optimized in terms of high execution speed and less memory usage</p>
DWM	<p>1. Understand Data Warehouse fundamentals, Data Mining Principles</p> <p>2. Design data warehouse with dimensional modelling and apply OLAP operations.</p> <p>3. Identify appropriate data mining algorithms to solve real world problems</p> <p>4. Compare and evaluate different data mining techniques like classification, prediction, clustering and association rule mining</p> <p>5. Describe complex data types with respect to spatial and web mining.</p> <p>6. Benefit the user experiences towards research and innovation.</p>
CSS	<p>On successful completion of course learner will be able to:</p> <p>1. Understand the principles and practices of cryptographic techniques.</p> <p>2. Understand a variety of generic security threats and vulnerabilities, and identify &amp; analyze particular security problems for given applications.</p> <p>3. Appreciate the application of security techniques and technologies in solving real life security problems in practical systems.</p> <p>4. Apply appropriate security techniques to solve security problem</p> <p>5. Design security protocols and methods to solve the specific security problems.</p>
ML	<p>1. Gain knowledge about basic concepts of Machine Learning</p> <p>2. Identify machine learning techniques suitable for a given problem</p> <p>3. Solve the problems using various machine learning techniques</p> <p>4. Apply Dimensionality reduction techniques.</p> <p>5. Design application using machine learning techniques</p>

**Class: BE Computer**

**Sem:VII**

<b>Name of the Course</b>	<b>COURSE OUTCOMES</b>
DSIP	<p>1. Apply the concept of DT Signal and DT Systems.</p> <p>2. Classify and analyze discrete time signals and systems</p> <p>3. Implement Digital Signal Transform techniques DFT and FFT.</p> <p>4. Use the enhancement techniques for digital Image Processing</p> <p>5. Differentiate between the advantages and disadvantages of different edge detection techniques</p> <p>6. Develop small projects of 1-D and 2-D Digital Signal Processing.</p>
MCC	<p>1. To identify basic concepts and principles in mobile communication &amp; computing, cellular architecture.</p> <p>2. To describe the components and functioning of mobile networking.</p> <p>3. To classify variety of security techniques in mobile network.</p> <p>4. To apply the concepts of WLAN for local as well as remote applications.</p> <p>5. To describe and apply the concepts of mobility management</p> <p>6. To describe Long Term Evolution (LTE) architecture and its interfaces.</p>
AISC	<p>1 Identify the various characteristics of Artificial Intelligence and Soft Computing techniques.</p> <p>2 Choose an appropriate problem solving method for an agent to find a sequence of actions to reach the goal state.</p> <p>3 Analyse the strength and weakness of AI approaches to knowledge</p>

	<p>representation, reasoning and planning.</p> <p>4 Construct supervised and unsupervised ANN for real world applications.</p> <p>5 Design fuzzy controller system.</p> <p>6 Apply Hybrid approach for expert system design.</p>
ASSDF	<p>1. Understand cyber attacks and apply access control policies and control mechanisms.</p> <p>2. Identify malicious code and targeted malicious code.</p> <p>3. Detect and counter threats to web applications.</p> <p>4. Understand the vulnerabilities of Wi-Fi networks and explore different measures to secure wireless protocols, WLAN and VPN networks.</p> <p>5. Understand the ethical and legal issues associated with cyber crimes and be able to mitigate impact of crimes with suitable policies.</p> <p>6. Use different forensic tools to acquire and duplicate data from compromised systems and analyse the same.</p>
DBA	<p>1. Understand the key issues in big data management and its associated applications for business decisions and strategy.</p> <p>1. Develop problem solving and critical thinking skills in fundamental enabling techniques like Hadoop, Mapreduce and NoSQL in big data analytics.</p> <p>2. Collect, manage, store, query and analyze various forms of Big Data.</p> <p>3. Interpret business models and scientific computing paradigms, and apply software tools for big data analytics.</p> <p>4. Adapt adequate perspectives of big data analytics in various applications like recommender systems, social media applications etc.</p>

**Class: BE Computer**

**Sem:VIII**

<b>Name of the Course</b>	<b>COURSE OUTCOMES</b>
HMI	<p>1. Identify User Interface (UI) design principles.</p> <p>2. Analysis of effective user friendly interfaces.</p> <p>3. Apply Interactive Design process in real world applications.</p> <p>4. Evaluate UI design and justify.</p> <p>5. Create application for social and technical task.</p>
DC	<p>On successful completion of course learner will be able to:</p> <p>1. Demonstrate knowledge of the basic elements and concepts related to distributed system technologies;</p> <p>2. Illustrate the middleware technologies that support distributed applications such as RPC, RMI and Object based middleware.</p> <p>3. Analyze the various techniques used for clock synchronization and mutual exclusion</p> <p>4. Demonstrate the concepts of Resource and Process management and synchronization algorithms</p> <p>5. Demonstrate the concepts of Consistency and Replication Management</p> <p>6. Apply the knowledge of Distributed File System to analyze various file systems like NFS, AFS and the experience in building large-scale distributed applications.</p>
NLP	<p>1. Have a broad understanding of the field of natural language processing.</p> <p>2. Have a sense of the capabilities and limitations of current natural language technologies,</p> <p>3. Be able to model linguistic phenomena with formal grammars.</p> <p>4. Be able to Design, implement and test algorithms for NLP problems</p> <p>5. Understand the mathematical and linguistic foundations underlying approaches to the various areas in NLP</p> <p>6. Be able to apply NLP techniques to design real world NLP applications such as machine translation, text categorization, text summarization, information extraction...etc.</p>
CCL	<p>1.Adapt different types of virtualization and increase resource utilization.</p>

- |  |   |
|--|---|
|  | <ol style="list-style-type: none"><li>2. Build a private cloud using open source technologies.</li><li>3. Analyze security issues on cloud.</li><li>4. Develop real world web applications and deploy on commercial cloud.</li><li>5. Demonstrate various service models.</li></ol> |
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# **Department of Electronics and Telecommunication Engineering**

## **PEO**

- I. Develop in our graduates to excel in Electronics and Telecommunication Engineering field so as to pursue postgraduate programs and succeed in industry
- II. Develop in our graduates the scientific and technical proficiency to pursue Research and Consultancy.
- III. Instil Commitment in Graduates the ability to cater to changing needs of society with good Technical and ethical values.
- IV. Develop within the Graduates leadership qualities and the life-long learning passion.

## **PO**

1. Graduates will demonstrate knowledge of mathematics with differential equations, vector calculus, complex variables, matrix theory, and statistics probability theory. They will be able to use Laplace Transforms, Fourier Transforms in Electrical circuit applications. They will possess fundamental knowledge of Physics, Chemistry, Mechanics, Civil, Mechanical, Electrical and Electronics Engineering languages and modern manufacturing practices.
2. Graduates will demonstrate an ability to identify, formulate and solve Electronics and Telecommunication Engineering problems, analysis and interpretation of the same.
3. Graduate will demonstrate an ability to design Electrical and Electronic circuits and conduct experiments with electronic systems, analyze and interpret data. Graduate will be able to study the parametric analysis on performance of electronic systems. They will be able to handle various lab apparatus and instruments and draw conclusions.
4. Graduates will demonstrate an ability to design and build digital and analog systems knowing specifications of various components.
5. Graduate will demonstrate skills to use modern engineering tools, various software applications and state of art equipments for analysis and development.
6. Graduates will be able to apply knowledge of professional engineering practices to assess social, health, legal and cultural issues.
7. Graduate will show the understanding of impact of engineering solutions on the social and environmental issues and also will be aware of contemporary issues and demonstrate the knowledge of advanced topics in Electronics and Telecommunication Engineering like PIC, ARM Processor, IPTV, Markov Chain etc for sustainable development.
8. Graduates will demonstrate knowledge of professional and ethical responsibilities. They will bear a good moral character to be a responsible citizen.
9. Graduate will be able to function effectively as member or leader in diverse teams, and in multidisciplinary settings
10. Graduate will be able to communicate effectively in both verbal and written form. They will be able to present a topic effectively, will be able to participate in group discussions and prepare a written report of any activity.
11. Graduate will demonstrate the knowledge and understanding of Electronics and Telecommunication Engineering along with management principles and apply the same in own work as a member or leader in a team, to manage projects and multidisciplinary tasks.

12. Graduate will develop confidence for self education and ability for life-long learning and can participate and succeed in competitive examinations like GATE, GRE, Energy Auditor and Manager, MPSC, UPSC and other competitive examinations.

## PSO

At the end of the program, the student:

1. Should be able to clearly understand the concepts and applications in the field of Communication, computer networking, signal processing, embedded systems and semiconductor technology.
2. Should be able to associate the learning from the courses related to Image and Signal processing, Microcomputers, Embedded and Communication Systems to arrive at solutions to real world problems.

## Department of Electronics and Telecommunication Engineering

### COURSE OUTCOMES

**Class: SE EXTC**

**Sem:III**

<b>Name of the Course</b>	<b>COURSE OUTCOMES</b>
Engineering Mathematics III	<ol style="list-style-type: none"> <li>1. Able to state and express the properties of Cayley Hamilton theorem, derogatory matrix, diagonalizable matrix, find Eigen values and Eigen vectors of matrix, function of square matrix, find laplace &amp; inverse laplace transform of the given function, analytic function, orthogonal trajectories for the given family of curves, image of the given region under given transformation, bilinear transformation, directional derivatives, work done, fourier series, half range fourier series, complex form of the given function.</li> <li>2. Able to prove show the matrix is diagonalizable, derogatory, statement on function of square matrix, properties of Laplace transform, orthogonal / orthonormal of the given set of functions, analyticity of the given function, harmonic function, properties of curl, divergence &amp; gradient, solve differential equation by laplace transform &amp; inverse laplace transform.</li> <li>3. Able to Verify Cayley Hamilton theorem, Green's theorem, evaluate definite integral by laplace transform, laplace transform &amp; inverse laplace transform of the given function, surface &amp; volume integral.</li> </ol>
Electronic Devices & Circuits	<p><b>After successful completion of this course the students will be able to</b></p> <ol style="list-style-type: none"> <li>1. Understand operation &amp; current voltage characteristics of semiconductor devices.</li> <li>2. Identify &amp; solve problems on biasing of semiconductor devices</li> <li>3. Analyze DC circuits &amp; relate ac models of semiconductor devices with their physical operation.</li> </ol>

	4. Evaluate frequency response to understand behavior of Electronics circuits.
Digital System Design	<p>After successful completion of the course student will be able to:</p> <ol style="list-style-type: none"> <li>1. Apply their knowledge in analyzing Circuits by using logic gates.</li> <li>2. Classify different logic families, semiconductor memories and PLD devices.</li> <li>3. Illustrate reduction of logical expressions using Boolean algebra and k-map.</li> <li>4. Implement Digital circuits using VHDL and functions using logic gates.</li> <li>5. Ability to design and implement digital circuits under realistic constraints and conditions.</li> </ol>
Network Theory	<p>After successful completion of the course student will be able to:</p> <ol style="list-style-type: none"> <li>1. Apply their knowledge in analyzing Circuits by using network theorems.</li> <li>2. Apply the time and frequency method of analysis.</li> <li>3. Evaluate circuit using graph theory.</li> <li>4. Find the various parameters of two port network.</li> <li>5. Apply network topology for analyzing the circuit.</li> <li>6. Synthesize the network using passive elements.</li> </ol>
Electronic Instrumentation & Control Systems	<ol style="list-style-type: none"> <li>1. Identify various sensors, transducers and their brief performance specification.</li> <li>2. Understand the principle of working of various transducer used to measure temperature, displacement, level, pressure and their application in industry</li> <li>3. Determine the models of physical systems in forms suitable for use in the analysis and design of control systems.</li> <li>4. Obtain the transfer functions for a given Control system.</li> <li>5. Understand the analysis of systems in time domain and frequency domain.</li> <li>6. Predict stability of given system using appropriate criteria.</li> </ol>

Name of the Course	COURSE OUTCOMES
Engineering MathematicsIV	<ol style="list-style-type: none"> <li>1. Able to find probability, mean, variance &amp; MGF, correlation &amp; regression, value class, extremals of given function , vectors in <math>R^n</math> for given conditions, Orthogonal or orthonormal basis , The Taylor's and Laurent's series expansion, residue, poles and singularities of the function, fit Binomial &amp; Poisson's distribution.</li> <li>2. Able to Prove given set is vector space,subspace,extremals of given function is a curve.</li> <li>3. Able to evaluate the complex integral by Cauchy's integral theorem and Residue theorem, integral for given path, Cauchy-Schwartz inequality, Pythagorean theorem ,given set is vector space,subspace ,Construct Orthogonal or orthonormal basis.</li> </ol>
Microcontrollers	<p>After successful completion of the course student will be able to:</p> <ol style="list-style-type: none"> <li>1. Define and describe the Features, architecture and pin configurations of 8051 microcontroller &amp; ARM7.</li> <li>2. Explain and Differentiate Microprocessor and Microcontroller, addressing mode, operating mode of 8051 microcontroller &amp; ARM7.</li> <li>3. Interface LED, LCD, keyboard and relay.</li> <li>4. Draw &amp; examine ARM7 processor families, Concept of Cortex-A, the Cortex-R, the Cortex-M</li> <li>5. Write assembly programming for 8051 microcontroller &amp; ARM7</li> </ol>
Linear Integrated Circuits	<p>After successful completion of the course student will be able to:</p> <ol style="list-style-type: none"> <li>1. Outline and classify all types of integrated circuits.</li> <li>2. Understand the fundamentals and areas of applications for the integrated circuits.</li> <li>3. Develop the ability to design practical circuits that perform the desired operations.</li> <li>4. Understand the differences between theoretical &amp; practical results in integrated circuits.</li> <li>5. Identify the appropriate integrated circuit modules for designing engineering application.</li> </ol>
Signals & Systems	<p>After successful completion of the course student will be able to:</p> <ol style="list-style-type: none"> <li>1. Classify and Analyze different types of signals and systems</li> <li>2. Analyze continuous time LTI signals and systems in transform domain</li> <li>3. Analyze and realize discrete time LTI signals and systems in transform domain</li> <li>4. Represent signals using Fourier Series and Analyze the systems using the Fourier</li> </ol>



	<p>Transform.</p> <p>5. Demonstrate the concepts learnt in Signals and systems Course using the modern engineering tools.</p>
Principles of Communication Engineering	<p>After successful completion of the course student will be able to:</p> <ol style="list-style-type: none"> <li>1. Understand the basic components and types of noises in communication system.</li> <li>2. Analyze the concepts of amplitude modulation and demodulation.</li> <li>3. Analyze the concepts of angle modulation and demodulation.</li> <li>4. Compare the performance of AM and FM receivers.</li> <li>5. Describe analog and digital pulse modulation techniques.</li> <li>6. Illustrate the principles of multiplexing and demultiplexing techniques</li> </ol>

**Class: TE EXTC**

**Sem:V**

<b>Name of the Course</b>	<b>COURSE OUTCOMES</b>
Digital Communication	<p>After successful completion of the course student will be able to:</p> <ol style="list-style-type: none"> <li>1. Apply the concepts of information theory in source coding.</li> <li>2. Compare different error control systems and apply various error detection codes.</li> <li>3. Analyze different error correction codes.</li> <li>4. Compare various baseband transmission methods for digital signals.</li> <li>5. Evaluate the performance of optimum baseband detection in the presence of white noise.</li> <li>6. Compare the performances of different digital modulation techniques</li> </ol>

Discrete Time Signal Processing	<p>After successful completion of the course student will be able to:</p> <ol style="list-style-type: none"> <li>1. Recall the system representations and understand the relation between different transforms.</li> <li>2. Understand the concepts of discrete-time Fourier transform, fast Fourier transform and apply in system analysis.</li> <li>3. Design digital IIR and FIR filters to satisfy the given specifications and evaluate the frequency response and polezero representations to choose a particular filter for the given application.</li> <li>4. Interpret the different realization structures of Digital IIR and FIR filters.</li> <li>5. Analyze the impact of hardware limitations on the performance of digital filters.</li> <li>6. Apply signal processing concepts, algorithms in applications related to the field of biomedical and audio signal processing.</li> </ol>
Digital VLSI	<p>After successful completion of the course student will be able to:</p> <ol style="list-style-type: none"> <li>1. Know various tools and processes used in VLSI Design.</li> <li>2. Explain working of various CMOS combinational and sequential circuits used in VLSI Design.</li> <li>3. Derive expressions for performance parameters of basic building blocks like CMOS inverter.</li> <li>4. Relate performance parameters with design parameters of VLSI circuits.</li> <li>5. Select suitable circuit and design style for given application.</li> <li>6. Design and realize various combinational and sequential circuits for given specifications.</li> </ol>
Random Signal Analysis	<p>After successful completion of the course student will be able to:</p> <ol style="list-style-type: none"> <li>1. Apply theory of probability in identifying and solving relevant problems.</li> <li>2. Differentiate continuous and discrete random variables and their distributions.</li> <li>3. Analyze mean, variance, and distribution function of random variables and functions of random variables.</li> <li>4. Define a random process, determine the type of the process and find the response of LTI system for WSS process.</li> <li>5. Explain linear regression algorithms and apply for predictive applications</li> </ol>
Department Optional Course-1 :-	<ol style="list-style-type: none"> <li>1. Able to state and define the Various standards of audio and video compression, types</li> </ol>

Data Compression and Cryptography	<p>of DES and Principles of public key cryptography.</p> <ol style="list-style-type: none"> <li>2. Able to identify and discuss statistical methods, cryptography and stenography , common network security attacks.</li> <li>3. Able to demonstrate and solve the problems on data compression coding techniques like arithmetic coding, Huffman coding and cryptographic techniques.</li> <li>4. Able to analyze security issues arising from the use of certain types of techniques, operation of a range of commonly used coding and compression techniques.</li> <li>5. Able to design and create efficient algorithms using standard algorithm design techniques.</li> </ol>
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**Class: TE EXTC**

**Sem:VI**

<b>Name of the Course</b>	<b>COURSE OUTCOMES</b>
Electromagnetics and Antenna	<ol style="list-style-type: none"> <li>1. Students will be able to describe electromagnetics field including static and dynamic in terms of Maxwell's equations.</li> <li>2. Students will be able to apply Maxwell's equation to solve various electromagnetic phenomenon such as electromagnetic wave propagation in different medium, power in EM wave.</li> <li>3. Students will derive the field equations for the basic radiating elements and describe basic antenna parameters like radiation pattern, directivity, gain etc.</li> <li>4. Students will be able to implement different types of the antenna structures such as Antenna arrays, Microstrip antenna and reflector antenna etc.</li> </ol>
Computer Communication Networks	<p>After successful completion of the course students will be able to:</p> <ol style="list-style-type: none"> <li>1. Analyze network topologies, hardware devices, addressing schemes and the protocol stacks</li> <li>2. Compare various transmission media and broadband technologies</li> <li>3. Analyze the flow control, error control and the medium access control techniques</li> <li>4. Judge network layer addressing and routing schemes</li> <li>5. Analyze connection oriented and connectionless services</li> <li>6. Apply the knowledge of application layer protocols</li> </ol>
Image Processing	<p>After successful completion of the course student will be able to:</p>

and Machine Vision	<ol style="list-style-type: none"> <li>1. Describe visual perception of human, different transform used in Image processing, use of transform coefficients, basics of image segmentation, ,Image processing applications and models in Image Processing</li> <li>2. Carry out calculation on image in spatial domain, in frequency domain and demonstrate image segmentation. Interpret and analyze 2D signals in frequency domain through image transforms and compare techniques of image segmentation.</li> <li>3. Justify and support use of spatial domain tool, frequency domain tool and image compression and segmentation techniques Apply quantitative models of image and video processing for various engineering applications.</li> <li>4. Able to answer the oral questions/queries by examiner/evaluators and write assignments and answers in English.</li> </ol>
Artificial Neural Network and Fuzzy Logic	<p>After successful completion of the course student will be able to</p> <ol style="list-style-type: none"> <li>1. Compare analysis between human and computer, Artificial Neural Networks models, characteristics of ANN's learning strategies, learning rules and basics of fuzzy logic.</li> <li>2. Identify different neural network architectures, their limitations and appropriate learning rules for each of the architectures.</li> <li>3. Design and implement a neural network using different training algorithms.</li> <li>4. Analyze the applications of neural networks and fuzzy logic to real world problems.</li> </ol>
Department Level Optional Course-2: - Radar Engineering	<p>After successful completion of the course student will be able to</p> <ol style="list-style-type: none"> <li>1. Explain generalized concept of RADAR.</li> <li>2. Solve problems using radar equations.</li> <li>3. Describe different types of radar for specific application.</li> <li>4. Explain concept of tracking radar.</li> <li>5. Plot the RADAR target from given specification</li> </ol>

**Class: BE EXTC**

**Sem:VII**

<b>Name of the Course</b>	<b>COURSE OUTCOMES</b>
Microwave Engineering	<p>After successful completion of the course student will be able to</p> <ol style="list-style-type: none"> <li>1) Characterize devices at higher frequencies.</li> <li>2) Design and analyze microwave circuits.</li> <li>3) Design and analyze amplifiers and oscillators at microwave frequencies.</li> <li>4) Demonstrate skills of planning, design and deployment of microwave networks.</li> </ol>

<p>Mobile Communication System</p>	<p>After successful completion of the course student will be able to</p> <ol style="list-style-type: none"> <li>1. Explain the cellular fundamentals and estimate the coverage and capacity of cellular systems.</li> <li>2. Classify different types of propagation models and analyze the link budget.</li> <li>3. Illustrate the fundamentals and system architecture of GSM, 2.5G and IS-95.</li> <li>4. Apply the concepts of 3G technologies of UMTS and CDMA 2000.</li> <li>5. Elaborate the principles of 3GPP LTE.</li> <li>6. Identify the emerging technologies for upcoming mobile communication systems.</li> </ol>
<p>Optical Communication</p>	<p>After successful completion of the course students will be able to</p> <ol style="list-style-type: none"> <li>1) List, write and explain fundamentals and transmission characteristics of optical fiber Communication.</li> <li>2) List, write and explain principles and characteristics of various sources ,detectors and various fiber optic components</li> <li>3) Calculate parameters for optical link budgeting and analyze the link</li> </ol>
<p>Department Level Optional Course III :- Internet Communication Engineering</p>	<p>After successful completion of the course student will be able to</p> <ol style="list-style-type: none"> <li>1) Explain the operation of the components of a router including, DHCP, NAT/PAT, Routing function, Switching function.</li> <li>2) Describe how DNS works in the global Internet including caching and root servers.</li> <li>3) Understand the current state-of-the-art developments in Internet technologies for multimedia communications.</li> <li>4) Understand the security protocol and services In the Internet</li> <li>5) Appreciate the principles used in designing multimedia protocols, and so understand why standard protocols are designed the way that they are.</li> <li>6) Understand the system design principles of multimedia communications systems.</li> <li>7) Solve problems and design simple networked multimedia systems</li> </ol>
<p>Institute Level Optional Course I: - Cyber Security and Laws</p>	<p>After successful completion of the course student will be able to</p> <ol style="list-style-type: none"> <li>1) Understand the principles and practices of cryptographic techniques.</li> <li>2) Understand a variety of generic security threats and vulnerabilities, and identify &amp; analyze particular security problems for given applications.</li> <li>3) Appreciate the application of security techniques and technologies in solving real life security problems in practical systems.</li> <li>4) Apply appropriate security techniques to solve security problems.</li> <li>5) Design security protocols and methods to solve the specific security problems.</li> </ol>

Name of the Course	COURSE OUTCOMES
RF Design	<p>After successful completion of the course student will be able to</p> <ol style="list-style-type: none"> <li>1. Design impedance matching networks and passive RF filters.</li> <li>2. Design and appraise RF amplifiers and oscillators.</li> <li>3. Analyze EMI and EMC in RF circuits.</li> </ol>
Wireless Networks	<p>After successful completion of the course, students will be able to</p> <ol style="list-style-type: none"> <li>1) Explain the fundamentals, architecture, design issues and standards of wireless networks</li> <li>2) List and compare Body area network (BAN) and personal area network (PAN) technologies such as Zigbee, Bluetooth, UWB, RFID, NFC etc.</li> <li>3) Classify different LAN topologies and technologies</li> <li>4) Illustrate the fundamentals and architecture of wireless Metropolitan Area Networks (WMAN) and describe the phases of planning and design of wireless networks</li> <li>5) Discuss various wireless adhoc networks architecture, traffic related protocols and transmission technology</li> <li>6) Understand the basic architecture and working of IOT</li> </ol>
Department Level Optional Course IV: - Satellite Communication	<p>After successful completion of the course student will be able to</p> <ol style="list-style-type: none"> <li>1. Explain basics of satellite communication, space segment and earth segment</li> <li>2. Understand different satellite orbits and orbital parameters</li> <li>3. Explain and analyze link budget of satellite signal for proper communication</li> <li>4. Understand various applications of satellite communications</li> </ol>
Institute Level Optional Course II: - Environmental Management	<p>After successful completion of the course student will be able to</p> <ol style="list-style-type: none"> <li>1. Understand the concept of environmental management</li> <li>2. Understand ecosystem and interdependence, food chain etc.</li> <li>3. Understand and interpret environment related legislations</li> </ol>
Institute Level Optional Course II: - Digital Business Management	<p>After successful completion of the course student will be able to..</p> <ol style="list-style-type: none"> <li>1)Identify drivers of digital business.</li> <li>2)Illustrate various approaches and techniques for E-business and management.</li> <li>3)Prepare E-business plan.</li> </ol>

## **Department of Mechanical Engineering**

### **PEO**

- 1) To develop the students to give outstanding performance in their professional career as employee in an industry or as an entrepreneur.
- 2) To motivate the students to pursue higher education or excel in multidisciplinary projects.
- 3) To inculcate professionalism, strong ethical values and lifelong learning ability in the students.

### **PO**

- 1) Apply the basic knowledge of mathematics, Science and Engineering to solve the Mechanical Engineering problems.
- 2) Identify, formulate and analyse complex Mechanical Engineering problems and propose a substantial conclusion.
- 3) Design solution for complex Mechanical Engineering problems that will satisfy the specific need.
- 4) Demonstrate the ability to design and conduct experiments, interpret and analyse the data and report results.
- 5) Select and use appropriate modern Mechanical engineering tools to analyse and solve Mechanical Engineering problems.
- 6) Assess societal, health, safety, cultural issues and responsibility related to a Mechanical Engineering problem.
- 7) Understand the impact of Mechanical Engineering solution on environment and demonstrate the knowledge of need for sustainable development.
- 8) Apply ethical principles and be committed to professional ethics, responsibilities and norms of Mechanical Engineering practices.
- 9) Work effectively as an individual as well as in the teams and in multidisciplinary environment.
- 10) Communicate effectively in both verbal and written forms of communication.
- 11) Demonstrate knowledge of engineering and management principles and apply them to manage projects and finance.
- 12) Recognize the need for lifelong learning and will be engaged in it in the context of technological advancements.

### **PSO**

- 1) Apply the Mechanical Engineering knowledge to design, analyze and solve the problems in Thermal Engineering, Mechanical Design and Manufacturing Engineering domain.
- 2) Work effectively individually, in teams and manage the financial and technical aspects of projects in professional manner.
- 3) Identify the revolutions in technology creating new learning opportunities and engage himself in lifelong learning.

# Department of Mechanical Engineering

## COURSE OUTCOMES

Class: SE Mechanical

Sem:III

Subject	Course Outcomes
Engineering Mathematics-III	<ol style="list-style-type: none"><li>1. Apply the concept of Laplace transform to solve the real integrals in engineering problems.</li><li>2. Apply the concept of inverse Laplace transform of various functions in engineering problems.</li><li>3. Expand the periodic function by using Fourier series for real life problems and complex engineering problems.</li><li>4. Find orthogonal trajectories and analytic function by using basic concepts of complex variable theory.</li><li>5. Apply Matrix algebra to solve the engineering problems.</li><li>6. Solve Partial differential equations by applying numerical solution and analytical methods for one dimensional heat and wave equations</li></ol>
Strength of Materials	<ol style="list-style-type: none"><li>1. Demonstrate fundamental knowledge about various types of loading and stresses induced.</li><li>2. Draw the SFD and BMD for different types of loads and support conditions.</li><li>3. Analyse the bending and shear stresses induced in beam.</li><li>4. Analyse the deflection in beams and stresses in shaft.</li><li>5. Analyse the stresses and deflection in beams and Estimate the strain energy in mechanical elements.</li><li>6. Analyse buckling phenomenon in columns.</li></ol>
Production Processes	<ol style="list-style-type: none"><li>1. Demonstrate an understanding of casting process</li><li>2. Illustrate principles of forming processes.</li><li>3. Demonstrate applications of various types of welding processes.</li><li>4. Differentiate chip forming processes such as turning, milling, drilling, etc.</li><li>5. Illustrate the concept of producing polymer components and ceramic components.</li><li>6. Illustrate principles and working of non-traditional manufacturing</li><li>7. Understand the manufacturing technologies enabling Industry 4.0</li></ol>
Materials and Metallurgy	<ol style="list-style-type: none"><li>1. Identify the various classes of materials and comprehend their properties</li><li>2. Apply phase diagram concepts to engineering applications</li><li>3. Apply particular heat treatment for required property development</li><li>4. Identify the probable mode of failure in materials and suggest measures to prevent them</li><li>5. Choose or develop new materials for better performance</li><li>6. Decide an appropriate method to evaluate different components in service</li></ol>
Thermodynamics	<ol style="list-style-type: none"><li>1. Demonstrate application of the laws of thermodynamics to a wide range of systems.</li><li>2. Compute heat and work interactions in thermodynamic systems</li><li>3. Demonstrate the interrelations between thermodynamic functions to solve practical problems.</li><li>4. Compute thermodynamic interactions using the steam table and Mollier chart</li><li>5. Compute efficiencies of heat engines, power cycles.</li><li>6. Apply the fundamentals of compressible fluid flow to the relevant systems</li></ol>



Materials Testing	<ol style="list-style-type: none"> <li>1. Prepare metallic samples for studying its microstructure following the appropriate procedure.</li> <li>2. Identify effects of heat treatment on microstructure of medium carbon steel and hardenability of steel using Jominy end Quench test</li> <li>3. Perform Fatigue Test and draw S-N curve</li> <li>4. Perform Tension test to Analyze the stress - strain behavior of materials</li> <li>5. Measure torsional strength, hardness and impact resistance of the material</li> <li>6. Perform flexural test with central and three point loading conditions</li> </ol>
Machine Shop Practice	<ol style="list-style-type: none"> <li>1. Know the specifications, controls and safety measures related to machines and machining operations.</li> <li>2. Use the machines for making various engineering jobs.</li> <li>3. Perform various machining operations</li> <li>4. Perform Tool Grinding</li> <li>5. Perform welding operations</li> </ol>
Skill Based Lab: CAD – Modeling	<ol style="list-style-type: none"> <li>1. Illustrate basic understanding of types of CAD model creation.</li> <li>2. Visualize and prepare 2D modeling of a given object using modeling software.</li> <li>3. Build solid model of a given object using 3D modeling software.</li> <li>4. Visualize and develop the surface model of a given object using modeling software.</li> <li>5. Generate assembly models of given objects using assembly tools of a modeling software</li> <li>6. Perform product data exchange among CAD systems.</li> </ol>
Mini Project - 1A	<ol style="list-style-type: none"> <li>1. Identify problems based on societal /research needs.</li> <li>2. Apply Knowledge and skill to solve societal problems in a group.</li> <li>3. Develop interpersonal skills to work as member of a group or leader.</li> <li>4. Draw the proper inferences from available results through theoretical/experimental/simulations.</li> <li>5. Analyse the impact of solutions in societal and environmental context for sustainable development.</li> <li>6. Use standard norms of engineering practices</li> <li>7. Excel in written and oral communication.</li> <li>8. Demonstrate capabilities of self-learning in a group, which leads to lifelong learning.</li> <li>9. Demonstrate project management principles during project work.</li> </ol>

**Class: SE Mechanical**

**Sem:IV**

<b>Subject</b>	<b>Course Outcomes</b>
Engineering Mathematics-IV	<ol style="list-style-type: none"> <li>1. Apply the concept of Vector calculus to evaluate line integrals, surface integrals using Green's theorem, Stoke's theorem &amp; Gauss Divergence theorem.</li> <li>2. Use the concepts of Complex Integration for evaluating integrals, computing residues &amp; evaluate various contour integrals.</li> <li>3. Apply the concept of Correlation, Regression and curve fitting to the engineering problems in data science.</li> <li>4. Illustrate understanding of the concepts of probability and expectation for getting the spread of the data and distribution of probabilities.</li> <li>5. Apply the concept of probability distribution to engineering problems &amp; testing hypothesis of small samples using sampling theory.</li> <li>6. Apply the concepts of parametric and nonparametric tests for analyzing practical problems.</li> </ol>

Fluid Mechanics	<ol style="list-style-type: none"> <li>1. Define properties of fluids, classify fluids and evaluate hydrostatic forces on various surfaces.</li> <li>2. Illustrate understanding of dimensional analysis of Thermal and Fluid systems.</li> <li>3. Differentiate velocity potential function and stream function and solve for velocity and acceleration of a fluid at a given location in a fluid flow.</li> <li>4. Formulate and solve equations of the control volume for fluid flow systems and Apply Bernoulli's equation to various flow measuring devices.</li> <li>5. Calculate pressure drop in laminar and turbulent flow, evaluate major and minor losses in pipes.</li> <li>6. Calculate resistance to flow of incompressible fluids through closed conduits and over surfaces.</li> </ol>
Kinematics of Machinery	<ol style="list-style-type: none"> <li>1. Identify various components of mechanisms</li> <li>2. Develop mechanisms to provide specific motion</li> <li>3. Draw velocity and acceleration diagrams of various mechanisms</li> <li>4. Choose a cam profile for the specific follower motion</li> <li>5. Predict condition for maximum power transmission in the case of a belt drive</li> <li>6. Illustrate requirements for an interference-free gear pair</li> </ol>
CAD/CAM	<ol style="list-style-type: none"> <li>1. Identify suitable computer graphics techniques for 3D modeling.</li> <li>2. Transform, manipulate objects &amp; store and manage data.</li> <li>3. Develop 3D model using various types of available biomedical data.</li> <li>4. Create the CAM Toolpath for specific given operations.</li> <li>5. Build and create data for 3D printing of any given object using rapid prototyping and tooling processes.</li> <li>6. Illustrate understanding of various cost effective alternatives for manufacturing products.</li> </ol>
Industrial Electronics	<ol style="list-style-type: none"> <li>1. Illustrate construction, working principles and applications of power electronic switches.</li> <li>2. Identify rectifiers and inverters for dc and ac motor speed control.</li> <li>3. Develop circuits using OPAMP and Timer IC 555.</li> <li>4. Identify digital circuits for industrial applications.</li> <li>5. Demonstrate the knowledge of basic functioning of microcontrollers.</li> <li>6. Analyze speed-torque characteristics of electrical machines for speed control.</li> </ol>

Python Programming	<ol style="list-style-type: none"> <li>1. Demonstrate understand of basic concepts of python programming.</li> <li>2. Identify, install and utilize python packages</li> <li>3. Develop and execute python programs for specific applications.</li> <li>4. Develop and build python program to solve real-world engineering problems</li> <li>5. Prepare a report on case studies selected.</li> </ol>
Skill based Lab: CNC and 3-D Printing	<ol style="list-style-type: none"> <li>1. Develop and execute part programing for any given specific operation.</li> <li>2. Build any given object using various CNC operations.</li> <li>3. Demonstrate CAM Tool path and prepare NC- G code.</li> <li>4. Develop 3D model using available biomedical data</li> <li>5. Build any given real life object using 3D printing process.</li> <li>6. Convert 2D images into 3D model</li> </ol>
Mini Project - 1B	<ol style="list-style-type: none"> <li>1. Identify problems based on societal /research needs.</li> <li>2. Apply Knowledge and skill to solve societal problems in a group.</li> <li>3. Develop interpersonal skills to work as member of a group or leader.</li> <li>4. Draw the proper inferences from available results through theoretical/experimental/simulations.</li> <li>5. Analyse the impact of solutions in societal and environmental context for sustainable development.</li> <li>6. Use standard norms of engineering practices</li> <li>7. Excel in written and oral communication.</li> <li>8. Demonstrate capabilities of self-learning in a group, which leads to life long learning.</li> <li>9. Demonstrate project management principles during project work.</li> </ol>

**Class: TE Mechanical**

**Sem:V**

<b>Subject</b>	<b>Course Outcomes</b>
Mechanical Measurements and Controls	<ol style="list-style-type: none"> <li>1. Handle, operate and apply the precision measuring instruments / equipment's.</li> <li>2. Analyze simple machined components for dimensional stability &amp; functionality.</li> <li>3. Classify various types of static characteristics and types of errors occurring in the system.</li> <li>4. Classify and select proper measuring instrument for displacement, pressure, flow and temperature measurements.</li> <li>5. Design mathematical model of system/process for standard input responses and analyse error and differentiate various types of control systems and time domain specifications</li> <li>6. Analyse the problems associated with stability.</li> </ol>
Thermal Engineering	<ol style="list-style-type: none"> <li>1. Analyze the three modes of heat transfer in engineering application.</li> <li>2. Develop mathematical models for different modes of heat transfer.</li> <li>3. Analyze performance parameters of different types of heat exchangers.</li> <li>4. Identify and analyze the Transient heat Transfer in engineering applications.</li> <li>5. Explain construction and working of different components of internal combustion engines.</li> <li>6. Evaluate engine performance and emission characteristics.</li> </ol>
Dynamics of Machinery	<ol style="list-style-type: none"> <li>1. Demonstrate working Principles of different types of governors and Gyroscopic effects on the mechanical systems</li> <li>2. Illustrate basic of static and dynamic forces</li> <li>3. Determine natural frequency of element/system</li> <li>4.</li> </ol>

	Determine vibration response of mechanical elements / systems 5. Design vibration isolation system for a specific application 6. Demonstrate basic concepts of balancing of forces and couples
MSTD	<ol style="list-style-type: none"> <li>1. Define various terms in machining sciences and tool design.</li> <li>2. Explain construction and details of various machining processes and related instruments.</li> <li>3. Demonstrate the inter-relationship between cutting parameters and machining performance measures like power requirement, cutting time, tool life and surface finish and illustrate the properties of various cutting tool materials and hence select an appropriate tool material for particular machining application</li> <li>4. Calculate the values of various forces involved in the machining operations and solve problems on theory and economics of metal cutting.</li> <li>5. Analyse heat generation in machining operation, coolant operations and economics of machining operations</li> <li>6. Design various single and multipoint cutting tools</li> </ol>
Finite Element Analysis	<ol style="list-style-type: none"> <li>1. Solve differential equations using weighted residual methods.</li> <li>2. Develop the finite element equations to model engineering problems governed by second order differential equations.</li> <li>3. Apply the basic finite element formulation techniques to solve engineering problems by using one dimensional element.</li> <li>4. Apply the basic finite element formulation techniques to solve engineering problems by using two dimensional elements.</li> <li>5. Apply the basic finite element formulation techniques to find natural frequency of single degree of vibration system.</li> <li>6. Use commercial FEA software, to solve problems related to mechanical engineering.</li> </ol>
Design of Experiments	<ol style="list-style-type: none"> <li>1. Plan, design, and conduct experimental investigations efficiently and effectively;</li> <li>2. Understand strategy in planning and conducting experiments;</li> <li>3. Choose an appropriate experimentation scheme to evaluate a new product design or process improvement through experimentation strategy, data analysis, and interpretation of experimental results.</li> </ol>
Thermal Engineering	<ol style="list-style-type: none"> <li>1. Estimate thermal conductivity of engineering materials.</li> <li>2. Evaluate performance parameters of extended surfaces.</li> <li>3. Analyze heat transfer parameters in various engineering applications.</li> <li>4. Analyze engine performance and emission parameters at different operating conditions.</li> </ol>
Finite Element Analysis	<ol style="list-style-type: none"> <li>1. Select appropriate element for given problem</li> <li>2. Select suitable meshing and perform convergence test</li> <li>3. Select appropriate solver for given problem</li> <li>4. Interpret the result</li> <li>5. Apply basic aspects of FEA to solve engineering problems</li> <li>6. Validate FEA solution</li> </ol>
Professional Communication And Ethics - II	<ol style="list-style-type: none"> <li>1. Plan and prepare effective business/ technical documents which will in turn provide solid foundation for their future managerial roles.</li> <li>2. Strategize their personal and professional skills to build a professional image and meet the demands of the industry.</li> <li>3. Emerge successful in group discussions, meetings and result-oriented</li> </ol>

	<p>agreeable solutions in group communication situations.</p> <p>4. Deliver persuasive and professional presentations.</p> <p>5. Develop creative thinking and interpersonal skills required for effective professional communication.</p> <p>6. Apply codes of ethical conduct, personal integrity and norms of organizational behavior</p>
Mini Project - 2A	<p>1. Identify problems based on societal /research needs.</p> <p>2. Apply Knowledge and skill to solve societal problems in a group.</p> <p>3. Develop interpersonal skills to work as member of a group or leader.</p> <p>4. Draw the proper inferences from available results through theoretical/experimental/simulations.</p> <p>5. Analyse the impact of solutions in societal and environmental context for sustainable development.</p> <p>6. Use standard norms of engineering practices</p> <p>7. Excel in written and oral communication.</p> <p>8. Demonstrate capabilities of self-learning in a group, which leads to life long learning.</p> <p>9. Demonstrate project management principles during project work.</p>

**Class: TE Mechanical**

**Sem:VI**

<b>Subject</b>	<b>Course Outcomes</b>
Machine Design	<p>1. Use design data book/standard codes to standardise the designed dimensions</p> <p>2. Design Knuckle Joint, cotter joint and Screw Jack</p> <p>3. Design shaft under various conditions and couplings</p> <p>4. Select bearings for a given applications from the manufacturers catalogue.</p> <p>5. Select and/or design belts and flywheel for given applications</p> <p>6. Design springs, clutches and brakes</p>
Turbo Machinery	<p>1. Define various parameters associated with steam generators and turbo machines.</p> <p>2. Identify various components and mountings of steam generators with their significance.</p> <p>3. Identify various turbo machines and explain their significance.</p> <p>4. Apply principles of thermodynamics and fluid mechanics to estimate various parameters like mass flow rate power, torque, efficiency, temperature, etc.</p> <p>5. Evaluate performance of SG and Turbo machines and apply various techniques to enhance performance.</p> <p>6. Evaluate various phenomena related to performance like cavitation, choking, surging.</p>
Heating, Ventilation, Air Conditioning and Refrigeration	<p>1. Illustrate the fundamental principles and applications of refrigeration and air conditioning systems.</p> <p>2. Identify various HVAC&amp;R components</p> <p>3. Evaluate performance of various refrigeration system</p> <p>4. Estimate cooling and heating loads for an air conditioning system.</p> <p>5. Select air handling unit &amp; design air distribution system</p> <p>6. Apply the knowledge of HVAC for the sustainable development of refrigeration and air conditioning systems.</p>

Automation and Artificial Intelligence	<ol style="list-style-type: none"> <li>1. Demonstrate understanding of fundamentals of industrial automation and AI.</li> <li>2. Design &amp; develop pneumatic / hydraulic circuits.</li> <li>3. Design and develop electro pneumatic circuits and PLC ladder logics.</li> <li>4. Demonstrate understanding of robotic control systems and their applications.</li> <li>5. Demonstrate understanding of various AI and machine learning technologies.</li> </ol>
Press Tool Design	<ol style="list-style-type: none"> <li>1. Demonstrate various press working operations for mass production of sheet metal parts</li> <li>2. Identify press tool requirements to build concepts pertaining to design of press tools</li> <li>3. Prepare working drawings and setup for economic production of sheet metal components</li> <li>4. Select suitable materials for different elements of press tools</li> <li>5. Illustrate the principles and blank development in bent &amp; drawn components</li> <li>6. understand safety aspects and automation in press working</li> </ol>
Measurements and Automation	<ol style="list-style-type: none"> <li>1. Apply inspection gauge to check or measure surface parameters. 2. Measure surface parameters using precision measurement tools and equipment.</li> <li>3. Measure different mechanical parameters by using sensors.</li> <li>4. Analyse the response of a control systems.</li> <li>5. Demonstrate use of automated controls using pneumatic and hydraulic systems.</li> <li>6. Implement program on PLC system and demonstrate its application</li> </ol>
Mini Project - 2B	<ol style="list-style-type: none"> <li>1. Identify problems based on societal /research needs.</li> <li>2. Apply Knowledge and skill to solve societal problems in a group. 3. Develop interpersonal skills to work as member of a group or leader.</li> <li>4. Draw the proper inferences from available results through theoretical/ experimental/simulations.</li> <li>5. Analyse the impact of solutions in societal and environmental context for sustainable development.</li> <li>6. Use standard norms of engineering practices</li> <li>7. Excel in written and oral communication.</li> <li>8. Demonstrate capabilities of self-learning in a group, which leads to lifelong learning.</li> <li>9. Demonstrate project management principles during project work.</li> </ol>

Subject	Course Outcomes
<b>Operation Research</b>	<ol style="list-style-type: none"> <li>1. Able to state and describe the concepts, assumptions, types in LPP, Assignment model, Transportation model, Inventory management, Game theory, Replacement model, Queuing model and simulation.</li> <li>2. Able to classify, differentiate and discuss various optimization techniques such as LPP, Assignment, Transportation, Sequencing, Scheduling, Methods of Game theory, inventory control models and related concepts.</li> <li>3. Able to solve the problems on LPP, Assignment, Transportation, Sequencing, Scheduling, Methods of Game theory, inventory control models, Replacement model and simulation.</li> <li>4. Able to analyze and test optimality of LPP, assignment and transportation model.</li> <li>5. Able to Formulate LPP, Assignment problem, Transportation problem for the purpose of optimization.</li> <li>6. Able to apply the principles of economics and finance to determine minimum cost associated with inventory management and replacement cost and period.</li> </ol>
<b>CAD/CAM/CAE</b>	<ol style="list-style-type: none"> <li>1. Identify proper computer graphic techniques for geometric modeling</li> <li>2. Able to transform, manipulate objects and store and manage data.</li> <li>3. Able to prepare part programming applicable to CNC machine</li> <li>4. Able to use rapid prototyping and tooling in any real life application</li> <li>5. Able to identify the tools for analysis of a complex engg. Components.</li> </ol>
<b>Mechanical Utility Systems</b>	<ol style="list-style-type: none"> <li>1. Able to describe operating principles of compressors and pumps</li> <li>2. Able to evaluate performance of reciprocating and rotary compressors</li> <li>3. Able to illustrate and analyze characteristics curves of pumps</li> <li>4. Able to interpret possibilities of energy conservation in pumping &amp; compressed air systems</li> </ol>
<b>Production Planning &amp; Control</b>	<ol style="list-style-type: none"> <li>1. Able to state and describe the concepts, functions, and types, factors influencing Activities of PPC, Forecasting, process planning, product planning Inventory, Project Management and advance production planning.</li> <li>2. Able to classify, compare and discuss products, processes, forecasting methods, sequencing models, CPM/PERT, Assignment and transportation.</li> <li>3. Able to solve the problems on forecasting, inventory, selection of process or machine, sequencing and scheduling, PERT/CPM, LPP, and Simplex, Assignment and Transportation model.</li> <li>4. Able to analyze and test forecasting accuracy and optimality of LPP, assignment and transportation model.</li> <li>5. Able to Formulate, construct, and draw a project network, LPP, Process sheets, work orders, shop or production orders, inspection orders, store issue orders.</li> <li>6. Able to apply the principles of economics and finance to determine minimum cost of project and inventory management.</li> <li>7. Able to answer the oral questions/queries by examiner/evaluators and write assignments and answers in English.</li> </ol>

<b>Machine Design II</b>	<ol style="list-style-type: none"> <li>1. Select appropriate gears for power transmission on the basis of given load and speed.</li> <li>2. Design gears based on the given conditions.</li> <li>3. Select bearings for a given applications from the manufacturers catalogue.</li> <li>4. Select and/or design belts for given applications.</li> <li>5. Design cam and follower and clutches</li> </ol>
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**Class: BE Mechanical**

**Sem:VIII**

<b>Subject</b>	<b>Course Outcomes</b>
<b>Renewable Energy Sources</b>	<ol style="list-style-type: none"> <li>1. Able to demonstrate need of different Renewable Energy Sources &amp; their importance</li> <li>2. Able to calculate &amp; analyze utilization of solar and wind energy</li> <li>3. Able to illustrate design of biogas plant</li> <li>4. Able to estimate alternate energy sources in India</li> </ol>
<b>Automobile Engineering</b>	<ol style="list-style-type: none"> <li>1. Able to practically identify different automotive systems.</li> <li>2. Able to describe importance and features of different systems.</li> <li>3. Able to explain principle, construction and working with applications of various sensors in modern automobiles.</li> </ol>
<b>Refrigeration And Air Conditioning</b>	<ol style="list-style-type: none"> <li>1. Understand Present Scenario of HVAC and RAC, Name Conventional Systems and State Limitations or Disadvantages, Types and Selection of RAC Systems and Load Calculation. State Details of BEE Star Rating, Working Cycles, Need for Aircraft Refrigeration. OD and GW Effect</li> <li>2. Discuss various conventional Systems and Distinguish between Conventional and Non-conventional System, Explain different working cycles, Multi-staging and its effect on the Performance. Identify Cooling Load for AC System Design. Distinguish between Different Aircraft Refrigeration System. Distinguish between various AC Systems. Discuss Various Protocols for Controlling OD and GW</li> <li>3. Applying Basic Concepts Predict Capacity of Refrigeration System, HVAC System, Cooling Tower, Ducting System and Compute Cooling Load, Operating Cost.</li> <li>4. Analyze Refrigeration and AC System Working Parameters and Calculate Operational Effectiveness and Losses</li> <li>5. Answer the Oral Questions. Explain Working of any RAC Application.</li> </ol>



<b>Industrial Engineering and Management</b>	<ol style="list-style-type: none"> <li>1. State and describe the concept of IE &amp; Productivity, Value engineering, roles and responsibilities of IE, factory layouts, CM and GT, principles of material handling</li> <li>2. Explain the material handling systems, factors affecting facility location decisions, issues in cell design and differentiate between production &amp; productivity, models of productivity measurement etc.</li> <li>3. Prepare action plan for IE techniques implementation, illustrate the basic and secondary functions for any product, solve numerical problems related to productivity, time study, work sampling and line balancing</li> <li>4. Construct network diagram for any project and FAST diagram for any product, perform job evaluation and assess effectiveness of MOST in certain applications.</li> <li>5. Answer the oral questions/queries by examiner/evaluators and write assignments and answers in English and present a seminar on any case study of Value Engineering/ Topics on IE techniques.</li> </ol>
<b>Design of Mechanical Systems</b>	<ol style="list-style-type: none"> <li>1. Design material handling systems such as hoisting mechanism of EOT Crane, belt conveyors.</li> <li>2. Design engine components such as cylinder, piston, connecting rod and crankshaft from system design point of view.</li> <li>3. Design pumps for the given applications.</li> <li>4. Prepare layout of machine tool gear box and select number of teeth on each gear.</li> </ol>

# Department of First year Engineering

## COURSE OUTCOMES

Class: First Year

Semester-I

Name of the Course	Course outcomes
<b>Engineering Mathematics – I</b>	<ol style="list-style-type: none"><li>1. Able to state and express the Euler's theorem, types of Matrices, Taylor's series, Demoivre's theorem, Partial derivative &amp; Jacobian of given function. Also solve, find the problems on roots of equation, Rank of matrix, <math>n^{\text{th}}</math> order derivative, simultaneous equation and extreme values of the function.</li><li>2. Able to Prove, show and test the properties of matrices, result on Jacobian, separation of real &amp; Imaginary parts, fitting of curve, statement on Euler's theorem &amp; partial derivative as well as complex number.</li><li>3. Able to verify, evaluate the Euler's theorem, consistency of simultaneous equations, linear dependence or independence of vector and the limit of given function.</li></ol>
<b>Engineering Physics – I</b>	Learner will be able to <ol style="list-style-type: none"><li>1. Illustrate the fundamentals of quantum mechanics and its application.</li><li>2. Illustrate the knowledge of crystal planes, Xray diffraction and its application.</li><li>3. Illustrate the knowledge of Fermi level in semiconductors and applications of semiconductors in electronic devices.</li><li>4. Illustrate the knowledge of interference in thin films and its various applications.</li><li>5. Illustrate the basic knowledge of superconductors and supercapacitors.</li><li>6. Illustrate the knowledge of engineering materials and applications.</li></ol>
<b>Engineering Chemistry – I</b>	<ol style="list-style-type: none"><li>1. Able to Define and explain Hardness of water its types, BOD &amp; COD, reverse osmosis, polymer, polymerization, plastics and its types, GT, phase rule, Aufbau principle, Hund's rule, Aromaticity, Huckel's rule</li><li>2. Able to discuss estimation of hardness and methods of softening &amp; purification of water, compounding and fabrication of plastics, preparation, properties and uses of plastic, reduced phase rule, limitations of phase rule, Quantum numbers, shapes of atomic orbitals, LCAO method, Structure and bonding in benzene &amp; pyrrole, Effect of I.M.F. on properties of compounds.</li><li>3. Able to differentiate or compare various methods of water softening, BOD &amp; COD, various types of plastics and apply the phase rule to water system and Pb-Ag system, Draw MOT of O<sub>2</sub>, BE<sub>2</sub>, CO &amp; NO using LCAO method, write electronic configuration, State whether the given compound is aromatic or not, Derive Nernst Equation.</li><li>4. Able to solve numerical based on calculating hardness of water, and softening of water, BOD &amp; COD of water, Calculate Molecular weight of the polymer, Calculate the amount of Eutectic mixture in a given alloy.</li><li>5. Able to perform practical based on analysis of water for its</li></ol>

	hardness, chloride content and determining the properties of lubricant.
<b>Engineering Mechanics</b>	<ol style="list-style-type: none"> <li>1. Able to state and describe the concepts and types of Force system, Moment, Couple, Equilibrium, Beam and support reaction, Friction, Truss and Basic concept related to Dynamics.</li> <li>2. Able to identify, classify and explain Types of force system, Conditions of Equilibrium, Zero force member processes, Work energy principle, D'Alemberts principle, Conservation of momentum, draw a-t, v-t, x-t curves.</li> <li>3. Able to solve the problems on Resultant of force system in 2D and 3D, Support reaction at various load, Centroid, Wedge and ladder friction, Kinematics of particles, kinematics of Rigid body and Kinetics of a Particle.</li> <li>4. Able to analyze Friction, Rectilinear Motion, Projectile Motion, Velocities based on Instantaneous Centre of rotation.</li> <li>5. Able to answer the oral questions/queries by examiner/evaluators and write assignments and answers in English.</li> </ol>
<b>Basic Electrical and Electronics Engineering</b>	<p>Learner will be able to...</p> <ol style="list-style-type: none"> <li>1. Apply various network theorems to determine the circuit response / behavior.</li> <li>2. Evaluate and analyze 1-<math>\Phi</math> circuits.</li> <li>3. Evaluate and analyze 3-<math>\Phi</math> AC circuits.</li> <li>4. Understand the constructional features and operation of 1-<math>\Phi</math> transformer.</li> <li>5. Illustrate the working principle of 3-<math>\Phi</math> machine.</li> <li>6. Illustrate the working principle of 1-<math>\Phi</math> machines.</li> </ol>

**Class: First Year**

**Semester-II**

<b>Name of the Course</b>	<b>Course outcomes</b>
<b>Engineering Mathematics – II</b>	<ol style="list-style-type: none"> <li>1. Able to solve the differential equation, Compute definite integral by using numerical integration, Find Area and mass bounded by curves, Apply numerical methods for solving first order differential equation, Change the order of integration.</li> <li>2. Able to Prove, show identities on numerical interpolation, mathematical statement on beta and gamma function, DUIS.</li> <li>3. Able to Evaluate Definite integral, Double and triple integral by Cartesian to polar coordinates, Volume bounded by curves.</li> </ol>
<b>Engineering Physics – II</b>	<p>Learner will be able to</p> <ol style="list-style-type: none"> <li>1. Illustrate the knowledge of diffraction through slits and its applications</li> <li>2. Illustrate the working principle of various lasers and their applications in different fields, the concept of optical fibre and its applications in communication system.</li> <li>3. Illustrate the fundamentals of electrodynamics with required mathematical concept.</li> <li>4. Illustrate the fundamentals of relativity.</li> <li>5. Illustrate the knowledge of synthesis , characterization and applications of</li> </ol>

	<p>nanomaterials.</p> <p>6. Illustrate the knowledge of working principles of various sensors.</p>
<b>Engineering Chemistry – II</b>	<ol style="list-style-type: none"> <li>1. Able to Define and explain Corrosion, Chemical and Electrochemical corrosion, Metallic coating, Fuel, Characteristics of good fuel, Calorific value, Knocking, Octane number and cetane number, Green Chemistry, 12 Principles of green chemistry, Atomic &amp; Molecular spectroscopy, Fluorescence and Phosphorescence.</li> <li>2. Able to discuss Types of corrosion, mechanism. Factors affecting the rate of corrosion, Classification of fuel, HCV &amp; LCV, Analysis of coal, Knocking, Catalytic converter, Selection Rule, Flame photometry, Advantages &amp; Disadvantages, Biodiesel.</li> <li>3. Able to differentiate between galvanizing and tinning. Or anodic and cathodic coating. Methods of controlling corrosion, Anti knock agents, Applications of Flame photometry, Jablonski Diagram &amp; its application, Conventional &amp; Green synthesis of various chemical products</li> <li>4. Able to solve numerical based on calculating GCV &amp; NCV of fuel, the constituents of coal. Also the amount of O<sub>2</sub> and air by weight &amp; volume required for complete combustion of given fuel, atom economy in green chemistry, emf of the cell.</li> </ol>
<b>Professional Communication &amp; Ethics - I</b>	<ol style="list-style-type: none"> <li>5. Eliminate barriers and use verbal/non-verbal cues at social and workplace situations.</li> <li>6. Employ listening strategies to comprehend wide-ranging vocabulary, grammatical structures, tone and pronunciation.</li> <li>7. Prepare effectively for speaking at social, academic and business situations.</li> <li>8. Use reading strategies for faster comprehension, summarization and evaluation of texts.</li> <li>9. Acquire effective writing skills for drafting academic, business and technical documents.</li> <li>10. Successfully interact in all kinds of settings, displaying refined grooming and social skills.</li> </ol>
<b>Engineering Graphics</b>	<ol style="list-style-type: none"> <li>1. Able to introduce the basic idea of drawing instruments, symbolic lines &amp; geometric constructions by 1<sup>st</sup> angle method &amp; significance of I. S. conventions.</li> <li>2. Able to visualize various views of solid objects, sections &amp; sectional views of given objects.</li> <li>3. Able to draw &amp; read various orthographic projections &amp; isometric projections of engineering components.</li> <li>4. Able to draw various engineering curves by standard procedure.</li> <li>5. Able with basic concepts required to study Machine Drawing especially for Mechanical &amp; Automobile engineering branches.</li> </ol>
<b>C-Programming</b>	<p>At the end of this course, students will be able to</p> <ol style="list-style-type: none"> <li>1. Apply this knowledge to solve the problems.</li> <li>2. Apply and analyse various types of numerical methods for solving differential equations.</li> <li>3. Solve and analyse the Differential equations and its application in related field of engineering.</li> <li>4. Solve the model by selecting and applying a suitable mathematical method like Trapezoidal rule, Simpson's (1/3)<sup>rd</sup> rule etc.</li> <li>5. Interpreting the mathematical results practically.</li> <li>6. Find and analyse area, mass of lamina and volume of solid by using double</li> </ol>

	and triple integration, 7. Find length of arc of a given curve. 8. Inculcate the habit of Mathematical Thinking.
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# Department of Master of Management Studies

## PEO

- Demonstrate an understanding of management terminology and organize and manage the business to track the progress records of an organization.
- Conduct a survey of the business environment, identifying opportunities and formulating an effective and efficient means to capitalize on that opportunity creating something of value
- Formulate and communicate an original business idea to the broader business public, and/or formulate and communicate an original business plan.
- Perform skills directly used in a specific business specialty practice or context developed through projects in their program.
- Research any aspects of business practice to produce a solid empirical basis for decision-making.
- Read a set of financial books regarding the profit and loss statements of an organization, formulate a cogent assessment of the situation and develop recommendations for increased financial health of the organization.
- Assess the potential market for a specific set of products and services, and formulate a marketing plan for selling those products services to that constituency

## PO

### **Leadership and Ethics**

The qualities of strong leadership in constantly changing world are far more complex than they were just a decade ago. This programme teaches the fundamentals and requisite skill sets of effective leadership in a global environment and does so within an over-arching framework of social responsibility.

### **Strategic Planning**

Visionary leaders see the big picture, the end-results, well before they implement a business plan. They know how to communicate and structure their ideas into logical steps that utilize their resources, respect social and cultural boundaries, and establish best practices with colleagues, customers, and suppliers.

### **Decision Making Tools**

To reduce the risk of failure, it is essential, particularly in a global marketplace, to have a well-round understanding and knowledge of all elements involved. This programme examines decision-making tools in the context of e-commerce, customer service, and global business issues in an efforts to empower analytical thinking and reasoning skills.

### **Problem Solving**

Effective global managers are problem sharp-shooters. Problem solving skills result from a firm understanding of the basic of tenets of global business practices and further refined through exposure to actual problem solving strategies. This programme relies on a mix of case studies as well as on real-life problems presented by global managers of successful area businesses.

### **Competencies**

The programme inculcates the competencies like critical thinking, communications, teamwork, Self-Management, Professionalism.

## PSO

- 1) Acquire the managerial professional attributes and be Capable of decision making by applying the knowledge of Management discipline.
- 2) Explore the entrepreneurial quality and start new business venture with innovative ideas.
- 3) Prepare students to undertake different researches in management programme.

### Department of Master of Management Studies

#### Course Outcomes

**Class: F. Y. MMS**

**SEM: I**

Name of the Course	Course outcomes
<b>Perspective Management</b>	<ol style="list-style-type: none"><li>1. Able to list, define and describe characteristics of management, planning, objectives and importance of strategy, management, planning, strategy &amp; policies, functions of management and styles of leadership.</li><li>2. Able to compare, differentiate, discuss and explain strategies with policies, individual decision making vs group decision making, Principals of Management, types of plan, objectives, strategy, policies, and management process.</li><li>3. Able to prepare, choose, select and practice strategic plan to startup new small scale business, best suitable strategy, policy , leadership quality and decision making authority, best type of planning and strategy, principals of management and decision making tools in real life.</li><li>4. Able to analyze, test and experiment nature of organizing, and functions of management in problem solving, nature of strategy, Principals of Management in real life.</li><li>5. Able to design and conclude levels of strategy and policies and how management principals are effective.</li></ol>
<b>Financial Accounting</b>	<ol style="list-style-type: none"><li>1. Able to list, define and describe the items of accounting cycle, current assets, current liabilities, Accounting, book keeping, depreciation, inventory, Balance sheet, profit &amp; loss account, inventory, Journal, Ledger, Trial balance.</li><li>2. Able to compare, differentiate, identify, discuss &amp; explain Trial balance &amp; balance sheet, Journal &amp; ledger, Book keeping &amp; accounting, Straight line method &amp; written down value method, fraud &amp; errors, revenue &amp; capital income, final account &amp; trial balance, types of account, accounting process, accounting concepts, various cost concepts, types of accounts, inventory, depreciation, Final account, income statement, balance sheet.</li></ol>

	<p>3. Able to prepare, select, apply, illustrate &amp; solve final account, store ledger, ledger accounts, trial account, depreciation account, cost sheet, statement of changes in financial position, most appropriate method for calculation of depreciation, inventory valuation, accounting principles for passing journal entries, accounting concepts, ledger accounts, final account, depreciation account, store ledger.</p> <p>4. Able to analyze &amp; calculate financial position with the help of Profit &amp; loss account &amp; balance sheet, requirement of inventory, working capital.</p> <p>Able to create and construct trial balance, cost sheet, balance sheet, cost sheet.</p>
<b>Business Statistics</b>	<p>1. Apply these basic concepts in business situations, Analyse charts graphs to analyse business situations.</p> <p>2. Understand the uncertainty in business situations as probability.</p> <p>3. Understand decision under risk, use of conditional expectation as basis for comparison.</p> <p>4. Use of distributions in Quality control, Six sigma and process control.</p> <p>5. Understand Confidence interval as way of hypothesis testing.</p> <p>6. Understand Model building.</p>
<b>Operations Management</b>	<p>1. Understand the basic concepts and learn how to apply the same.</p> <p>2. Understand the physical processes.</p> <p>3. Understand characteristics of equipment, machines and workflow.</p> <p>4. Understand how, when, what and how much to order, stock and cost implications.</p> <p>5. Understand capacity utilization, overall production planning and control.</p> <p>6. Understand quality and control methods, understand sources of variation and identify them on charts &amp; process improvement.</p>
<b>Managerial Economics</b>	<p>1. To demonstrate perpetual base for multi-disciplinary principles in managerial economics for achieving organizational goals.</p> <p>2. To become life-long learners of the skills and competencies necessary to adapt and manage global economic challenges.</p> <p>3. Develop research based thinking and use of quantitative and statistical tools for business decision making.</p>
<b>Effective &amp; Management Communication</b>	<p>1. Able to list, define and describe channels of communication, elements of communication, models of communication, Communication, Public Speaking, Group Discussion, Meeting, personal barriers arising in communication, semantic barriers and psychological barriers arising in communication.</p> <p>2. Able to compare, differentiate, discuss &amp; explain theories of communication, verbal and non-verbal communication, differentiate between formal and</p>



	<p>informal, Do's and Don'ts of group discussion, process of communication, types of grapevine, types of meetings, horizontal communication with its merits and demerits, types of reports, 7c's of business communication, objectives, features of communication.</p> <p>3. Able to prepare, illustrate , practice &amp; solve report on improving discipline in college, the development of technology for managers, business etiquette when dealing with people, tips to become self-confident while communicating, Case Study.</p> <p>4. Able to analyze the use of modern services in business communication</p>
<p><b>E-commerce</b></p>	<p>1. Able to list, define and describe the e-commerce, models of e-commerce, EDI, Product &amp; Service Digitization, Infrastructure of e-commerce, Ethical issues in e-commerce &amp; Security issues in e-commerce.</p> <p>2. Able to compare, differentiate, identify, discuss &amp; explain B2B, B2C, C2C, C2B, B2G, G2B &amp; G2C models of e-commerce, traditional commerce vs e-commerce, e-commerce vs m-commerce, impact of e-commerce on supply chain management &amp; positive &amp; negative side of increased usage of technology in business &amp; society.</p> <p>3. Able to prepare, choose, demonstrate &amp; practice analytical chart of active &amp; passive attacks, more suitable e-payment option, usage of Paytm, e-banking, debit card, credit card &amp; other e-payment techniques &amp; ethical &amp; security issues during online transactions.</p> <p>4. Able to analyze, test &amp; experiment management challenges &amp; opportunities of e-commerce, impact of changes in business processes &amp; risk management options &amp; usage of smart card in real life.</p> <p>5. Able to design and conclude catalogues in B2C e-commerce, digital signature, when &amp; how to use e-commerce models.</p>
<p><b>Personal Grooming/Personal Effectiveness</b></p>	<p>1. Know yourself (Your Values, Abilities and Goals).</p> <p>2. Identify influences of their attitudes towards success, achievement, and disappointment both in personal and professional lives.</p> <p>3. Enhancing corporate and social Image, learning grooming basics and personal hygiene management.</p> <p>4. An understanding of the key role listening plays in the ability to solve problems, work effectively with customers, and be a valuable team member.</p> <p>5. Augment skills related to this important dimension of the selection process in organizations.</p>

Name of the Course	Course outcomes
<p><b>Marketing Management</b></p>	<ol style="list-style-type: none"> <li>1. Able to list, define and describe importance of marketing, characteristics of effective segmentation, need, demand, want, product, value, satisfaction, market, marketing management, segmentation market positioning and methods of segmentation.</li> <li>2. Able to differentiate, identify, discuss &amp; explain between selling and marketing, trends of economic environment, concepts of marketing and modern marketing concepts, bases of segmentation, de-marketing and reasons for doing segmentation.</li> <li>3. Able to choose, apply &amp; illustrate effective segmentation a criterion's, positioning strategies on segmented market, classification of product, concept and components of marketing mix and consumer's decision making process.</li> <li>4. Able to analyze, test &amp; experiment levels of market segmentation, factors affecting pricing, factors affecting choice of distribution channels, factors influencing consumer behavior, steps involved in target marketing, consumer behavior and Experiment factors affecting marketing environment.</li> <li>5. Able to design and assess tools for promotional activities, consumer purchase process, macro environment members and micro environment members.</li> </ol>
<p><b>Financial Management</b></p>	<ol style="list-style-type: none"> <li>1. Able to list, define and describe the sources of Finance, Financial Management, Working Capital, Inventory Management, approaches of working capital finances</li> <li>2. Able to compare, differentiate, identify, discuss &amp; explain proposals with the help of capital budgeting, different sets of capital structure planning , gross working capital vs net working capital, impact of discounting factors for selection of proposal, positive &amp; negative side of excessive working capital, financial management, ratio analysis, working capital, inventory management, cash management, receivables management, capital budgeting, capital structure, leverage, cost of capital</li> <li>3. Able to prepare, choose, select &amp; compute Performa of financial statement, statement of working capital requirement, statement of inventory management, more suitable proposal with the help of capital budgeting, best suitable option among different proposals with the help of capital budgeting, optimal capital structure</li> <li>4. Able to analyze, calculate financial statements using various ratios, working</li> </ol>

	capital policies, Working capital requirement, optimal capital structure
<b>Operations Research</b>	<ol style="list-style-type: none"> <li>1. Understand application in business. Data Envelopment Analysis as extension of LPP model.</li> <li>2. Understand special cases of LPP and apply in appropriate situation.</li> <li>3. Understand Competitive environment of business.</li> <li>4. Understand project management techniques.</li> <li>5. Understand queue model as a measure of performance of system.</li> </ol>
<b>Business Research Methods</b>	<ol style="list-style-type: none"> <li>1. Able to List, Define, Describe, Types of research, Types of Research Hypothesis, Classification of Research Design, Classification of Data, Sources of Data Collection, Research, Research Problem, Hypothesis, Research Design, Sampling, Research Report, Process of Research, Research applications in social &amp; business, Research Design, Types of Research Proposals.</li> <li>2. Able to Compare, Differentiate, Identify, Discuss, Explain Research Problem &amp; Research Design, Descriptive vs Inferential Analysis, Primary Data &amp; secondary data, Decision problem &amp; Research Problem, Research Process, Classifications of Research Designs, Features of good Research study, classification of data, Research, Types of Research, Research Design, Hypothesis</li> <li>3. Able to Prepare, choose, select, apply, employ, Illustrate, demonstrate, practice, compute, Solve Research Proposal, Research Report, Methods of Data Collection, Research Problem, Management Problem, Sampling Method, methods of data collection.</li> <li>4. Able to Analyze, Calculate, test, experiment The process of Research, Classification of Research design, Testing of Hypothesis, data with the help of MS Excel.</li> <li>5. Able to Design, Create, Construct, Assess, Conclude Questionnaire, Schedule for data collection, A report; structures questionnaire, Questionnaire; schedule, Research ethics; responsibility of ethics in research</li> </ol>
<b>Human Resource Management</b>	<ul style="list-style-type: none"> <li>• To be able to Contribute to the development, implementation &amp; evaluation of employee selection, retention plans processes.</li> <li>• To be able to Facilitate with the concept of HRM towards development of professional practices imbibe by the students.</li> <li>• To be able to analyze information needs for current &amp; emerging technologies</li> <li>• To be able to manage own professional development to conduct &amp; organizational research activities.</li> <li>• To be able to understand key skills to enable students to effectively contribute dynamic organizations.</li> </ul>

<p><b>Cost &amp; Management Accounting</b></p>	<ol style="list-style-type: none"> <li>1. Able to list, define and describe the elements of cost , process costing, normal loss, abnormal loss, abnormal gain, job costing, cost accounting, budget the classification of cost, job costing procedure, methods of costing, target costing, lifecycle costing</li> <li>2. Able to compare, differentiate, identify, discuss &amp; explain traditional costing, activity based costing, cost, and financial &amp; management accounting, marginal costing &amp; absorption costing, the impact of activity based costing on manufacturing firm, the relationship between financial, cost &amp; management accounting, cost &amp; management accounting, objectives of budgetary control, marginal costing, Break-even point, contribution, margin of safety and fixed cost.</li> <li>3. Able to prepare, choose, apply &amp; process account, job costing account, the best method of costing ,job costing procedure to complete the order of products to be delivered , sales budget, cash budget, flexible budget</li> <li>4. Able to analyze, calculate the cost according to the classification, breakeven point, margin of safety, P/V ratio, sales, profit, contribution</li> <li>5. Able to design and construct the process account, job costing account, the statement of cost sheet</li> </ol>
<p><b>Entrepreneurship Management</b></p>	<ol style="list-style-type: none"> <li>1. Able to list, define and describe the factors affecting women entrepreneur, internal &amp; external motivating factors, and components of business plan. Entrepreneurship, entrepreneur, venture capital, women entrepreneur, enterprise, business plan, innovation, creativity, the factors affecting women entrepreneur, feasibility study involved in launching an enterprise, advantages of entrepreneurship, general, region specific &amp; public policy conditions.</li> <li>2. Able to compare, differentiate, discuss &amp; explain opportunity, social &amp; technopreneurship between entrepreneur, intrapreneurs &amp; manager the opportunities in International Business, the product to start a business, the project to launch the start-up international variations in entrepreneurship, make in India campaign &amp; Digital India Campaign, process of entrepreneurship, types of innovation, principles of innovation, steps involved in launching an enterprise, legal framework to start a business in India.</li> <li>3. Able to prepare, choose &amp; solve EPRG business plan the best route to start a business case study.</li> <li>4. Able to analyze business opportunities in domestic &amp; global market, who are entrepreneurs, PEST factors?</li> <li>5. Able to design &amp; assess the various fund raising options &amp; financial institutions, the process of creativity .</li> </ol>
<p><b>Management Information</b></p>	<ol style="list-style-type: none"> <li>1. Able to list, define and describe characteristics of good information,</li> </ol>

<b>System</b>	<p>competitive advantages of information &amp; MIS, data, information and MIS, need of MIS and information system development stakeholders.</p> <p>2. Able to differentiate, identify, discuss &amp; explain Manual vs computerized information system, threats in information security, transaction processing system, office automation system, knowledge work system, management information system, decision support system, and executive support system, several components of MIS and their relationship and porter's value chain model.</p> <p>3. Able to choose, illustrate &amp; demonstrate proper type of attack and type of security system, steps of system analysis, system design and reasons for having e-security.</p> <p>4. Able to analyze, test &amp; experiment influence of IT on organizational goals, analytical model of information system and several types of information system in real life.</p> <p>5. Able to design and assess system development life cycle, marketing information system, financial information system, transaction processing system, manufacturing information system and HR information system.</p>
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**Class: S. Y. MMS**

**SEM: III**

<b>Name of the Course</b>	<b>Course outcomes</b>
<b>MMS 3<sup>rd</sup> Semester (Common subjects)</b>	
<b>International Business</b>	<p>1. Able to list, define and describe different modes of entering into international business, International Business, contract manufacturing, country risk analysis, Offshore Banking, Determinants of Porter Diamond Model, CAGE Framework of Pankaj Ghemawat, role of MNC's in India, nature &amp; scope of IB</p> <p>2. Able to compare, differentiate, discuss &amp; explain globalization &amp; international business, between domestic &amp; international business, off shoring &amp; outsourcing, in brief the international business approaches, the matrix organizational structure, advantages &amp; disadvantages of MNC to host country, importance &amp; objectives of IB, nature &amp; scope of IB, supply and political factors influencing FDI, ways of optimizing supply chain management, principles of WTO</p> <p>3. Able to prepare &amp; choose EPRG model, the alternative for Foreign Direct Investment.</p> <p>4. Able to design &amp; assess various organizational structures, country attractiveness based on country risk analysis.</p>
<b><u>Strategic Management (UA)</u></b>	1. To be able to List, define & describe strategic planning & identify the

	<p>process involve in strategy formulations.</p> <p>2. To be able to Compare differentiate various matrixes applicable to different industry context.</p> <p>3. To be able to Prepare, demonstrate VRIO analysis &amp; organizational value chain.</p> <p>4. To be able to understand &amp; compare different strategies apply by different industries.</p> <p>5. To be able to Assess offensive &amp; defensive strategies of different industries &amp; its sub types with reference industry context.</p>
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**MMS 3<sup>rd</sup> Semester (Finance Specialization)**

<p><b><u>Financial Markets &amp; Institutions</u></b></p>	<p>1. Able to List, Define, Describe Fixed Income Securities, Financial Products, Components of Financial System, Derivative Products, Products issued by Financial Institutions, Indian Financial System, RBI, Mutual Funds, Stock Exchange, Formal &amp; Informal Sector.</p> <p>2. Able to Compare, Differentiate, Identify, Discuss, Explain Fixed Income Securities, high return securities, equity &amp; debt market, types of bonds, Primary market &amp; Secondary Market, Financial Institutions &amp; Financial Intermediaries, The structure of Indian Financial System, The importance of derivatives, role of RBI, Role of Broking house, Role of SEBI, Formal &amp; Informal Financial Sector, Functions of financial system, Mutual Funds, Types of Mutual Funds</p> <p>3. Able to Prepare, select, Illustrate List of financial products for investment, list of financial products issues in domestic market &amp; global market, Best investment products among different alternative available, Role of commercial banks, role of broking house, role of broker, role of clearing house.</p> <p>4. Able to Analyze, Calculate Outline of basics of derivative products, various types of MF, Advantages of MF, Different measures of risk of fixed income securities</p> <p>5. Able to Design, Conclude Portfolio management services, Role of foreign exchange market in financial system, the working of intermediary, role of RBI in Indian financial system</p>
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<p><b><u>Security Analysis &amp; Portfolio Management</u></b></p>	<p>1. Able to List, Define, Describe Types of Securities, Fixed income securities, types of bonds, Security, risk, return, portfolio, initial public offer, rights issue, Portfolio management process, equity research</p> <p>2. Able to Compare, Differentiate, Identify, Discuss, Explain Risk &amp; return analysis, Profitability vs absolute loss, Investment vs speculation, The criteria for evaluation; portfolio management process, Portfolio; initial public offer, rights issue, Portfolio management process, functions of financial markets, criteria for</p>
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	<p>evaluation, primary market, structure of secondary market</p> <p>3. Able to Prepare, choose, select, apply, Hypothetical portfolio, Appropriate techniques of valuation of equity shares, The best/optimal securities for creation of portfolio, Capital market theories, factor models &amp; APT; Investment decision theory; portfolio theory</p> <p>4. Able to Analyze, Calculate Portfolio management process, risk return relationship, company analysis, portfolio optimization, Risk return analysis, return on equity investment, prices using EMN</p> <p>5. Able to Design, Construct, Assess, Portfolio, Portfolio management strategies, Portfolio performance measurement</p>
<b>Corporate Valuation &amp; Mergers &amp; Acquisition</b>	<p>1. Be able to understand the process and economic rationale for M&amp;As.</p> <p>2. Be able to understand typical valuation techniques in M&amp;As.</p> <p>3. Be able to apply the valuation techniques to M&amp;A assessment and decision making.</p> <p>4. Have acquired analytical skills in analyzing real-world cases in M&amp;As.</p> <p>5. Have developed skills in group work, including communication, collaboration, and presentation.</p>
<b>Financial Regulations</b>	<p>1. Able to list, define and describe elements of KYC, financial regulatory bodies in India, preamble of Foreign Regulation Contribution Regulation Act 2010, SEBI, FCRA, FEMA, and Foreign Contribution, structure of financial regulations in India, objectives and functions of SEBI, objectives of FERA.</p> <p>2. Able to compare, differentiate, identify, discuss &amp; explain qualitative and quantitative credit control, between FERA &amp; FEMA, techniques and illegal sources adopted in money laundering, concept Competition Commission of India, advantages of KYC and risk based approach in KYC, function of financial system, process of registration with the central government, Financial Regulation, Insurance Regulatory and Development Authority.</p> <p>3. Able to illustrate &amp; compute the whole structure of financial system in India, the reason behind formation of FEMA.</p> <p>4. Able to analyze the penalties of Unfair Trade Practices, Money Laundering and FEMA, impact of non-registration/offence &amp; penalties under Foreign Contribution Regulation Act 2010.</p>
<b>Derivatives &amp; Risk Management</b>	<p>1. Able to list, define and describe elements the participants of derivatives, properties of options, option, derivatives, arbitrage, hedgers, and speculators, mechanism of option, NSCCL, purposes of derivatives.</p>

	<p>2. Able to compare, differentiate, identify, discuss &amp; explain option trading strategies, between spot market&amp; future market, holder &amp; writer, forward &amp; future, the options for risk management, in brief the financial system &amp; settlement in derivatives market, why should one trade in option, the types of derivatives, functions of derivatives, features of future contract, advantages of futures, different dimensions of risk option.</p> <p>3. Able to choose, illustrate &amp; solve the various trading strategies for risk management &amp; basic instruments for trading in derivatives, Black Scholes Model, problem based on interest rate futures.</p> <p>4. Able to Calculate the future value of the money invested &amp; forward price based on deal.</p>
<p><b>Banking &amp; Financial Services Institutions</b></p>	<p>1. Understanding different kinds of financial services available in Indian financial institutions.</p> <p>2. Do comprehension of various services and products available for retail and corporate by banks in India.</p> <p>3. Understand different insurance products and plans available in India.</p> <p>4. Comprehend different mutual fund products and plans available in India</p> <p>5. Understand concept of leasing and leasing procedures followed by various Indian financial institutions.</p> <p>6. Do comprehension of hire purchase financing and consumer credit financing in India.</p>
<p><b>MMS 3<sup>rd</sup> Semester (HRM Specialization)</b></p>	
<p><b>Training &amp; Development</b></p>	<ul style="list-style-type: none"> <li>• Introduction to the concept of human resource development.</li> <li>• Exploring the concept of learning organization.</li> <li>• Introduction to adult learning and different methodologies.</li> <li>• Introduction to preparation of training budget, calendar and training modules.</li> <li>• Understanding the process of training needs assessment.</li> <li>• Understanding the method of competency modeling and mapping.</li> <li>• Exploring various types of training.</li> <li>• Introduction to training evaluation, cost benefit analysis and ROI.</li> </ul>
<p><b>Compensation &amp; Benefits</b></p>	<ul style="list-style-type: none"> <li>• Understanding business context for reward strategies and preparing strategies.</li> <li>• Understanding the elements of reward strategy and management.</li> <li>• Exploring Compensation / Remuneration place in Reward Strategy.</li> </ul>



	<ul style="list-style-type: none"> <li>• Understanding Elements of Compensation Structure.</li> <li>• Learning to Cost the CTC of each element of Compensation Structure.</li> <li>• Understanding the concept of Inflation.</li> <li>• Understanding Provident Fund, ESIC, Gratuity, Superannuation, Bonus under Payment of Bonus Act.</li> <li>• Learning various types of Variable Pay.</li> <li>• Preparing the CTC of an employee.</li> </ul>
<b>Competency Based HRM &amp; Performance Management</b>	<ul style="list-style-type: none"> <li>• Basic Understanding of concept of Competency and its relevance to modern day Organizations.</li> <li>• Gaining knowledge about the various methods of data collection in mapping process and knowledge of validating the Competency model.</li> <li>• Knowledge about running the assessment centre and Report writing and learning about how to give feedback.</li> <li>• Learning about the conceptual frame work of Performance Management System and its linkage with HR practices.</li> <li>• Learning about the Implementation of Performance Management System, issues and challenges.</li> <li>• Overview of ethical practices in performance management.</li> </ul>
<b>Labor Laws &amp; Implications on Industrial Relations</b>	<ul style="list-style-type: none"> <li>• To give a snapshot of IR and the faculty to relate importance of IR to Labor Laws, changing dynamics of IR.</li> <li>• Understanding court jurisdictions and basics of labor laws.</li> <li>• To study history, provisions, case laws &amp; amendments under each law.</li> </ul>
<b>HR Planning &amp; Application of Technology in HR</b>	<ul style="list-style-type: none"> <li>• Introduction to HR Planning and forecasting.</li> <li>• Learning the concept of job analysis and selection.</li> <li>• Understanding the nuances of workforce diversity.</li> <li>• Overview of application of technology in HR.</li> <li>• Introduction to HR Analytics.</li> </ul>
<b>Employee Relations, Labor Laws &amp; Alternate Dispute Resolution</b>	<ul style="list-style-type: none"> <li>• Discuss the history of the IR movement and growth in India.</li> <li>• Discuss various definitions of IR &amp; IR approaches with their advantages and disadvantages.</li> <li>• Understanding the genesis of conflict in IR and various methods prevent the same.</li> <li>• Understanding various methods to solve the conflict. Drafting simple settlement agreements and discuss issues related to enforceability of</li> </ul>

	<p>agreements.</p> <ul style="list-style-type: none"> <li>• To highlight the importance of Labor welfare &amp; workers participation in management and how can it help for smooth industrial relations.</li> <li>• This chapter is expected to be thought completely with practical examples of companies. No particular book required for the same</li> </ul>
<b>MMS 3<sup>rd</sup> Semester (Operations Specialization)</b>	
<b>Supply Chain Management</b>	<ul style="list-style-type: none"> <li>• Understanding of Supply chain.</li> <li>• Understanding of Logistics concept.</li> <li>• Understanding of Warehousing function. &amp; distribution channel.</li> <li>• Understanding of Warehouse process and logistics information.</li> <li>• Understanding of customer service and performance measurement.</li> <li>• Understanding various distribution networks.</li> <li>• Understanding importance information in supply of chain.</li> <li>• Understanding various ethics, Rules and regulations in supply chain.</li> </ul>
<b>Operations Analytics</b>	<ul style="list-style-type: none"> <li>• Describe the major methods of customer data collection used by companies and understand how this data can inform business decisions.</li> <li>• Describe the main tools used to predict customer behavior and identify the appropriate uses for each tool. Communicate key ideas about customer analytics and how the field informs business decisions. Communicate the history of customer analytics and latest best practices at top firms.</li> </ul>
<b>Service Operations Management</b>	<ul style="list-style-type: none"> <li>• Better understanding of services.</li> <li>• Understanding of workflow of Services.</li> <li>• Understanding complexity of services.</li> <li>• Developing quantitative ability for decision making.</li> <li>• Understanding Profitability in Service Industry.</li> <li>• Understanding Inventory in Service Industry.</li> <li>• Inventory control in Service industry.</li> </ul>
<b>Manufacturing Resource Planning &amp; Control</b>	<ul style="list-style-type: none"> <li>• Achieving strategic fit between corporate strategy and operations strategy and global economy, Understanding the competitive priorities.</li> <li>• Understanding Value chain concept , core competence and distinctive capabilities.</li> <li>• Technology strategy, NPD, Importance of time as competitive priority Various process alternatives.</li> </ul>

	<ul style="list-style-type: none"> <li>• Understanding of trade offs, make or buy decisions, JIT.</li> <li>• Understanding application of Technology in operations strategy.</li> </ul>
<b>Materials Management</b>	<ul style="list-style-type: none"> <li>• Preparation for the course in respect Operations as well as Organization.</li> <li>• Planning with financial perspective and understanding impact of MRP on financial statements.</li> <li>• Overview of purchasing activities.</li> <li>• Detailed understanding of purchase process.</li> <li>• To understand how industry give selective importance to specific materials.</li> <li>• Understanding the controls over materials.</li> <li>• Understanding importance of standardization.</li> <li>• Understanding the processes &amp; financial impacts.</li> <li>• Basic introduction to materials handling.</li> <li>• Subject: Strategic Operations Management</li> </ul>
<b>Strategic Operations Management</b>	<ul style="list-style-type: none"> <li>• Achieving strategic fit between corporate strategy and operations strategy and global economy, Understanding the competitive priorities.</li> <li>• Understanding Value chain concept , core competence and distinctive capabilities.</li> <li>• Technology strategy, NPD, Importance of time as competitive priority Various process alternatives.</li> <li>• Understanding of trade offs, make or buy decisions, JIT.</li> <li>• Understanding application of Technology in operations strategy.</li> </ul>
<b>MMS 3<sup>rd</sup> Semester (Marketing Specialization)</b>	
<b>Sales Management</b>	<ul style="list-style-type: none"> <li>• Familiarizing the student with the sales management function.</li> <li>• Deeper understanding about sales organizations across sectors.</li> <li>• The students will develop an appreciation of negotiations &amp; sales of services and physical goods.</li> <li>• Familiarizing the students with techniques of sales process.</li> <li>• Identify right attitude and skills for sales force. Developing an understanding of Territory Management.</li> <li>• The student will learn how to motivated sales team and how compensation is linked to sales force performance and retention. To develop an understanding of the Art of positive evaluation.</li> </ul>

<p><b>Marketing Strategy</b></p>	<ul style="list-style-type: none"> <li>• To be able to develop marketing strategies based on product, price, place, promotion</li> <li>• To be able to identify role of strategies in process of New product development</li> <li>• To implement integrated plan of marketing to measure effectiveness from industry context</li> <li>• To be able to explain role of marketing towards appropriate decision making.</li> <li>• To be able to create strategic awareness &amp; conclude various alternatives of decisions to the industry.</li> </ul>
<p><b>Consumer Behavior</b></p>	<ul style="list-style-type: none"> <li>• To be able to identify measure determinants &amp; influence of consumer decision process</li> <li>• To be able to recognize ethical implications of marketing actions on consumer behavior</li> <li>• To be able to use most appropriate technique in consumer behavior apply to their relationship</li> <li>• To be able to understand appropriate combination of theories towards consumer behavior</li> <li>• To be able to apply principles to the level of consumers for improvement of managerial decision making among students</li> </ul>
<p><b>Services Marketing</b></p>	<ul style="list-style-type: none"> <li>• Able to list, define and describe characteristics &amp; types of services and service management, target market, segmentation, positioning &amp; marketing mix, factors influencing demand, service management process and need of services marketing.</li> <li>• Able to compare, differentiate, discuss and explain societies from different living point of view, goods vs services, optimal vs maximal use of capacity, several positioning and marketing strategies, strategies of marketing mix and 7 P's of service marketing .</li> <li>• Able to prepare, select, apply and demonstrate marketing mix for Tata Nano, target market and positioning strategy, segmentation rules for targeted market, benefits of customer satisfaction and strategies of service marketing.</li> <li>• Able to analyze and test importance of service management, consumer behavior, market opportunities, need of service marketing and challenges in service marketing and marketing mix for fast food services.</li> <li>• Able to construct and conclude ratio and relationship between demand and capacity, customer satisfaction and behavior.</li> </ul>

<b>Product &amp; Brand Management</b>	<ul style="list-style-type: none"> <li>• To be able Identify core benefits of Brand equity &amp; its effective factors on industry context.</li> <li>• To able to understand knowledge of social, Legal &amp; ethical issues in Brand &amp; promotion decision</li> <li>• To able to understand key concepts of branding &amp; ideas of brands</li> <li>• To able to understand &amp; conduct measurement of brand equity, positioning &amp; communication.</li> <li>• To able to provide appropriate tools, models to make better decision making.</li> </ul>
<b>Digital Marketing</b>	<ul style="list-style-type: none"> <li>• Able to list, define and describe benefits and limitations of digital marketing, disadvantages of SEO, digital marketing, e-commerce, models of e-commerce, advertising methods.</li> <li>• Able to compare, identify, discuss and explain different social media platforms, type of SEO, several social media platforms, several medias used in digital marketing.</li> <li>• Able to select, apply, demonstrate and practice best SMM practices, SEO strategies, internet marketing techniques, impact of digital marketing on consumer's decision making process, web page creation using HTML.</li> <li>• Able to analyze and test different approaches of e-marketing and suitable marketing media.</li> <li>• Able to design, create, construct and conclude basic HTML document structure, a marketing plan, documents using body attributes, header elements, text formatting tags, comments and lists and how digital marketing is more effective than traditional marketing.</li> </ul>

**Class: S. Y. MMS**

**SEM: IV**

Name of the course	Course Outcomes
<b>MMS 4<sup>th</sup> Semester (Common subjects)</b>	
<b>Project Management</b>	<ul style="list-style-type: none"> <li>• Introduce concepts of basics of project management, Evaluate new project proposals, prepare detailed project report.</li> <li>• Understand network diagram, critical path, concepts of crashing network.</li> <li>• Define risks in project management, make resource charts, find probability of completion of project.</li> <li>• Understand organization structure, flow of authority and responsibility.</li> <li>• Understand concepts of earned value, prepare revised estimates of cost and</li> </ul>

	<p>time.</p> <ul style="list-style-type: none"> <li>• Evaluate project Financially, make projected statements of proposal.</li> <li>• Apply all above principles to cases, students Presentations.</li> </ul>
<b>MMS 4<sup>th</sup> Semester (Finance Specialization)</b>	
<b>Commercial Banking</b>	<ul style="list-style-type: none"> <li>• Knowledge &amp; understanding of the history of Indian banking and related areas.</li> <li>• Understand basic schemes of deposit &amp; credit, dangers of money laundering &amp; usefulness of preventive vigilance.</li> <li>• Understand types of credits – term loan and working capital and how to appraise a credit proposal.</li> <li>• To understand important banking laws.</li> <li>• Understand measures taken towards financing priority sector schemes.</li> </ul>
<b>MMS 4<sup>th</sup> Semester (HRM Specialization)</b>	
<b>Strategic HRM</b>	<ul style="list-style-type: none"> <li>• Learning the basics of strategic HRM.</li> <li>• Introduction to HR strategies.</li> <li>• Introduction to talent management.</li> <li>• Learning basics of competencies &amp; competency based HR practices.</li> <li>• Learning strategies for improving organizational effectiveness.</li> <li>• Introduction to HR strategies in international context.</li> </ul>
<b>MMS 4<sup>th</sup> Semester (Operations Specialization)</b>	
<b>Strategic Sourcing in Supply Management</b>	<ul style="list-style-type: none"> <li>• Basic understanding of Purchasing.</li> <li>• Development of Basic purchasing strategies.</li> <li>• Understanding about pattern of spending and costing.</li> <li>• Understanding of purchase cycle from requisition to payment.</li> <li>• Basic introduction to imports.</li> <li>• Understanding of types of purchase orders.</li> <li>• Understanding about classification about various types of items.</li> <li>• Understanding of Supplier evolution and selection.</li> <li>• Understanding of costing and reduction of cost.</li> </ul>
<b>MMS 4<sup>th</sup> Semester (Marketing Specialization)</b>	
<b>Trends in Marketing</b>	<ul style="list-style-type: none"> <li>• To be able to develop appropriate marketing plans of new trends &amp; practices to ensure sustainability</li> <li>• To be able to demonstrate basic concepts to be apply for marketing</li> </ul>

products & services with reference different industry context.

- To be able to utilize effective communication & problem solving skills through use of new technologies with understanding of business environment.
- To be able to evaluate different marketing practices of business environment.
- To be able to use, supervise management & marketing principles skills for any marketing occupation.