JAYAWANT SHIKSHAN PRASARAK MANDAL's
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(Approved by AICTE, New Delhi, Govt of Maharashtra and Affiliated to University of Pune)
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Dr. Rajendra D. Kanphade
M.E. Ph.D. (Electronics Engg.)
LMISTE, FIETE, SMIEEE
Principal

DEPARTMENT OF COMPUTER ENGINEERING	
SE[COMPUTER]	
DM	C201 Year of Study:2021-22(SEM-I)
C201.1	Illustrate concept of set theory, proposition & mathematical induction.
C201.2	Discuss the basic concepts associated with relation, functions and their applications.
C201.3	Explaining possible outcomes of elementary combinatorial processes such as permutation and combination and calculating the probabilities.
C201.4	Explain concept in graph theory &apply algorithm to solve various mathematical problems.
C201.5	Illustrate basic terminology in trees & apply algorithms to find minimum spanning tree.
C201.6	To identify and prove the properties of groups and rings
DELD	C202 Year of Study:2021-22(SEM-I)

C202.1	Design and implement Boolean Algebraic assignments and Combinational digital circuits as per the specifications.
C202.2	Design and implement Sequential digital circuits as per the specifications.
C202.3	Construct ASM Chart and Design the minimum systems using VHDL
C202.4	Designing Combinational Circuits and Sequential Circuits using PLD's
C202.5	Apply the knowledge to select the logic families IC packages as per the design specifications
C202.6	Develop minimum embedded system for simple real world application
DSA	C203 Year of Study:2021-22(SEM-I)
C203.1	Able to analyze different problems and Apply algorithmic strategy for efficient solutions.
C203.2	Able to analyze characteristics of linear data structure and design social networking and Maps applications.
C203.3	Able to design and implement solutions for different problems using various types of linked list.
C203.4	Apply and implement concept of stack for non-recursive function, expression conversion and evaluation.
C203.5	Choose and Implement different queue according to application.
C203.6	Implement different searching and sorting algorithm.
COA	C204 Year of Study:2021-22(SEM-I)
C204.1	Able to design optimally functional units of ALU by analyzingStructure ,function and storage representation and performance of computer system

C204.2	Able to design cache memory and analyze performance characteristics of memory hierarchy.
C204.3	Able to evaluate I/O interfacing techniques to microprocessor
C204.4	Able to create assembly language program for microprocessor system
C204.5	Able to evaluate various design alternatives of processor organization
C204.6	Able to evaluate various design alternatives of control unit
OOP	C205 Year of Study:2021-22(SEM-I)
C205.1	Understand & Analyze concepts of Object Oriented Programming
C205.2	Apply OOP principles for effective programming
C205.3	Develop programming application using Virtual Function.
C205.4	Apply concept of Templates &Exception handling to develop programming
C205.5	Understand concept of Data hierarchy & Files- streams
C205.6	Understand concept of STL & develop Algorithm for Searching-Sorting
DEL LAB	C206 Year of Study:2021-22(SEM-I)
C206.1	1.Design and implement Boolean Algebraic assignments and Combinational digital circuits as per the specifications.
C206.2	2. Design and implement Sequential digital circuits as per the specifications.

C206.3	3. Construct ASM Chart and Design the minimum systems using VHDL
C206.4	4.Designing Combinational Circuits and Sequential Circuits using PLD's
C206.5	5. Apply the knowledge to select the logic families IC packages as per the design specifications
C206.6	6. Develop minimum embedded system for simple real world application
DSL LAB	C207 Year of Study:2021-22(SEM-I)
C207.1	Able to analyze different problems and Apply algorithmic strategy for efficient solutions.
C207.2	Able to analyze characteristics of linear data structure and design social networking and Maps applications.
C207.3	Able to design and implement solutions for different problems using various types of linked list.
C207.4	Apply and implement concept of stack for non-recursive function, expression conversion and evaluation.
C207.5	Choose and Implement different queue according to application.
C207.6	Implement different searching and sorting algorithm.
OOP LAB	C208 Year of Study:2021-22(SEM-I)
C208.1	Understand & Analyze concepts of Object Oriented Programming
C208.2	Apply OOP principles for effective programming
C208.3	Develop programming application using Virtual Function.

C208.4	Apply concept of Templates &Exception handling to develop programming
C208.5	Understand concept of Data hierarchy & Files- streams
C208.6	Understand concept of STL & develop Algorithm for Searching-Sorting
Soft Skills	C209 Year of Study:2021-22(SEM-I)
C209.1	Effectively communicate through verbal/oral communication and improve the listening skills
C209.2	Write precise briefs or reports and technical documents.
C209.3	Actively participate in group discussion / meetings / interviews and prepare & deliver presentations.
C209.4	Become more effective individual through goal/target setting, self motivation and practicing creative thinking.
C209.5	Function effectively in multi-disciplinary and heterogeneous teams through the knowledge of team work, Inter-personal relationships, conflict management and leadership quality.
MIII	C210 Year of Study:2021-22(SEM-II)
C210.1	Solve higher order linear differential equation using appropriate techniques for modeling and analyzing electrical circuits.
C210.2	Solve problems related to Fourier transform, Z-Transform and applications to Signal and Image processing.
C210.3	Apply statistical methods like correlation, regression analysis and probability theory for analysis and prediction of a given data as applied to machine intelligence.
C210.4	Perform vector differentiation and integration to analyze the vector fields and apply to compute line, surface and volume integrals. Analyze conformal mappings, transformations and perform contour integration of complex

CG	C211 Year of Study:2021-22(SEM-II)
C211.1	To apply concept of geometric, mathematical and algorithmic concepts necessary for programming computer graphics.
C211.2	To apply and implement the concept of polygon filling, windowing and clipping.
C211.3	To design and develop interactive 2D and 3D computer graphics.
C211.4	Design and develop graphics applications using modern tools like 3D Render, 3D Maya in animation, gaming and image processing.
C211.5	Develop scientific and strategic approach to solve complex problems in the domain of Computer Graphics.
C211.6	To develop the competency to understand the concept related to computer vision and virtual reality.
ADS	C212 Year of Study:2021-22(SEM-II)
C212.1	Design and implement solutions for different problems on tree.
C212.2	Apply different data structures to solve problems on graph.
C212.3	Describe and implement the hash function and concepts of collision and its resolution methods.
C212.4	Compare and design dynamic and static trees.
C212.5	Construct heap and multiway trees.
C212.6	Explain and apply various file organizations.
MI	C213 Year of Study:2021-22(SEM-II)

C213.1	Understand and compare architectures of advanced processors and it's resources
C213.2	Apply assembly language programming to develop real time applications
C213.3	Implement parallel processing and math coprocessor
C213.4	Compare different processor configurations
PPL	C214 Year of Study:2021-22(SEM-II)
C214.1	To assimilate the software development process and concept of syntax and semantics of language.
C214.2	To tabulate the different data types and construct the structure of Computation.
C214.3	To explore the different programming paradigms.
C214.4	To interpret the basic of Object Oriented Programming Language.
C214.5	To exhibit the principles Object Oriented Programming using java.
C214.6	To practice the concept of exception handling and Programming paradigms effectively in application development.
CGLab	C215 Year of Study:2021-22(SEM-II)
C215.1	To apply concept of geometric, mathematical and algorithmic concepts necessary for programming computer graphics.
C215.2	To apply and implement the concept of polygon filling, windowing and clipping.
C215.3	To design and develop interactive 2D and 3D computer graphics.

C215.4	Design and develop graphics applications using modern tools like 3D Render, 3D Maya in animation, gaming and image processing.
C215.5	Develop scientific and strategic approach to solve complex problems in the domain of Computer Graphics.
C215.6	To develop the competency to understand the concept related to computer vision and virtual reality.
ADS Lab	C216 Year of Study:2021-22(SEM-II)
C216.1	Design and implement solutions for different problems on tree.
C216.2	Apply different data structures to solve problems on graph.
C216.3	Describe and implement the hash function and concepts of collision and its resolution methods.
C216.4	Compare and design dynamic and static trees.
C216.5	Construct heap and multiway trees.
C216.6	Explain and apply various file organizations.
MIL Lab	C217 Year of Study:2021-22(SEM-II)
C217.1	Understand and compare architectures of advanced processors and it's resources
C217.2	Apply assembly language programming to develop real time applications
C217.3	Implement parallel processing and math coprocessor
C217.4	Compare different processor configurations

TE[COMPUTER]	
TOC	C301 Year of Study:2021-22(SEM-I)
C301.1	to subdivide problems space based on input subdivision using constraints, grammar
C301.2	to design deterministic turing machine for all input all output , NP Complete
C301.3	to design non deterministic turing machine for all input all output, NP Hard
DBMS	C302 Year of Study:2021-22(SEM-I)
C302.1	Design E-R Model for given requirements and convert the same into database tables.
C302.2	Use database techniques such as SQL & PL/SQL.
C302.3	Use modern database techniques such as NOSQL
C302.4	Explain transaction Management in relational database System.
C302.5	Describe different database architecture and analyses the use of appropriate architecture in real time environment.
C302.6	Use advanced database Programming concepts Big Data – HADOOP
SE& PM	C303 Year of Study:2021-22(SEM-I)
C303.1	Selection of s/w processing model for s/w system by comparing models

C303.2	Analyze the s/w Requirement & carryout feasibility study.
C303.3	Design s/w system using appropriate method.
C303.4	Plan, schedule and execute a project considering the risk management.
C303.5	Scheduling & Planning of s/w system for Risk Management & Cost Estimation
C303.6	Plan, schedule and execute testing
IS & EE	C304 Year of Study:2021-22(SEM-I)
C304.1	Understand the importance of an information system to an organization
C304.2	Understand activities in managing ,designing, planning, implementation and deployment of computerized system in Information System to an organization
C304.3	Student would be aware of various Information System solutions like ERP, CRM, Data warehouses and the issues in successful implementation of these technology solutions in any organizations
C304.4	Outline the past history, present position and expected performance of a company engaged in engineering practice or in the computer industry.
C304.5	Evaluate present worth, future worth and annual worth analyses ,economic alternatives
C304.6	Evaluate benefit/cost, lifecycle and breakeven analysis on one or more economic alternatives
CN	C305 Year of Study:2021-22(SEM-I)
C305.1	Ability to study Physical layer devices and logical link layer Protocols, architecture and its functionality.
C305.2	Ability to analysis of MAC layer protocols and Qos parameters in Networks.

C305.3	Able to learn and understand the transport and application layer protocols and Technologies.
SDL	C306 Year of Study:2021-22(SEM-I)
C306.1	Evaluate problems and analyze data using current technologies in a wide variety of business and organizational contexts.
C306.2	Create data-driven web applications
C306.3	Incorporate best practices for building applications
C306.4	Employ Integrated Development Environment(IDE) for implementing and testing of software solution
C306.5	Construct software solutions by evaluating alternate architectural patterns.
CN LAB	C308 Year of Study:2021-22(SEM-I)
C308.1	Analyze the requirements for a given organizational structure to select the most appropriate networking architecture, topologies, transmission mediums, and technologies
C308.2	Demonstrate design issues, flow control and error control Analyze data flow between TCP/IP model using Application, Transport and Network Layer Proto
C308.3	Illustrate applications of Computer Network capabilities, selection and usage for various sectors of user commu
C308.4	Illustrate Client-Server architectures and prototypes by the means of correct standards and technol
C308.5	Demonstrate different routing and switching algorithms
DAA	C309 Year of Study:2021-22(SEM-II)

C309.1	Describe various aspects of algorithm and analyze the asymptotic performance of algorithms
C309.2	Describe different models and solve problems using greedy strategy.
C309.3	Describe and apply different algorithmic design techniques.
C309.4	Classify different types of problems and analyze performance with the help of complexity theory
C309.5	Describe Amortized analysis, Embedded algorithms and solve the problems using randomized and approximation algorithms.
C309.6	Apply and analyze Multithreaded, Distributed algorithm and string matching algorithms.
SP&OS	C310 Year of Study:2021-22(SEM-II)
C310.1	Able to analyze system softwares like editors, loaders, assemblers, debuggers & compilers.
C310.2	Able to analyze macro processors, linkers and loaders.
C310.3	Able to use tools like lex and yacc.
C310.4	Able to understand OS types, process scheduling and deadlocks.
C310.5	Able to understand & apply memory management techniques.
C310.6	Able to understand I/O management techniques.
ES&IOT	C311 Year of Study:2021-22(SEM-II)
C311.1	Implement an architectural design for IoT for specified requirement

C311.2	Solve the given societal challenge using IoT
C311.3	Choose between available technologies and devices for stated IoT challenge
SDM	C312 Year of Study:2021-22(SEM-II)
C312.1	Analyze the problem statement (SRS) and choose proper design technique for designing web- based/ desktop application
C312.2	Design an application using UML Staticmodeling as fundamental tool.
C312.3	Design an application using UML Dynamic modeling as fundamental tool.
C312.4	Decide appropriate modern tool for designing and modeling
C312.5	Apply design patterns to understand reusability in OO design.
C312.6	Apply appropriate modern testing tool for testing web-based/desktop application
WT	C313 Year of Study:2021-22(SEM-II)
C313.1	Analyze given assignment to select sustainable web development design methodology.
C313.2	Develop web based application using suitable client side and server side web technologies
C313.3	Develop solution to complex problems using appropriate method, technologies, frameworks, web services and content management
SEMINAR	C314 Year of Study:2021-22(SEM-II)

C314.1	be able to be familiar with basic technical writing concepts and terms, such as audience analysis, jargon, format, visuals, and presentation.
C314.2	be able to improve skills to read, understand, and interpret material on technology.
C314.3	improve communication and writing skills
WT LAB	C315 Year of Study:2021-22(SEM-II)
C315.1	Analyze given assignment to select sustainable web development design methodology.
C315.2	Develop web based application using suitable client side and server side web technologies
C315.3	Develop solution to complex problems using appropriate method, technologies, frameworks, web services and content management
SPOS LAB	C316 Year of Study:2021-22(SEM-II)
C316.1	Able to analyze system softwares like editors, loaders, assemblers, debuggers & compilers.
C316.2	Able to analyze macro processors, linkers and loaders.
C316.3	Able to use tools like lex and yacc.
C316.4	Able to understand OS types, process scheduling and deadlocks.
C316.5	Able to understand & apply memory management techniques.
C316.6	Able to understand I/O management techniques.

ESIOT LAB	C317 Year of Study:2021-22(SEM-II)
C317.1	Design the minimum system for sensor based application
C317.2	Solve the problems related to the primitive needs using IoT
C317.3	Develop full fledged IoT application for distributed environment
BE[COMPUTER]	
HPC	C401 Year of Study:2021-22(SEM-I)
C401.1	Describe different parallel architectures, inter-connect networks, programming models
C401.2	Develop an efficient parallel algorithm to solve given problem
C401.3	Analyze and measure performance of modern parallel computing systems
C401.4	Build the logic to parallelize the programming task
AI&R	C402 Year of Study:2021-22(SEM-I)
C402.1	Identify and apply suitable Intelligent agents for various AI applications.
C402.2	Design smart system using different informed search / uninformed search or heuristic approaches.
C402.3	Identify knowledge associated and represent it by ontological engineering to plan a strategy to solve given problem.
C402.4	Apply the suitable algorithms to solve AI problems.

C402.5	Implement crypto-arithmetic problems using AI.
C402.6	Design and Implement mini project using AI.
DA	C403 Year of Study:2021-22(SEM-I)
C403.1	Write case studies in Business Analytic and Intelligence using mathematical models
C403.2	Present a survey on applications for Business Analytic and Intelligence
C403.3	Provide problem solutions for multi-core or distributed, concurrent/Parallel environments
ELE I-DMW	C404 Year of Study:2021-22(SEM-I)
C404.1	Apply basic, intermediate and advanced techniques to mine the data
C404.2	Analyze the output generated by the process of data mining
C404.3	Explore the hidden patterns in the data
C404.4	Optimize the mining process by choosing best data mining technique
ELE II - MC	C405 Year of Study:2021-22(SEM-I)
C405.1	Justify the Mobile Network performance parameters and design decisions
C405.2	Choose the modulation technique for setting up mobile network.

C405.3	Formulate GSM/CDMA mobile network layout considering futuristic requirements which conforms to the technology.
C405.4	Use the 3G/4G technology based network with bandwidth capacity planning.
C405.5	Percept to the requirements of next generation mobile network and mobile applications.
PWS-I	C408 Year of Study:2021-22(SEM-I)
C408.1	Solve real life problems by applying knowledge.
C408.2	Analyze alternative approaches, apply and use most appropriate one for feasible solution
C408.3	Write precise reports and technical documents in a nutshell.
C408.4	Participate effectively in multi-disciplinary and heterogeneous teams exhibiting team work, Inter-personal relationships, conflict management and leadership quality.
C408.5	To publish Conference paper
ML	C408 Year of Study:2021-22(SEM-II)
C409.1	Distinguish different learning based applications
C409.2	Apply different preprocessing methods to prepare training data set for machine learning.
C409.3	Design and implement supervised and unsupervised machine learning algorithm
C409.4	Implement different learning models
C409.5	Learn Meta classifiers and deep learning concepts

ICS	C410 Year of Study:2021-22(SEM-II)
C410.1	Gauge the security protections and limitations provided by today's technology.
C410.2	Identify information security and cyber security threats.
C410.3	Analyze threats in order to protect or defend it in cyberspace from cyber-attacks.
C410.4	Build appropriate security solutions against cyber-attacks.
EL-III(ERTOS)	C411 Year of Study:2021-22(SEM-II)
C411.1	Recognize and classify embedded and real-time systems
C411.2	Explain communication bus protocols used for embedded and real-time systems
C411.3	Classify and exemplify scheduling algorithms
C411.4	Apply software development process to a given RTOS application
C411.5	Design a given RTOS based application C
EL-IV(CC)	C412 Year of Study:2021-22(SEM-II)
C412.1	To install cloud computing environments.
C412.2	To develop any one type of cloud

C412.3	To explore future trends of cloud computing
PWS-II	C413 Year of Study:2021-22(SEM-II)
C413.1	Show evidence of independent investigation
C413.2	Critically analyze the results and their interpretation.
C413.3	Report and present the original results in an orderly way and placing the open questions in the right perspective
C413.4	Link techniques and results from literature as well as actual research and future research lines with the research
C413.5	Appreciate practical implications and constraints of the specialist subject
DEPARTMENT OF ELECTRICAL ENGINEERING AY2021 - 2022	
CO Statement	
	Power Generation Technologies
CO201.1	Illustrate operations of thermal, nuclear, diesel and gas power plant with all accessories and cycles.
CO201.2	Identify the components of hydro power plant and solve simple numerical on turbine.
CO201.3	Interpretation of wind based energy generation along with its analysis and comparison
CO201.4	Apply the application of solar energy in thermal and electrical power generation.
CO201.5	Explain the operation of electrical energy generation using biomass, tidal, geothermal, hydel plants, fuel cell and interconnection with grid

	Engineering Mathematics-III
CO202.1	Solve higher order linear differential equation using appropriate techniques for analyzing electrical circuits.
CO202.2	Solve problems related to Laplace transform, Fourier transform, Z-transform and applications to Signal and Image processing.
CO202.3	Perform vector differentiation and integration, analyze the vector fields and apply to Electro-Magnetic fields.
CO202.4	Analyze conformal mappings, transformations and perform contour integration of complex functions in the study of electrostatic and signal processing.
	Material Science
CO203.1	classify properties and characteristics of different electrical engineering materials
CO203.2	State various applications measuring methods for parameters of different classes of electrical engineering materials
CO203.3	Solve simple problems based on dielectric, magnetic and conducting materials.
CO203.4	Apply knowledge of Nano-technology to electrical engineering.
CO203.5	Explain different classes of materials as per IS to decide the quality of the materials.
	Analog and Digital Electronics
CO204.1	To apply various concepts of numbering systems & their conversion, perform binary arithmetic and reduce Boolean expressions by K- Map
CO204.2	explain conceptual knowledge of different types of logical circuits like flip flops, registers, counters, etc and apply to various digital circuits & its Applications.

CO204.3	gain conceptual knowledge of operational Amplifier, analyze parameters along with its configurations & applications.
CO204.4	analyze in different types of Transistors & amplifiers & various types of diode rectifiers using R, RL & RC loads.
	Electrical Measurement & Instrumentation
CO205.1	Explain various characteristic of measuring instruments, their classification and range extension technique.
CO205.2	Classify resistance ,apply measurement techniques for measurement of resistance and inductance.
CO205.3	Explain construction, working principle of dynamometer wattmeter and single phase energy meter.
CO205.4	Measurement of various electrical parameter using CRO and physical parameter using transducers.
	Soft skill
CO206.1	DoSWOT analysis.
CO206.2	Develop presentation and take part in group discussion.
CO206.3	Understand andImplement etiquettes in workplace and in society at large.
CO206.4	Work in team with team spirit.
CO206.5	Utilize the techniques for time management and stress management
	Power System-I
CO207.1	Recognize different patterns of load curve, calculate different factors associated with generating stations and to study tariff structure for LT and HT consumers
CO207.2	To identify various electrical equipments used in power station and to study different types of line insulators for overhead lines
CO207.3	To apply concept of sag and span for mechanical design of overhead lines and study underground cables

CO207.4	To analyze resistance and inductance of overhead transmission line
CO207.5	To compute G.M.R. and G.M.D. and capacitance of overhead lines..
CO207.6	To analyze performance of short and medium transmission line models
	Electrical Machines-I
CO208.1	To explain the construction and energy conversion principles of transformers and AC/ DC motors.
CO208.2	To develop the equivalent circuits of machines.
CO208.3	To evaluate the performance of electrical machines by actual experimenting.
CO208.4	To apply the fundamentals to select the machines for specific applications.
	Network Analysis
CO209.1	Able to develop strong basics for electrical neywork and problem solving by using modern tool and analyzing relevant technical for network in different condidtions by
CO209.2	Estimate the performance of the network and analyze the behavior of its transient response using modern tool, classical method.
CO209.3	Analyze the behavior of its transient response using laplace transform approach
CO209.4	Implement network concept fot analysis of 2-port network and designing passive filters circuit
	Numerical Methods & Computer Programming
CO210.1	Develop algorithms and implement programs using C language for various numerical methods.
CO210.2	Demonstrate types of errors in computation and their causes of occurrence.
CO210.3	Identify various types of equations and apply appropriate numerical method to solve polynomial eq, transcendental eq, interpolation and numerical integration.

CO210.4	Apply and compare various numerical methods to solve first and second order ODE and solve linear simultaneous equations.
	Fundamental of Microcontroller and Applications
CO211.1	Illustrate about different types, working of Microcontroller - 8051, Internal architecture, along with Instruction set
CO211.2	Apply the programming skills to program the microcontroller in assembly language
CO211.3	Apply the concepts of timers, interrupts, serial communication of 8051 and programming using assembly language.
CO211.4	Analyze the real time problems and Design & develope interfacing circuits for various applications.
	Project Based Learning
CO212.1	Identify, formulate, and analyze the simple project problem
CO212.2	Apply knowledge of mathematics, basic sciences, and electrical engineering fundamentals to develop solutions for the project
CO212.3	Learn to work in teams, and to plan and carry out different tasks that are required during a project.
CO212.4	Understand their own and their team-mate's strengths and skills.
CO212.5	Draw information from a variety of sources and be able to filter and summarize the relevant points
CO212.6	Communicate to different audiences in oral, visual, and written forms
	Industrial and Technology Management
CO301.1	Understand concept of technology management and quality management
CO301.2	Explain importance of quality management and understand use of various assistance tools for quality improvement
CO301.3	Differentiate betweenmarketing management and financial management and understant various theories of work motivation and group dynamics

CO301.4	Summarize intellectual property rights and understand concept of patent, copy rights and trademark
	Advanced Microcontroller and Embedded System
CO302.1	Illustrate architecture of PIC18F458 microcontroller, its instructions and the addressing modes.
CO302.2	Construct the program and debug in assembly language or C language for specific applications.
CO302.3	Use of an IDE for simulating the functionalities of PIC microcontroller and its use for software and hardware development.
CO302.4	Identify the Interfacing of microcontroller with various devices.
CO302.5	Determine the advance features of microcontroller peripherals in electrical system.
	Electrical Machines-II
CO303.1	Apply the knowledge of mathematics to obtain the emf equation of synchronous generator.
CO303.2	Create and simulate the matlab model to understand the speed control of three phase induction motor and give the valid conclusions based on analysis and experiments.
CO303.3	Investigate the performance of the synchronous generator by obtaining the OC & SC test on three phase synchronous generator and formulate the voltage regulation.
CO303.4	Understand the operation, working of single phase induction motor, special machines.
	Power Electronics
CO304.1	Apply the fundamental principles of power electronic device like SCR and GTO and use them with their triggering circuit, protection circuit.
CO304.2	Describe construction and working principle of MOSFET, IGBT, MCT and To classify chopper circuits along with analysis
CO304.3	Analyze single Phase AC to DC converters and evaluate their performance
CO304.4	Analyze three Phase AC to DC converters and AC voltage regulators and evaluate their performance.

CO304.5	Analyze single Phase DC to AC inverters and evaluate their performance.
CO304.6	Analyze three Phase DC to AC inverters and evaluate their performance.
	Electrical Installation Design and Condition Based Maintenance
CO305.1	Classify distribution systems, its types and substations
CO305.2	Design of different earthing systems for residential and industrial premises
CO305.3	Select methods of condition monitoring and testing of various Electrical Equipments.
CO305.4	Estimate and Costing of residential and industrial premises.
CO305.5	Summarize the importance of electrical safety.
	Seminar and technical communication
CO306.1	Understand needs of today's world regarding innovations in Electrical engineering.
CO306.2	Improve presentation and documentation skill.
CO306.3	Apply theoretical knowledge to actual industrial applications and research activity.
CO306.4	Help to contribute in analysis, planning, management and operation in Electrical engineering.
	Power SystemII
CO307.1	To explain the evaluation of ABCD constants and equivalent circuit parameters of Long transmission line
CO307.2	To evaluate the performance & to solve problems involving modeling design of HVDC & EHV-AC powertransmission line.
CO307.3	To explain advantages of Per unit system &analyze power flow in power transmission networks.

CO307.4	To explain the calculation of currents & voltages in a faulted power system under both symmetrical & unsymmetrical faults
	Computer Aided Design of Electrical Machines
CO308.1	Develop mathematical equation and draw it's equivalent diagram to find transfer function of physical system.
CO308.2	Demonstrate time response of linear system.
CO308.3	Identify various types of methods to find stability of system in time domian & in frequency domain.
CO308.4	Design PID controller for LTI system .
	Electrical Mobility
CO309.1	Analyze the concepts of Hybrid and Electric vehicles.
CO309.2	Describe the different types of energy storage systems
CO309.3	Comprehend the knowledge of the battery charging and management systems.
CO309.4	Classify the different mode of operation for hybrid vehicle
CO309.5	Apply the different Charging standards used for electric vehicles
CO309.6	Differentiate between Vehicle to home & Vehicle to grid concepts
	design of electrical Machine
CO310.1	Student will be able to gain thr knowledge of electrical machines with respect to heating and cooling curve
CO310.2	Student will be able to apply various specifications of electrical machines as per IS-2026 (Part -1)
CO310.3	Students will be able to design three phase transformer

CO310.4	Students will be able to determine parameter and performance of three phase transformer
CO310.5	Students will be able to design three phase induction motor by using modern tools
CO310.6	Students will be able to determine parameter and performance of three phase induction motor
	Internship
CO311.1	Understand the working culture and environment of the Industry and get familiar with various departments and practices in the industry
CO311.2	Operate various meters, measuring instruments, tools used in industry efficiently and develop technical competence.
CO311.3	Apply internship learning in other course completions and final year project management, i.e. topic finalization, project planning, hardware development, result interpretations, report writing
CO311.4	Create a professional network and learn about ethical, safety measures, and legal practices.
CO311.5	Appreciate the responsibility of a professional towards society and the environment.
CO311.6	Identify career goals and personal aspirations.
	power system operation and control
CO401.1	Analyze the dynamics of power system giving emphasis on stability study using equal area and point by point method
CO401.2	Identify the requirement of reactive power compensation and compensate reactive power using conventional and advancesd controller such as FACTs
CO401.3	Incorporate the automatic frequency and voltage control strategies for single and two area case and analyze the effects, knowing the necessity of generation control
CO401.4	Formulate the unit commitment and economic load dispatch and solve it using optimization techniques. Analyze interchange power between interconnected utilities considering reliability aspects of power system.
	PLC & SCADA application

CO402.1	To introduce students with the concept of PLC, generic PLC architecture, I/O modules (Interface) of PLC
CO402.2	To develop ladder logic for PLC application in an industry
CO402.3	Develop architecture of SCADA and explain the importance of SCADA in critical infrastructure.
CO402.4	Develop software program using modern engineering tools and technique for PLC and SCADA
	Power quality
CO403.1	Elaborate the concept of power quality and identify power quality issues in Power system.
CO403.2	Determine the causes of voltage sag also estimate magnitude of voltage sag in power system.
CO403.3	List out the sources of transient over voltages and outline the various techniques for overvoltage protection and flickering mitigation techniques
CO403.4	Analyse the concept of harmonic distortion and list out the effect of harmonic distortion.
CO403.5	Estimate the harmonic analysis and evaluate total harmonic distortion also Estimate parameters for passive harmonic filter.
CO403.6	Elaborate the various power quality measurement devices with the guidelines in power system.
	Restructuring and development
CO404.1	Enlist the functions of various key entities in India and explain the implications of various policies and acts on restructuring and deregulation.
CO403.2	Evaluate the process of restructuring of power system
CO403.3	Classify various cost components in generation, transmission, distribution sector and tariff
CO403.4	Explain different power sector restructuring models .
CO403.5	Describe different types of electricity markets

CO403.6	Illustrate pricing and transmission rights of electricityalongwithfundamental concept of congestion management
	control system -II
CO405.1	Describe the basic digital control system, sampling and reconstruction .
CO405.2	Express a system in the state space format.
CO405.3	Solve the state equation and familiarize with STM and its properties.
CO405.4	Design a control system using state space techniques including state feedback control and full order observer.
	PROJECT I
CO406.1	Design project for public health, safety, cultural,societal,environmentalconsideration applying engineering knowledge.
CO406.2	Inculcate the knowledge of project management, finance with communicating effectively on complex engineering activity with documentation,presentation and sharing instruction.
CO406.3	Engage in independent and lifelong learning by functioning effectively in teamwork alongwith professional ethics and team work
CO406.4	Analyse methods including design of hardware and using model tools for validation of hardware.
	Sweatch Gear & protection
CO407.1	Describe the fundamentals of protective relaying and theory of arc interruption.
CO407.2	Categorize types of circuit breaker based on ratings.
CO407.3	Estimate the causes and effects of overvoltage due to lightning on protection.
CO407.4	Estimate the faults in transformer, alternator, 3 phase induction motor and its protection.
	Power electronics control drives

CO408.1	To Apply the basic concepts of drive and identify the importance of electrical drives in industries
CO408.2	To Classify the various types of loads and their characteristics in the industries
CO408.3	To solve the basic problems on motor –load dynamics and multiquadrant operation
CO408.4	To Apply electric braking and its types, impart the practical knowledge by solving numericals
CO408.5	To explain the solid state control methods of DC motors, 3 phase induction motors, BLDC and PMSM motors.
CO408.6	To enable students to apply the fundamentals of machines and power electronics in the industrial applications and develop their analytical skills
	HVDC & FACTS
CO409.1	Compare HVDC and EHV AC systems for various aspects also explain HVDC circuit with chs.
CO409.2	Elaborate the layout of HVDC system with various components including protective devices
CO409.3	Determine the concept of VSC HVDC and conventional HVDC system
CO409.4	List out various types of Power Electronic Controllers like inverter and converter
CO409.5	Explain the concept of SVC AND STATCOM with operation details and characteristics
CO409.6	Understand the UPFC with details working operation and constraints.
	SMART GRID
CO410.1	Illustrate about different types, working of Microcontroller - 8051, Internal architecture, along with Instruction set
CO410.2	Apply the programming skills to program the microcontroller in assembly language
CO410.3	Apply the concepts of timers , interrupts , serial communication of 8051 and programming using assembly language.

CO410.4	Analyze the real time problems and Design & develope interfacing circuits for various applications.
	PROJECT II
CO411.1	Design project for public health, safety, cultural,societal,environmentalconsideration applying engineering knowledge.
CO411.2	Inculcate the knowledge of project management, finance with communicating effectively on complex engineering activity with documentation,presentation and sharing instruction.
CO411.3	Engage in independent and lifelong learning by functioning effectively in teamwork alongwith professional ethics and team work
CO411.4	Analyse methods including design of hardware and using model tools for validation of hardware.

DEPARTMENT OF MECHANICAL ENGINEERING

Class: Second Year (2019 Pattern)

C201	**Solid Mechanics**
C201.1	DEFINE various types of stresses and strain developed on determinate and indeterminate members
C201.2	DRAW Shear force and bending moment diagram for various types of transverse loading and support.
C201.3	COMPUTE the slope & deflection, bending stresses and shear stresses on a beam
C201.4	CALCULATE torsional shear stress in shaft and buckling on the column
C201.5	APPLY the concept of principal stresses and theories of failure to determine stresses on a 2-D element.
C201.6	UTILIZE the concepts of SFD & BMD, torsion and principal stresses to solve combined loading application based problems.
C202	**Solid Modeling and Drafting**
C202.1	UNDERSTAND basic concepts of CAD system, need and scope in Product Lifecycle Management

C202.2	UTILIZE knowledge of curves and surfacing features and methods to create complex solid geometry
C202.3	CONSTRUCT solid models, assemblies using various modeling techniques & PERFORM mass property analysis, including creating and using a coordinate system
C204.4	APPLY geometric transformations to simple 2D geometries
C202.5	USE CAD model data for various CAD based engineering applications viz. production drawings, 3D printing, FEA, CFD, MBD, CAE, CAM, etc.
C202.6	USE PMI & MBD approach for communicatio
C203	**Engineering Thermodynamics**
C203.1	DESCRIBE the basics of thermodynamics with heat and work interactions.
C203.2	APPLY laws of thermodynamics to steady flow and non-flow processes
C203.3	APPLY entropy, available and non available energy for an Open and Closed System.
C203.4	DETERMINE the properties of steam and their effect on performance of vapour power cycle
C203.5	ANALYSE the fuel combustion process and products of combustion
C203.6	SELECT various instrumentations required for safe and efficient operation of steam generator
C204	**Engineering Materials and Metallurgy**
C204.1	COMPARE crystal structures and ASSESS different lattice parameters
C204.2	CORRELATE crystal structures and imperfections in crystals with mechanical behavior of materials.
C204.3	DETERMINE mechanical properties using destructive and nondestructive testing of materials
C204.4	ESTIMATE different parameters of the system viz., phases, variables, component, grains, grain boundary, and degree of freedom. etc.

C204.5	ANALYSE effect of alloying element & heat treatment on properties of ferrous & nonferrous alloy.
C204.6	SELECT appropriate materials for various applications.
C205	**Electrical and Electronics Engineering**
C205.1	APPLY programming concepts to UNDERSTAND role of Microprocessor and Microcontroller in embedded systems.
C205.2	DEVELOP interfacing of different types of sensors and other hardware devices with Atmega328 based Arduino Board
C205.3	UNDERSTAND the operation of DC motor, its speed control methods and braking.
C205.4	DISTINGUISH between types of three phase induction motor and its characteristic features.
C205.5	EXPLAIN about emerging technology of Electric Vehicle (EV) and its modular subsystems
C205.6	CHOOSE energy storage devices and electrical drives for EVs
C206	**Geometric Dimensioning and Tolerancing Lab**
C206.1	SELECT appropriate IS and ASME standards for drawing
C206.2	ANALYSE variety of industrial drawings.
C206.3	APPLY geometric and dimensional tolerance, surface finish symbols in drawing
C206.4	EVALUATE dimensional tolerance based on type of fit, etc.
C206.5	SELECT an appropriate manufacturing process using DFM, DFA, etc
C208	**Engineering Mathematics - III**
C208.1	SOLVE higher order linear differential equations and its applications to model and analyze mass spring systems

C208.2	APPLY Integral transform techniques such as Laplace transform and Fourier transform to solve differential equations involved in vibration theory, heat transfer and related mechanical engineering applications
C208.3	APPLY Statistical methods like correlation, regression in analyzing and interpreting experimental data applicable to reliability engineering and probability theory in testing and quality control..
C208.4	PERFORM Vector differentiation & integration, analyze the vector fields and APPLY to fluid flow problems
C208.5	SOLVE Partial differential equations such as wave equation, one and two dimensional heat flow equations.
C209	**Kinematics of Machinery**
C209.1	APPLY kinematic analysis to simple mechanisms
C209.2	ANALYZE velocity and acceleration in mechanisms by vector and graphical method
C209.3	SYNTHESIZE a four bar mechanism with analytical and graphical methods
C209.4	APPLY fundamentals of gear theory as a prerequisite for gear design
C209.5	CONSTRUCT cam profile for given follower motion
C210	**Applied Thermodynamics**
C210.1	DETERMINE COP of refrigeration system and ANALYZE psychrometric processes
C210.2	DISCUSS basics of engine terminology,air standard, fuel air and actual cycles.
C210.3	IDENTIFY factors affecting the combustion performance of SI and CI engine.
C210.4	DETERMINE performance parameters of IC Engines and emission control.
C210.5	EXPLAIN working of various IC Engine systems and use of alternative fuels
C210.6	CALCULATE performance of single and multi stage reciprocating compressors and DISCUSS rotary positive displacement compressors

C211	**Fluid Mechanics**
C211.1	DETERMINE various properties of fluid.
C211.2	APPLY the laws of fluid statics and concepts of buoyancy
C211.3	IDENTIFY types of fluid flow and terms associated in fluid kinematics
C211.4	APPLY principles of fluid dynamics to laminar flow
C211.5	ESTIMATE friction and minor losses in internal flows and DETERMINE boundary layer formation over an external surface
C211.6	CONSTRUCT mathematical correlation considering dimensionless parameters, also ABLE to predict the performance of prototype using model laws
C212	**Manufacturing Processes**
C212.1	SELECT appropriate moulding, core making and melting practice and estimate pouring time, solidification rate and DESIGN riser size and location for sand casting process
C212.2	UNDERSTAND mechanism of metal forming techniques and CALCULATE load required for flat rolling
C212.3	DEMONSTRATE press working operations and APPLY the basic principles to DESIGN dies and tools for forming and shearing operations
C212.4	EXPLAIN different welding processes and EVALUATE welding characteristics
C212.5	DIFFERENTIATE thermoplastics and thermosetting and EXPLAIN polymer processing techniques.
C212.6	UNDERSTAND the principle of manufacturing of fibre-reinforce composites and metal matrix composites
C213	**Machine Shop**
C213.1	PERFORM welding using TIG/ MIG/ Resistance/Gas welding technique
C213.2	MAKE Fibre-reinforced Composites by hand lay-up process or spray lay-up techniques

C213.3	PERFORM cylindrical/surface grinding operation and CALCULATE its machining time
C213.4	DETERMINE number of indexing movements required and acquire skills to PRODUCE a spur gear on a horizontal milling machine
C213.5	PREPARE industry visit report
C213.6	UNDERSTAND procedure of plastic processing
C214	**Project Based Learning - II**
C214.1	IDENTIFY the real-world problem (possibly of interdisciplinary nature) through a rigorous literature survey and formulate / set relevant aims and objectives
C214.2	ANALYZE the results and arrive at valid conclusions.
C214.3	PROPOSE a suitable solution based on the fundamentals of mechanical engineering by possibly integration of previously acquired knowledge.
C214.4	CONTRIBUTE to society through proposed solutions by strictly following professional ethics and safety measures
C214.5	USE of technology in proposed work and demonstrate learning in oral and written form
C214.6	DEVELOP ability to work as an individual and as a team member
Class: Third Year (2019 Pattern)	
C301	**Numerical and Statistical Methods**
C301.1	SOLVE system of equations using direct and iterative numerical methods
C301.2	ESTIMATE solutions for differential equations using numerical techniques
C301.3	DEVELOP solution for engineering applications with numerical integration
C301.4	CREATE a model using a curve fitting and regression analysis

C301.5	APPLY statistical Technique for quantitative data analysis
C301.6	DEMONSTRATE the data, using the concepts of probability and linear algebra
C302	**Heat and Mass Transfer**
C302.1	APPLY the modes of heat transfer equations for one dimensional thermal system.
C302.2	DESIGN a thermal system considering fins, thermal insulation and & Transient heat conduction.
C302.3	EVALUATE the heat transfer rate in natural and forced convection & validate with experimentation results
C302.4	INTERPRET heat transfer by radiation between objects with simple geometries, for black and grey surfaces.
C302.5	ABILITY to analyze the rate of mass transfer using Fick's Law of Diffusion and understands mass diffusion in different coordinate systems
C302.6	ANALYSIS of heat transfer equipments and investigation of its performance.
C303	**Design of Machine Elements**
C303.1	ANALYZE the cotter and knuckle Joints, levers and components subjected to eccentric loading
C303.2	DESIGN shafts, keys and couplings under static loading conditions
C303.3	ANALYZE different stresses in power screws and APPLY those in the procedure to design screw jack.
C303.4	EVALUATE dimensions of machine components under fluctuating loads.
C303.5	INTERPRET the stress developed on the different type of welded and threaded joints.
C303.6	APPLY the design and development procedure for different types of springs.
C304	**Mechatronics**

C304.1	DEFINE key elements of mechatronics, principle of sensor and its characteristics
C304.2	UTILIZE concept of signal processing and MAKE use of interfacing systems such as ADC, DAC, Digital I/O.
C304.3	DETERMINE the transfer function by using block diagram reduction technique
C304.4	EVALUATE Poles and Zero, frequency domain parameter for mathematical modeling for mechanical system.
C304.5	APPLY the concept of different controller modes to an industrial application
C304.6	DEVELOP the ladder programming for industrial application
C305	**ELE I Machining Science &Technology**
C305.1	DEFINE metal cutting principles and mechanics of metal cutting and tool life.
C305.2	DESCRIBE features of gear and thread manufacturing processes
C305.3	SELECT appropriate grinding wheel and demonstrate the various surface finishing processes.
C305.4	SELECT appropriate jigs/fixtures and to draw the process plan for a given component
C305.5	EVALUATE various parameters of process planning
C305.6	GENERATE CNC program for Turning / Milling processes and generate tool path using CAM software.
C306	**Digital Manufacturing Laboratory**
C306.1	DEVELOP a component using conventional machines, CNC machines and Additive Manufacturing Techniques.
C306.2	ANALYZE cutting tool parameters for machining given job
C306.3	DEMONSTRATE simulation of manufacturing process using Digital Manufacturing Tools.

C306.4	DESIGN jigs and Fixtures for a given component
C306.5	DEMONESTRATE different parameters for CNC retrofitting and reconditioning
C307	**Skill Development**
C307.1	DEMONSTRATE procedure of assembly & disassembly of various machines.
C307.2	DEVELOP a working/model of machine parts or any new product
C307.3	EVALUATE fault with diagnosis on the machines, machine tools and home appliances
C307.4	DEMONSTRATE the various activities performed in an industry such as maintenance, design of components, material selection.
C309	**Artificial Intelligence & Machine Learning**
C309.1	DEMONSTRATE fundamentals of artificial intelligence and machine learning.
C309.2	APPLY feature extraction and selection techniques.
C309.3	APPLY machine learning algorithms for classification and regression problems.
C309.4	DEVELOP a machine learning model using various steps.
C309.5	EXPLAIN concepts of reinforced and deep learning.
C309.6	SIMULATE machine learning model in mechanical engineering problems.
C310	**Computer Aided Engineering**
C310.1	DEFINE the use of CAE tools and DESCRIBE the significance of shape functions in finite element formulations.
C310.2	APPLY the various meshing techniques for better evaluation of approximate results

C310.3	APPLY material properties and boundary condition to SOLVE 1-D and 2-D element stiffness matrices to obtain nodal or elemental solution.
C310.4	APPLY various numerical methods for different types of analysis.
C310.5	SOLVE non-linear and dynamic analysis problems by analyzing the results obtained from analytical and computational method.
C310.6	GENERATE the results in the form of contour plot by the USE of CAE tools
C311	**Design of Transmission Systems**
C311.1	APPLY the principle of Spur & Helical gear design for industrial application and PREPARE a manufacturing drawing with the concepts of GD&T.
C311.2	DESIGN Bevel & Worm gear considering design parameters as per design standards.
C311.3	DESIGN Rolling and Sliding Contact Bearings from manufacturer's catalogue for a typical application considering suitable design parameters
C311.4	DESIGN various types of Clutches, Brakes, used in automobile
C311.5	APPLY various concept to DESIGN Machine Tool Gear box, for different applications
C311.6	ELABORATE various modes of operation, degree of hybridization and allied terms associated with hybrid electric vehicles.
C312	**ELE II Surface Engineering**
C312.1	DEFINE the basic's principle & mechanism of surface degradation.
C312.2	SELECT correct corrosion prevention techniques for a different service condition.
C312.3	DEMONSTRATE the role of surface engineering of materials to modify/improve the surface properties
C312.4	SELECT the suitable surface heat treatments to improve the surface properties
C312.5	APPLY the surface modification technique to modify surface properties

C312.6	EVALUTE various surface coating defects using various testing/characterization method.
C313	**Measurement Laboratory**
C313.1	EVALUATE causes of errors in Vernier calipers, micrometers by performing experiments in standard metrological conditions, noting deviations at actual and by plotting cause and effect diagram, to reduce uncertainty in
C313.2	ANALYZE strain measurement parameters by taking modulus of elasticity in consideration to acknowledge its usage in failure detection and force variations.
C313.3	EXAMINE surface Textures, surface finish using equipment's like Talysurf and analyze surface finish requirements of metrological equipment's like gauges, jaws of vernier calipers, micrometers, magnifying glasses of height gauge and
C313.4	MEASURE the dimensional accuracy using Comparator and limit gauges and appraise their usage in actual measurement or comparison with standards set to reduce measurement lead time.
C313.5	PERFORM Testing of Flow rate, speed and temperature measurements and their effect on performance in machines and mechanisms like hydraulic or pneumatic trainers, lathe machine etc. to increase repeatability and
C313.6	COMPILE the information of opportunities of entrepreneurships/business in various sectors of metrology like calibrations, testing, coordinate and laser metrology etc in an industry visit report.
C314	**Fluid Power & Control Laboratory**
C314.1	DEFINE working principle of components used in hydraulic and pneumatic systems.
C314.2	EXPLAIN various applications of hydraulic and pneumatic systems
C314.3	SELECT an appropriate component required for hydraulic and pneumatic systems using manufactures' catalogues.
C314.4	ANALYSE various hydraulic and pneumatic systems for industrial/mobile applications
C314.5	DESIGN a hydraulic and pneumatic system for the industrial applications.
C314.6	DEMONESTRATE various IoT, PLC based controlling system using hydraulics and pneumatics.
C315	**Internship/Mini project**
C315.1	DEMONSTRATE professional competence through industry internship.

C315.2	APPLY knowledge gained through internships to complete academic activities in a professional manner.
C315.3	CHOOSE appropriate technology and tools to solve given problem.
C315.4	DEMONSTRATE abilities of a responsible professional and use ethical practices in day to day life.
C315.5	DEVELOP network and social circle, and DEVELOPING relationships with industry people.
C315.6	ANALYZE various career opportunities and DECIDE career goals.
Class: Final Year (2015 Pattern)	
C401	Hydraulics & Pneumatics
C401.1	Understand working principle of components used in hydraulic & pneumatic systems
C401.2	Identify various applications of hydraulic & pneumatic systems
C401.3	Selection of appropriate components required for hydraulic and pneumatic systems
C401.4	Analyse hydraulic and pneumatic systems for industrial/mobile applications
C401.5	Design a system according to the requirements
C401.6	Develop and apply knowledge to various applications
C402	CAD CAM Automation
C402.1	Apply homogeneous transformation matrix for geometrical transformations of 2D CAD entities for basic geometric transformations
C402.2	Use analytical and synthetic curves and surfaces in part modeling.
C402.3	Do real times analysis of simple mechanical elements like beams, trusses, etc. and comment on safety of engineering components using analysis software

C402.4	Generate CNC program for Turning / Milling and generate tool path using CAM software.
C402.5	Demonstrate understanding of various rapid manufacturing techniques and develop competency in designing and developing products using rapid manufacturing technology
C402.6	Understand the robot systems and their applications in manufacturing industries
C403	Dynamics of Machinery
C403.1	Estimate natural frequency for single DOF undamped & damped free vibratory systems
C403.2	Determine response to forced vibrations due to harmonic excitation, base excitation and excitation due to unbalance forces.
C403.3	Apply balancing technique for static and dynamic balancing of multi cylinder inline and radial engines.
C403.4	Describe vibration measuring instruments for industrial / real life applications along with suitable method for vibration control.
C403.5	Explain noise, its measurement & noise reduction techniques for industry and day today life problems.
C404A	Elective-I: Finite Element Analysis
C404A.1	Understand the Fundamentals concept of FEA & Techniques used to solve mechanical engineering problems.
C404A.2	Analyze 1D element structural problems involving bars, beams, trusses.
C404A.3	Derive and use 2-D element stiffness matrices and load vectors to solve for displacements and stresses.
C404A.4	Analyze 2D elements for triangular, quadrilateral, iso-parametric Element.
C404A.5	Analyze steady state heat transfer problems
C404A.6	Compute dynamic problems consisting bar, beam element and interpret the result of 3D element structural problems using commercial FEA package.
C404C	Elective I- HVAC

C404C.1	Determine the performance parameters of transcritical & ejector systems used in refrigeration & air-conditioning applications
C404C.2	Estimate thermal performance of compressor, evaporator, condenser and cooling tower used in refrigeration systems.
C404C.3	Describe refrigerant piping design, capacity & safety controls and balancing of vapour compressor system.
C404C.4	Explain importance of indoor and outdoor design conditions, IAQ, ventilation and air distribution system used in central air conditioning systems
C404C.5	Estimate heat transmission through building walls using CLTD and decrement factor &time lag methods with energy-efficient and cost-effective measures for building envelope load of AC system.
C404C.6	Explain working of types of desiccant, evaporative, thermal storage, radiant cooling, clean room and and formulate mathematical model of air-conditioning system.
C405 A	Elective II Automobile Engineering
C404C.1	To compare and select the proper automotive system for the vehicle.
C404C.2	To analyse the performance of the vehicle
C404C.3	To diagnose the faults of automobile vehicles.
C404C.4	To apply the knowledge of EVs, HEVs and solar vehicles
C405 B	Elective II Operation Research
C405B.1	Apply LPP and Decision Theory to solve the problems
C405B.2	Apply the concept of transportation models to optimize available resources
C405B.3	Decide optimal strategies in conflicting situations
C405B.4	Implement the project management techniques
C405B.5	Minimize the process time

C405B.6	Optimize multi stage decision making problems
C405C	Elective II Energy Audit Management
C405C.1	Compare energy scenario of India and World.
C405C.2	Carry out Energy Audit of the Residence / Institute/ Organization
C405C.3	Evaluate the project using financial techniques
C405C.4	Identify and evaluate energy conservation opportunities in Thermal Utilities
C405C.5	Identify and evaluate energy conservation opportunities in Electrical Utilities
C405C.6	Identify the feasibility of Cogeneration and WHRUse a CFD tool effectively for practical problems and research
C407	Energy Engineering
C407.1	Illustrate thermal power plant system and cogeneration power plant with detailed explanation of each component depending upon global energy scenario, present status and future scope of power generation in India
C407.2	Associate and discuss types of steam condenser used in thermal power plant and environmental impact of thermal power plant
C407.3	Compute theoretical aspects, geological considerations and types of components for hydroelectric and nuclear power plant with economic consideration.
C407.4	Estimate performance parameter of gas turbine power plant and diesel power plant with their configuration.
C407.5	Discuss types of Non-conventional power plant and their commercialization
C407.6	Associate and discuss types of electrical instruments used in power plant and Estimate miscellaneous cost and performances incorporated with types of power generation system
C408	Mechanical System Design
C408.1	Analyze and design machine tool gear box, cylinder, pressure vessel and I.C. engine components for stated specifications.

C408.2	Apply the statistical considerations in design to analyze the defects and failure modes in industrial product.
C408.3	Design suitable material handling system for bulk load.
C408.4	Develop the optimum solutions for weight, cost, and size, stiffness using Johnson's method for shaft, helical spring, and pressure vessel
C409 A	ELE III-Tribology
C409A.1	Understand the practical aspect of tribology in industry
C409A.2	Describe theories, laws, measurement of friction and wear.
C409A.3	Analyze hydrodynamic bearing and performance using derived equations
C409A.4	Determine performance of hydrodynamic bearing using derived equations
C409A.5	Explain characteristics of Elasto-hydrodynamic lubrication and Gas Lubrication
C409A.6	Apply the principles of surface engineering for different applications of tribology
C409B	ELE III-Industrial Engineering
C409B.1	Describe different aspect of industrial engineering and productivity improvement techniques.
C409B.2	Apply different concepts of method study to improve the work content
C409B.3	Describe and analyze techniques of work measurement and time study
C409B.4	Illustrate different aspect of work system design and production planning control
C409B.5	Identify various cost accounting and financial management practices applicable in different industries.
C409B.6	Apply concept of engineering economy, ergonomics and industrial safety practices.

C409C	ELE III-Robotics
C409C.1	Identify different type of robot configuration with relevant terminology.
C409C.2	Select suitable sensors, actuators and drives for robotic systems.
C409C.3	Understand kinematics in robotic systems
C409C.4	Design robot with desired motion with suitable trajectory planning
C409C.5	Select appropriate robot programming for given application
C409C.6	Understand need of IoT, machine learning, simulation in robotics
C410A	ELECTIVE IV- Advanced Manufacturing Processes
C410A1	Classify and analyze special forming processes
C410A.2	Analyze and identify applicability of advanced joining processes
C410A.2	Understand and analyze the basic mechanisms of hybrid non-conventional machining techniques
C410A.3	Select appropriate micro and nano fabrication techniques for engineering applications
C410A.4	Understand and apply various additive manufacturing technology for product development
C410A.5	Understand material characterization techniques to analyze effects of chemical composition,composition variation, crystal structure, etc.
C410C	ELECTIVE IV- Product Design & Development
C410C.1	Describe fundamentals of Product design and development process, understand conventional and recent trends of Product design and development process
C410C.2	Identify & formulate customer needs and its tools for the product design & development. Explain mission statement, forecasting.

C410C.3	Describe information gathering for product development like brain storming, lateral thinking and morphological analysis for product development
C410C.4	Demonstrate reverse and forward engineering in product development by using teardown process. Explain Benchmarking for the product development process
C410C.5	Describe conceptually design processes as DFA, DFMEA, design for safety etc. also cost analysis for the effective cost of the product
C410C.6	Explain Product life cycle and management and data management concepts.
DEPARTMENT OF ELECTRONICS AND TELECOMMUNICATION ENGINEERING	
SE[E&TC]	
C201.1	Apply higher order linear differential equation using appropriate techniques for modeling and analyzing electrical circuits.
C201.2	Apply problems related to Fourier transform, Z-transform and applications to Cmmunication systems and Signal processing.
C201.3	Obtain Interpolating polynomials, numerically differentiate and integrate functions, numerical solutions of differential equations using single step and multi-step iterative methods used in modern scientific computing.
C201.4	Perform vector differentiation to the vector fields and apply to Electro-Magnetic fields.
C201.5	Perform vector integration to the vector fields and apply to Electro-Magnetic fields.
C201.6	Analyze conformal mappings, transformations and perform contour integration of complex functions in the study of electrostatics and signal processing.
C202.1	Understand the physics, characteristics and parameters of MOSFET towards its application as an amplifier.
C202.2	Design MOSFET amplifiers, with and without feedback, MOSFET oscillators, for given Specifications.
C202.3	Analyze and assess the performance of linear and switching regulators, with their variants, towards applications in regulated power supplies.

C202.4	Understand schematic of Op-Amp and define its performance parameters.
C202.5	Design, Build and test Op-amp based analog signal processing and conditioning circuits towards various real time applications.
C202.6	Compare the principles of various data conversion techniques and PLL with their applications.
C203.1	Interpret the types of digital logic families for the effective design of the electronic system.
C203.2	Use the basic logic gates and various reduction techniques of the digital logic circuit
C203.3	Design combinational circuits using knowledge of Boolean algebra.
C203.4	Construct Sequential Circuits.
C203.5	Demonstrate the concept of FSM and ASM for digital electronics applications.
C203.6	Apply the knowledge of combinational and sequential logic design for complex digital circuits.
C204.1	Analyze behavior of the simple DC and AC circuit with different circuit simplification techniques.
C204.2	Formulate first order or second order differential equations of driven and source free RL,RC and series RLC circuits to determine network parameters.
C204.3	Summarize two port networks in time domain and s-domain
C204.4	Differentiating DC motors and Generators based on their working principle and characteristics.
C204.5	Understand induction motors construction, working and characteristics.
C204.6	Interpret of construction and working of special function motors

C205.1	Identify the appropriate data structure to enhance programming skill by applying knowledge of basic data structures.
C205.2	Classify several searching and sorting methods to analyze and interpret the data with the help of time and space complexity.
C205.3	Organize data structures to evaluate mathematical expression to solve engineering problems for industry & research.
C205.4	Organize & implement data to provide flexibility in programming.
C205.5	Organize composite data to solve the problems by demonstrating non-linear data structures.
C205.6	Select an appropriate algorithm to satisfy eco-social needs and safety.
C207.1	Analyze classification of systems with mathematical expressions and operate continuous and discrete time signals.
C207.2	Formulate input output relationship for LTI systems and interpret system response with convolution.
C207.3	Evaluate the signals in frequency domain using Fourier series and Fourier transform.
C207.4	Resolve the signals in complex frequency domain using Laplace Transform and develop the ability to analyze system by using properties.
C207.5	Compute the probability of a given event, model, probability functions CDF and PDF.
C208.1	Determine physical system in suitable form for analysis of control system.
C208.2	Understand the stability of a closed-loop control system.
C208.3	Apply time domain parameters for control systems analysis.

C208.4	Inspect control systems stability in frequency domain.
C208.5	Express system equations in state variable form.
C208.6	Introduce controllers and digital control system.
C209.1	Determine the bandwidth and transmission power requirements by performing time and frequency domain analysis of signals.
C209.2	Design the trans receivers for generation, transmission and reception of Amplitude Modulation Systems.
C209.3	Develop FM generation and reception system of required specification.
C209.4	Compare the pulse modulation techniques for analog to digital signal conversion.
C209.5	Discuss the generation and reconstruction of PCM, DPCM and DM.
C209.6	Analyze synchronization and equalization techniques in baseband digital transmission.
C210.1	Interpret the principles of Object Oriented Programming
C210.2	Apply the concepts of classes and objects to write programs in C++
C210.3	Develop the programs for Operator Overloading in C++
C210.4	Demonstrate the concepts of methods & Inheritance for writing code for real time applications
C210.5	Extrapolate the concept of Templates and Exception handling to develop robust programs in C++
C210.6	Utilize file handling programs for implementing small projects in C++

C211.1	Understand the problems in society, organization or industry and through literature survey and apply engineering knowledge to convert it into open ended problem statement.
C211.2	Select appropriate techniques, resources and modern engineering tools to demonstrate and interpret the said work through proper documentation.
C211.3	Design, analyze and evaluate the performance of the real time system with consideration of the ethical, societal and environmental approach.
C211.4	Communicate effectively on designed system through presentation report writing with proper product management and finance aspects.
C212.1	Adapt Soft Skills and Hard Skills along with Technical writing for engineering applications.
C212.2	Solve problems based on Arithmetic and mathematical reasoning
C212.3	Compute Analytical Reasoning and Quantitative Ability problems.
C212.4	Acquire writing skills needed for comprehension and email etiquettes.
C212.5	Make use of presentation skills, right attitude and non verbal communication for facing interviews.
C212.6	Evaluate alternate solutions for problem solving techniques with required skills.
C211.1	Understand the basics of Data science and its significance
C211.2	Utilize various data analyzing packages in Python
C211.3	Develop the programs for statistical data Analysis
C211.4	Understand the statistical model for data analysis.

TE[E&TC]	
C301.1	Demonstrate the use of source coding methods.
C301.2	Analyze the channel blocks for digital communication systems.
C301.3	Determine the impacts of random noise in digital communication system.
C301.4	Categories baseband receiver for received input based on signal to noise ratio and bit error probability.
C301.5	Distinguish between pass band receivers for bandwidth and symbol rate.
C301.6	Illustrate the use of spread spectrum technology for digital communication system
C302.1	Identify concept of sampling and orthogonality and mapping between analog to digital domain.
C302.2	Carryout DT signal and system using DFT and its significance and problem related to computational complexity.
C302.3	Test DTLTI system using Z transform by applying its properties.
C302.4	Construct digital IIR filter for given filter specifications.
C302.5	Design digital FIR filter to meet specific magnitude and linear phase requirements.
C302.6	Discuss different DSP applications.
C303.1	Use the vector calculus to analyze electrostatic and Magnetostatic field by adapting laws for its applications
C303.2	Compute the value of capacitance using electrostatic boundary conditions.

C303.3	Utilize Maxwell's equations and electromagnetic wave theory to solve different electromagnetic problems.
C303.4	Express the transmission line parameters to construct its equations for professional engineering solution.
C304.1	Explain the architecture, features & peripheral support of 8051 microcontroller.
C 304.2	Interpret Input Output port interfacing & programming environment of 8051 microcontroller.
C 304.3	Simulate small embedded application for 8051 microcontroller using assembly language programming.
C 304.4	Understand the architecture, features & peripheral support of PIC microcontroller.
C 304.5	Describe interfacings with PIC microcontroller using port structure & interrupt structure.
C 304.6	Simulate small embedded application for PIC microcontroller using embedded C.
C305.1	Understand basic elements of mechatronics system and its characterization.
C305.2	Categorize different types of sensors and transducers and their selection as per need of application.
C305.3	Identify the hydraulic actuators for hydraulic system applications by comparing functionality and performance parameters.
C305.4	Illustrate pneumatic actuators and their use for pneumatic system applications.
C305.5	Discuss electric, electro-mechanical actuators including their parameter consideration.
C305.6	Apply the knowledge of mechatronics elements in automobile applications.

C307.1	Understand the construction and working of power devices with their gate driving circuits.
C307.2	Analyze types of single phase & three phase controlled rectifiers (AC to DC Converters).
C307.3	Illustrate single phase & three phase controlled Inverters (DC to AC Converters).
C307.4	Examine the types of choppers & AC voltage controller.
C307.5	Distinguish resonant converters & protection circuits.
C307.6	Infer the types of UPS and different motor drives.
C 308.1	Perform information theoretic analysis of communication system specifically for data compression by means of source coding techniques.(Unit1)
C 308.2	Evaluate channel coding techniques for error detection and correction in communication system and computer network.(Unit2 &4)
C 308.3	Design cyclic codes and encoder-decoder circuits by understanding the Galois field arithmetic. (Unit3)
C 308.4	Comprehend fundamental principles of data communication and networking. (Unit5)
C 308.5	Understand the flow and error control techniques in communication network.(Unit6)
C309.1	1 Illustrate fundamentals of Management thoughts, vital for understanding the conceptual frame work of Business Management as a discipline.
C309.2	Evaluate quality assessment tools for project development..
C309.3	Analyze financial of Project Management process for execution of ideas.
C309.4	Demonstrate role & responsibilities of best suitable HR professional to acquire human resource for an organization.

C309.5	Develop Entrepreneurship skills.
C309.6	Understand different Marketing environment & consumer behaviours.
C310.1	Relate the ARM microprocessor architecture & DSP architecture to recognize its applications.
C310.2	Utilize advanced peripherals to interface with ARM based microcontrollers
C310.3	Develop an Embedded System to solve real time problems.
C310.4	Make use of DSP Processors and resources for signal processing.
C311.1	Utilize the components of system software for implementation of assembler and macro processor
C311.2	Understand system software concepts as linker, loader and compilers
C311.3	Classify the Operating Systems with the knowledge of its fundamentals.
C311.4	Infer concurrency controls in OS
C311.5	Evaluate different memory management schemes
C311.6	Illustrate the IO and file management policies.
C312.1	Understand the problems in society, organization or industry and through literature survey and apply engineering knowledge to convert it into open ended problem statement.
C312.2	Select appropriate techniques, resources and modern engineering tools to demonstrate and interpret the said work through proper documentation.

C312.3	Design, analyze and evaluate the performance of the real time system with consideration of the ethical, societal and environmental approach.
C312.4	Communicate effectively on designed system through presentation report writing with proper product management and finance aspects.
BE[E&TC]	
C401.1	Implement digital system design modules using VHDL coding .
C401.2	Determine adequacy of efficient VHDL modeling by focusing design issues
C401.3	Understand architectures to model digital circuit with simulate, synthesis & prototype in CPLD/FPGA.
C401.4	Design digital CMOS circuit to estimate chip area , power & speed.
C401.5	Analyze issues & constraints in ASIC Design
C401.6	Apply testing methodology in digital design and built self test circuit.
C402.1	Understand MAC protocols and basic principles of wired & wireless LANs.
C402.2	Describe and analyze the Network layer services and its performance, IP protocol, IP Packet forwarding techniques, IPv4 and Mobile IP.
C402.3	Summarize unicast & multicast network routing algorithms and explain IGMP & IPv6 protocols.
C402.4	Compare transport layer protocols and evaluate their performance.
C402.5	Explain the concept of C-S Model for HTTP, DNS, FTP, DHCP, Email and Telnet using Windows XP/2003 Server systems applications.

C402.6	Discuss the concept of cryptography and elaborate network & internet security.
C403.1	Explain different terminologies of radiating elements to analyze various performance parameters.
C403.2	Analyze different antenna to evaluate array factor for antenna array.
C403.3	Implement different modes of transmission lines during the wave propagation.
C403.4	Design microwave communication network by using passive microwave components.
C403.5	Generate the electromagnetic waves with the help of microwave tubes and solid state devices.
C404.1	Understand the architecture and basic knowledge of IoT systems. (Unit 1)
C404.2	Interface sensors and actuators to IoT on WSN platform. (Unit 2)
C404.3	Apply wireless technology and IP based protocols for design of IoT systems. (Unit 3&4)
C404.4	Use data storage techniques in IoT systems. (Unit 5)
C404.5	Implement applications of IoT for betterment of society. (Unit 6)
C405.1	Illustrate the stages of product design aspects.
C405.2	Identify the basic requirements for hardware design & testing methods.
C405.3	Use the appropriate software platform for the testing & real time Programming.

C405.4	Understand the PCB design techniques.
C405.5	Test & debug the designed product.
C405.6	Recognize the importance of Preparation, Presentation, and Preservation of documents.
C407.1	Illustrate switching techniques for voice and data traffic.
C407.2	Evaluate the performance parameters in traffic engineering.
C407.3	Demonstrate basic concepts of cellular network & propagation mechanism.
C407.4	Interpret GSM network and its applications.
C407.5	Infer data transmission in GSM & its services.
C407.6	Understand evolution of GSM & CDMA technologies
C408.1	Describe the primary components fiber optical communication systems.
C408.2	Design Link power budget and Rise Time Budget by proper selection of components and check its viability.
C408.3	Understand the role of WDM components in advanced fiber optical communication systems.
C408.4	Analyze various launching techniques and orbital mechanisms to get communication system as per engineering norms
C408.5	Identify various satellite subsystems to meet the socio economic challenges
C408.6	Design and analyze satellite link for sustainable satellite communication

C409.1	Analyze the type of control system for their selection in process industry.
C409.2	Design a signal conditioning circuit as per the sensor interface requirement.
C409.3	Discover the need of various controller modes and actuators for applications in multi-disciplinary process and environment.
C409.4	Interpret PLC architectures and modern communication technology for various industrial systems by comparing them.
C409.5	Implement a SCADA and HMI system for automation applications.
C409.6	Understand CNC Machine tools and process.
C410.1	Understand Wireless Sensor Network different Concepts and Terminologies.
C410.2	Recognize use of Radio Communication and importance of Link Management in WSN
C410.3	Illustrate various wireless standards and protocols associated with Wireless Sensor Network
C410.4	Identify Localization concept and Routing Techniques used in WSN
C410.5	Explain various techniques of Data Aggregation and importance of security in Wireless Sensor Network
C410.6	Monitor and Coordinate the issues involved in design and deployment of Wireless Sensor Network
C411.1	Understand the problems in society, organization or industry and through literature survey and apply engineering knowledge to convert it into open ended problem statement.
C411.2	Select appropriate techniques, resources and modern engineering tools to demonstrate and interpret the said work through proper documentation.

C411.3	Design, analyze and evaluate the performance of the real time system with consideration of the ethical, societal and environmental approach.
C411.4	Communicate effectively on designed system through presentation report writing with proper product management and finance aspects.
MBA	**SEM-I**
	101 – Managerial Accounting
CO101.1	DESCRIBE the basic concepts related to Accounting, Financial Statements, Cost Accounting, Marginal Costing, Budgetary Control and Standard Costing
CO101.2	EXPLAIN in detail, all the theoretical concepts taught through the syllabus.
CO101.3	PERFORM all the necessary calculations through the relevant numerical problems.
CO101.4	ANALYSE the situation and decide the key financial as well as non-financial elements involved in the situation.
CO101.5	EVALUATE the financial impact of the decision.
	102 - Organizational Behaviour
CO102.1	DESCRIBE the major theories, concepts, terms, models, frameworks and research findings in the field of organizational behavior.
CO102.2	EXPLAIN the implications of organizational behavior from the perspectives of employees, managers, leaders and the organization.
CO102.3	MAKE USE OF the Theories, Models, Principles and Frameworks of organizational behavior in specific organizational settings.
CO102.4	DECONSTRUCT the role of individual, groups, managers and leaders in influencing how people behave and in influencing organizational culture at large.
CO102.5	FORMULATE approaches to reorient individual, team, managerial and leadership behaviour inorder to achieve organizational goals.
CO102.6	ELABORATE UPON the challenges in shaping organizational behavior, organizational culture and organizational change.

	103 – Economic Analysis for Business Decisions
CO103.1	DEFINE the key terms in micro-economics.
CO103.2	EXPLAIN the key terms in micro-economics, from a managerial perspective.
CO103.3	IDENTIFY the various issues in an economics context and DEMONSTRATE their significance from the perspective of business decision making.
CO103.4	EXAMINE the inter-relationships between various facets of micro-economics from the perspective of a consumer, firm, industry, market, competition and business cycles.
CO103.5	DEVELOP critical thinking based on principles of micro-economics for informed business decision making.
CO103.6	ANTICIPATE how other firms in an industry and consumers will respond to economic decisions made by a business, and how to incorporate these responses into their own decisions.
	104 - Business Research Methods
CO104.1	DEFINE various concepts & terms associated with scientific business research.
CO104.2	EXPLAIN the terms and concepts used in all aspects of scientific business research.
CO104.3	MAKE USE OF scientific principles of research to SOLVE contemporary business research problems.
CO104.4	EXAMINE the various facets of a research problem and ILLUSTRATE the relevant aspects of the research process from a data driven decision perspective.
CO104.5	JUDGE the suitability of alternative research designs, sampling designs, data collection instruments and data analysis options in the context of a given real-life business research problem from a data driven decision
CO104.6	FORMULATE alternative research designs, sampling designs, data collection instruments, testable hypotheses, data analysis strategies and research reports to address real-life business research problems.
	105 – Basics of Marketing
CO105.1	RECALL and REPRODUCE the various concepts, principles, frameworks and terms related to the function and role of marketing.
CO105.2	DEMONSTRATE the relevance of marketing management concepts and frameworks to a new or existing business across wide variety of sectors and ILLUSTRATE the role that marketing plays in the ‘tool kit’ of every organizational

CO105.3	APPLY marketing principles and theories to the demands of marketing function and practice in contemporary real world scenarios.
CO105.4	EXAMINE and LIST marketing issues pertaining to segmentation, targeting and positioning, marketing environmental forces, consumer buying behavior, marketing mix and Product Life Cycle in the context of real world marketing
CO105.5	EXPLAIN the interrelationships between segmentation, targeting and positioning, marketing environment, consumer buying behavior, marketing mix and Product Life Cycle with real world examples.
CO105.6	DISCUSS alternative approaches to segmentation, targeting and positioning, the marketing environment, consumer buying behavior, marketing mix and Product Life Cycle in the context of real world marketing offering (commodities,
	106 – Digital Business
CO106.1	DESCRIBE the conceptual framework of e commerce, mobile commerce and social commerce.
CO106.2	SUMMARIZE the impact of information, mobile, social, digital, IOT and related technologies on society, markets & commerce.
CO106.3	ILLUSTRATE value creation & competitive advantage in a digital Business environment.
CO106.4	EXAMINE the changing role of intermediaries, changing nature of supply chain and payment systems in the online and offline world.
CO106.5	ELABORATE upon the various types of digital business models and OUTLINE their benefits and limitations.
CO106.6	DISCUSS the various applications of Digital Business in the present day world.
	107 – Management Fundamentals
CO107.1	ENUMERATE various managerial competencies and approaches to management.
CO107.2	EXPLAIN the role and need of Planning, Organizing, Decision Making and Controlling.
CO107.3	MAKE USE OF the principles of goal setting and planning for simple as well as complex tasks and small projects.
CO107.4	COMPARE and CONTRAST various organizational structures of variety of business and not-for-profit entities in a real world context.
CO107.5	BUILD a list of the decision making criteria used by practicing managers, leaders and entrepreneurs in routine and non-routine decision making situations and EVALUATE and EXPLAIN the same.

CO107.6	FORMULATE and DISCUSS a basic controlling model in a real life business, start up and not-for-profit organizational context.
	109 – Entrepreneurship Development
CO109.1	DEFINE the key terms, LIST the Attributes and Characteristics of Entrepreneurs features and ENUMERATE the Factors influencing Entrepreneurship Growth.
CO109.2	DISCUSS various theories of entrepreneurship and the entrepreneurship development ecosystem in Indian context.
CO109.3	APPLY the theories of entrepreneurship and entrepreneurship development framework to analyze and identify entrepreneurial opportunities.
CO109.4	DISCRIMINATE between potential options available for entrepreneur for embarking on establishing a Start Up
CO109.5	EVALUATE the start up ecosystem and the entrepreneurial opportunities in light of requirements of a business plan.
CO109.6	CREATE a business plan that captures entrepreneurs and variety of entrepreneur motivations, entrepreneur culture and sectoral opportunities and financing options.
	110 – Essentials of Psychology for Managers
CO110.1	DEFINE the basic concepts of psychology.
CO110.2	EXPLAIN the sensing and perceiving processes.
CO110.3	APPLY principles of learning and conditioning to human behavior.
CO110.4	ILLUSTRATE the linkages between learning, memory and information processing.
CO110.5	EXPLAIN the basic intrapersonal processes that influence social perception.
	113 - Verbal Communication Lab
CO113.1	RECOGNIZE the various elements of communication, channels of communication and barriers to effective communication.
CO113.2	EXPRESS themselves effectively in routine and special real world business interactions.

CO113.3	DEMONSTRATE appropriate use of body language.
CO113.4	TAKE PART IN professional meetings, group discussions, telephonic calls, elementary interviews and public speaking activities.
CO113.5	APPRAISE the pros and cons of sample recorded verbal communications in a business context.
CO113.6	CREATE and DELIVER effective business presentations, using appropriate technology tools, for common business situations.
	115 - Selling & Negotiations Skills Lab
CO115.1	DESCRIBE the various selling situations and selling types.
CO115.2	OUTLINE the pre-sales work to be carried out by a professional salesperson.
CO115.3	IDENTIFY the key individuals involved in a real world sales process for a real world product/ service / e-product / e-service.
CO115.4	FORMULATE a sales script for a real world sales call for a product/ service / e product / e-servi
CO115.5	DECONSTRUCT the pros and cons of sample real world sales calls for a product/ service / e-product / e-service.
CO115.6	DEVELOP a sales proposal for a real world product/ service / e-product / e service and for a rea
	116 - MS Excel
CO116.1	SELECT appropriate menus and functions of MS Excel to Create, Format, Import, Merge, Save, Print Spreadsheets & Charts using business data.
CO116.2	SHOW how to do basic troubleshooting and fix mistakes most people make when working with spreadsheets.
CO116.3	USE various functions of MS Excel, Execute pivot table analysis, common (and powerful functions), and different types of lookups (vlookup, hlookup, and index/match).
CO116.4	ILLUSTRATE the use of the most commonly used data-manipulation commands in MS Excel.
CO116.5	DERIVE insights from multiple data sources in MS EXCEL and work with it to answer relevant business questions.

CO116.6	CREATE standard Excel Templates for routine business data management and analysis activities.
MBA	SEM-II
	201 – Marketing Management
CO201.1	DESCRIBE the key terms associated with the 4 Ps of marketing.
CO201.2	COMPARE and CONTRAST various approaches to pricing for a real world marketing offering (commodities, goods, services, e-products/ e-services.)
CO201.3	DEMONSTRATE an understanding of various channel options for a real world marketing offering (commodities, goods, services, e-products/ e service
CO201.4	EXAMINE the product line of a real world marketing offering (commodities, goods, services, e-products/ e-services.)
CO201.5	EXPLAIN the role of various communication mix elements for a real world marketing offering (commodities, goods, services, e-products/ e-services.)
CO201.6	DESIGN a marketing plan for a real world marketing offering (commodities, goods, services, e-products/ e-services.)
	202 – Financial Management
CO202.1	DESCRIBE the basic concepts related to Financial Management, Various techniques of Financial Statement Analysis, Working Capital, Capital Structure, Leverages and Capital Budgeting.
CO202.2	EXPLAIN in detail all theoretical concepts throughout the syllabus
CO202.3	PERFORM all the required calculations through relevant numerical problems.
CO202.4	ANALYZE the situation and comment on financial position of the firm estimate working capital required decide ideal capital structure evaluate various project proposals
CO202.5	EVALUATE impact of business decisions on Financial Statements, Working Capital, Capital Structure and Capital Budgeting of the firm
	203 – Human Resource Management
CO203.1	DESCRIBE the role of Human Resource Function in an Organization.

CO203.2	ENUMERATE the emerging trends and practices in HRM.
CO203.3	ILLUSTRATE the different methods of HR Acquisition and retention.
CO203.4	DEMONSTRATE the use of different appraisal and training methods in an Organization.
CO203.5	OUTLINE the compensation strategies of an organization
CO203.6	INTERPRET the sample job descriptions and job specifications for contemporary entry level roles in real world organizations.
	204 – Operations & Supply Chain Management
CO204.1	DEFINE basic terms and concepts related to Production, Operations, Services, Supply Chain and Quality Management.
CO204.2	EXPLAIN the process characteristics and their linkages with process-product matrix in a real world context.
CO204.3	DESCRIBE the various dimensions of production planning and control and their inter-linkages with forecasting.
CO204.4	CALCULATE inventory levels and order quantities and MAKE USE OF various inventory classification methods.
CO204.5	OUTLINE a typical Supply Chain Model for a product / service and ILLUSTRATE the linkages with Customer Issues, Logistic and Business Issues in a real world context.
CO204.6	ELABORATE upon different operational issues in manufacturing and services organisations where the decision-making element is emphasized.
	207 – Contemporary Frameworks in Management
CO207.1	DEFINE Emotional Intelligence (EQ), IDENTIFY the benefits of emotional intelligence and RELATE the 5 Dimensions of Trait EI Model to the practice of emotional intelligence.
CO207.2	DESCRIBE how companies achieve transition from being good companies to great companies, and DISCUSS why and how most companies fail to make the transition.
CO207.3	APPLY the 21 laws that make leadership work succesfully to improve your leadership ability and ILLUSTRATE its positive impact on the whole organization.
CO207.4	EXAMINE the fundamental causes of organizational politics and team failure.

CO207.5	EXPLAIN the approach to being effective in attaining goals by aligning oneself to the "true north" principles based on a universal and timeless character ethic.
	209 - Start Up and New Venture Management
CO209.1	DESCRIBE the strategic decisions involved in establishing a startup.
CO209.2	EXPLAIN the decision making matrix of entrepreneur in establishing a startup.
CO209.3	IDENTIFY the issues in developing a team to establish and grow a startup
CO209.4	FORMULATE a go to market strategy for a startup.
CO209.5	DESIGN a workable funding model for a proposed startup.
CO209.6	DEVELOP a convincing business plan description to communicate value of the new venture to customers, investors and other stakeholders.
	210 – Qualitative Research Methods
CO210.1	ENUMERATE the key terms associated with Qualitative research approach.
CO210.2	COMPARE and CONTRAST Qualitative research approach with the Quantitative approach.
CO210.3	CONSTRUCT appropriate research and sampling designs for Qualitative research work in real world business and non-business contexts
CO210.4	ILLUSTRATE the use of appropriate qualitative research methods in real world business and non-business contexts.
CO210.5	EVALUATE the quality of Qualitative Research work
CO210.6	COMBINE Qualitative and Quantitative research approaches in a real world research project.
	214 - Industry Analysis - Desk Research
CO214.1	DESCRIBE the key characteristics of the players in an industry.

CO214.2	SUMMARIZE the management ethos and philosophy of the players in the industry.
CO214.3	DEMONSTRATE an understanding of the regulatory forces acting on the industry.
CO214.4	COMPARE and CONTRAST, using tables and charts, the market and financial performance of the players in an industry.
CO214.5	ASSESS the impact of recent developments on the industry and its key players.
CO214.6	PREDICT the future trajectory of the evolution of the industry in the immediate future (1 to 3 years).
	205MKT: Marketing Research
CO205MKT.1	IDENTIFY and DESCRIBE the key steps involved in the marketing research process.
CO205MKT.2	COMPARE and CONTRAST various research designs, data sources, data collection instruments, sampling methods and analytical tools and SUMMARIZE their strengths & weaknesses.
CO205MKT.3	DEMONSTRATE an understanding of the ethical framework that market research needs to operate within
CO205MKT.4	ANALYSE quantitative data and draw appropriate Inferences to address a real life marketing issue.
CO205MKT.5	DESIGN a market research proposal for a real life marketing research problem and EVALUATE a market research proposal.
CO205MKT.6	PLAN and UNDERTAKE qualitative or quantitative Market Research and demonstrate the ability to appropriately analyse data to resolve a real life marketing issue.
	206MKT: Consumer Behavior
CO206MKT.1	ENUMERATE social and psychological factors and their influence his/her behavior as a consumer.
CO206MKT.2	EXPLAIN fundamental concepts associated with consumer and organizational buying behavior.
CO206MKT.3	APPLY consumer behavior concepts to real world strategic marketing management decision making.
CO206MKT.4	ANALYSE the dynamics of human behavior and the basic factors that influence the consumer’s decision process.

CO206MKT.5	EXPLAIN the consumer and organizational buying behavior process for a variety of products (goods/services).
CO206MKT.6	DISCUSS the use of the Internet, e-commerce & information technology with respect to the changing consumer marketplace and ELABORATE on the various aspects of the changing Indian Consumer.
	217MKT: Integrated Marketing Communications
CO217MKT.1	DESCRIBE the IMC mix and the IMC planning process.
CO217MKT.2	EXAMINE the role of integrated marketing communications in building brand identity, brand equity, and customer franchise.
CO217MKT.3	CONSTRUCT a marketing communications mix to achieve the communications and behavioural objectives of the IMC campaign plan.
CO217MKT.4	ANALYZE and critically evaluate the communications effects and results of an IMC campaign to determine its success for a variety of brands.
CO217MKT.5	DESIGN a sales promotion campaign and CHOOSE the avenues for Public Relations, Publicity and Corporate Advertising for a consumer and a business-to-business product
CO217MKT.6	DEVELOP an integrated cross-media strategy and creative message and concept to reach the target audience and deliver the brand promise through an IMC campaign for a variety of brands.
	218MKT: Product and Brand Management
CO218MKT.1	DEFINE the key concepts and DESCRIBE the elements of a product strategy.
CO218MKT.2	EXPLAIN the process and methods of brand management, including how to establish brand identity and build brand equity.
CO218MKT.3	IDENTIFY the Brand Marketing Strategies for Leaders, Challengers, Followers and Niche Strategies for real life consumer, business products and services operating in various markets and in the digital space.
CO218MKT.4	EXAMINE the key brand concepts by articulating the context of and the rationale of application for real life consumer, business products and services operating in various markets and in the digital space.
CO218MKT.5	FORMULATE effective branding strategies for real life consumer, business products and services operating in various markets and in the digital space.
CO218MKT.6	COLLECT brand audit data using appropriate tools and PROPOSE strategic recommendations for Reinforcing / Revitalizing / Rejuvenating failed Brands for real life consumer, business products and services in various markets
	205FIN: Financial Markets and Banking Operations

CO205FIN.1	RECALL the structure and components of Indian financial system through banking operations & Financial Markets.
CO205FIN.2	UNDERSTAND the concepts of financial markets, their working and importance.
CO205FIN.3	ILLUSTRATE the working and contribution of Banks and NBFCs to the Indian Economy.
CO205FIN.4	ANALYZE the linkages in the Financial Markets.
CO205FIN.5	EXPLAIN the various banking and accounting transactions.
CO205FIN.6	DEVELOP necessary competencies expected of a finance professional.
	206FIN: Personal Financial Planning
CO206FIN.1	UNDERSTAND the need and aspects of personal financial planning
CO206FIN.2	Describe the investment options available to an individual
CO206FIN.3	IDENTIFY types of risk and means of managing it
CO206FIN.4	DETERMINE the ways of personal tax planning
CO206FIN.5	EXPLAIN retirement and estate planning for an individual and design a financial plan
CO206FIN.6	CREATE a financial plan for a variety of individuals.
	217FIN: Securities Analysis & Portfolio Management
CO217FIN.1	REMEMBER various concepts taught in the syllabus.
CO217FIN.2	EXPLAIN various theories of Investment Analysis and Portfolio Management.
CO217FIN.3	CALCULATE risk and return on investment using various concepts covered in the syllabus.

CO217FIN.4	ANALYZE and DISCOVER intrinsic value of a security.
CO217FIN.5	DESIGN/ CREATE optimal portfolio.
	219FIN: Direct Taxation
CO219FIN.1	UNDERSTAND various basic concepts/ terminologies related Direct Taxation
CO219FIN.2	EXPLAIN how tax planning can be done.
CO219FIN.3	ILLUSTRATE how online filling of various forms and returns can be done.
CO219FIN.4	CALCULATE Gross Total Income and Income Tax Liability of an individual assessee.
CO219FIN.5	ANALYZE and DISCOVER intrinsic value of a security.
CO219FIN.6	DESIGN/ DEVELOP / CREATE tax saving plan.
	205HRM: Competency Based Human Resource Management System
CO205HRM.1	DEFINE the key terms related to performance management and competency development.
CO205HRM.2	EXPLAIN various models of competency development.
CO205HRM.3	PRACTICE competency mapping.
CO205HRM.4	ANALYSE competencies required for present and potential future job roles at various levels and across variety of organizations.
CO205HRM.5	DESIGN and MAP their own competency and plan better and appropriate career for themselves.
CO205HRM.6	DEVELOP a customized competency model in accordance with the corporate requirements.
	206HRM: Employee Relations and Labour Legislations

CO206HRM.1	SHOW awareness of important and critical issues in Employee Relations
CO206HRM.2	INTERPRET and relate legislations governing employee relations.
CO206HRM.3	DEMONSTRATE an understanding of legislations relating to working environment.
CO206HRM.4	OUTLINE the role of government, society and trade union in ER.
CO206HRM.5	EXPLAIN aspects of collective bargaining and grievance handling.
CO206HRM.6	DISCUSS the relevant provisions of various Labour Legislations.
	217HRM: Labour Welfare
CO217HRM.1	ENUMERATE the key concepts of the subject matter.
CO217HRM.2	DESCRIBE the key aspects of the labour policy regulation in the country.
CO217HRM.3	IDENTIFY the applicability of various legislations to variety of real world organizations.
CO217HRM.4	EXAMINE the traditional concept of labour welfare in the industry.
CO217HRM.5	EXPLAIN the conditions of labour and their welfare and social security needs in the country.
CO217HRM.6	ELABORATE upon the perspective of labour problems and remedial measures in the country.

DEPARTMENT OF INFROMATION TECHNOLOGY

SE[IT]

C201	Discrete Mathematics

C201.1	Formulate and apply formal proof techniques and solve the problems with logical reasoning
C201.2	Analyze and evaluate the combinatorial problems by using probability theory.
C201.3	Apply the concepts of graph theory to devise mathematical models
C201.4	Analyze types of relations and functions to provide solution to computational problems.
C201.5	Identify techniques of number theory and its application.
C201.6	Identify fundamental algebraic structures.
C202	Logic Design & Computer Organization
C202.1	Perform basic binary arithmetic & simplify logic expressions.
C202.2	Grasp the operations of logic ICs and Implement combinational logic functions using ICs.
C202.3	Comprehend the operations of basic memory cell types and Implement sequential logic functions using ICs.
C204.4	Elucidate the functions & organization of various blocks of CPU.
C202.5	Understand CPU instruction characteristics, enhancement features of CPU.
C202.6	Describe an assortment of memory types (with their characteristics) used in computer systems and basic principle of interfacing input, output devices.
C203	Data Structure & Algorithms
C203.1	Perform basic analysis of algorithms with respect to time and space complexity.
C203.2	Select appropriate searching and/or sorting techniques in the application development.
C203.3	Implement abstract data type (ADT) and data structures for given application.

C203.4	Design algorithms based on techniques like brute -force, divide and conquer, greedy, etc.
C203.5	Apply implement learned algorithm design techniques and data structures to solve problems.
C203.6	Design different hashing functions and use files organizations.
C204	Object-Oriented Programming
C204.1	Differentiate various programming paradigms.
C204.2	Identify classes, objects, methods, and handle object creation, initialization, and Destruction to model real-world problems.
C204.3	Identify relationship among objects using inheritance and polymorphism principles.
C204.4	Handle different types of exceptions and perform generic programming.
C204.5	Use of files for persistent data storage for real world application.
C204.6	Apply appropriate design patterns to provide object-oriented solutions.
C205	Basics of Computer Network
C205.1	Understand and explain the concepts of communication theory and compare functions of OSI and TCP/IP model.
C205.2	Analyze data link layer services, error detection and correction, linear block codes, cyclic Codes, framing and flow control protocols.
C205.3	Compare different access techniques, channelization and IEEE standards.
C205.4	Apply the skills of subnetting, supernetting and routing mechanisms.
C205.5	Differentiate IPv4 and IPv6.
C205.6	Illustrate services and protocols used at transport layer.

C207		**Data Structure & Algorithms Lab**
	C207.1	Analyze algorithms and to determine algorithm correctness and time efficiency class.
	C207.2	Implement abstract data type (ADT) and data structures for given application.
	C207.3	Design algorithms based on techniques like brute -force, divide and conquer, greedy, etc.).
	C207.4	Solve problems using algorithmic design techniques and data structures.
	C207.5	Analyze of algorithms with respect to time and space complexity.
C208		**Object Oriented Programming Lab**
	C208.1	Differentiate various programming paradigms.
	C208.2	Identify classes, objects, methods, and handle object creation, initialization, and destruction to model real-world problems.
	C208.3	Identify relationship among objects using inheritance and polymorphism.
	C208.4	Handle different types of exceptions and perform generic programming
	C208.5	Use file handling for real world application.
	C208.6	Apply appropriate design patterns to provide object-oriented solutions.
C209		**Soft Skill Lab**
	C209.1	Introspect about individual's goals, aspirations by evaluating one's SWOC and think creatively
	C209.2	Develop effective communication skills including Listening, Reading, Writing and Speaking.
	C209.3	Constructively participate in group discussion, meetings and prepare and deliver Presentations.

C209.4	Write precise briefs or reports and technical documents.
C209.5	Practice professional etiquette, present oneself confidently and successfully handle personal interviews.
C209.6	Function effectively in multi-disciplinary and heterogeneous teams through the knowledge of team work, Inter-personal relationships, conflict management and leadership quality.
C210	**Mandatory Audit Course3: Quantitative Aptitude & Logical Reasoning**
C210.1	Apply basic concepts of quantitative abilities
C210.2	Use logical reasoning for solving real world problems
C210.3	Compete in examinations like internships, industry placements, postgraduate admissions, civil services etc.
C211	Engineering Mathematics-III
C211.1	Solve Linear differential equations, essential in modelling and design of computer-based systems.
C211.2	Apply concept of Fourier transform and Z-transform and its applications to continuous and discrete systems and image processing.
C211.3	Apply Statistical methods like correlation& regression analysis and probability theory for data analysis and predictions in machine learning.
C211.4	Solve Algebraic &Transcendental equations and System of linear equations using numerical techniques.
C211.5	Obtain Interpolating polynomials, numerical differentiation and integration, numerical solutions of ordinary differential equations used in modern scientific computing.
C212	Processor Architecture
C212.1	Apprehend architecture and memory organization of PIC 18 microcontroller.
C212.2	Implement embedded C programming for PIC 18.

C212.3	Use concepts of timers and interrupts of PIC 18.
C212.4	Demonstrate real life applications using PIC 18.
C212.5	Analyze architectural details of ARM processor.
C213	Database Management System
C213.1	Apply fundamental elements of database management systems.
C213.2	Design ER-models to represent simple database application scenarios.
C213.3	Formulate SQL queries on data for relational databases.
C213.4	Improve the database design by normalization & to incorporate query processing.
C213.5	Apply ACID properties for transaction management and concurrency control.
C213.6	Analyze various database architectures and technologies.
C214	Computer Graphics
C214.1	Specify mathematical and logical aspects for developing elementary graphics operations like scan conversion of points, lines and circle and apply it for problem solving.
C214.2	Explain and employ techniques of geometrical transforms to produce position and manipulate objects in 2 dimensional and 3-dimensional spaces respectively.
C214.3	Describe mapping from a world coordinates to device coordinates, clipping, and projections in order to produce 3D images on 2D output device.
C214.4	Apply the concepts of rendering, shading, animation, curves and fractals using computer graphics tools in design, development and testing of 2D, 3D modeling applications.
C214.5	Develop the competency to understand the concepts related to Virtual reality.
C215	Software Engineering

C215.1	Classify various software application domains.
C215.2	Analyze software requirements by using various modeling techniques.
C215.3	Translate the requirement models into design models.
C215.4	Apply planning and estimation to any project.
C215.5	Use quality attributes and testing principles in software development life cycle
C215.6	Discuss recent trends in Software engineering by using CASE and agile tools.
C216	Programming Skill Development Lab
C216.1	Apply concepts related to embedded C programming.
C216.2	Develop and Execute embedded C program to perform array addition, block transfer, sorting operations
C216.3	Perform interfacing of real-world input and output devices to PIC18FXXX microcontroller
C216.4	Use source prototype platform like Raspberry-Pi/Beagle board/Arduino.

TE[IT]

C301	Theory of computation
C301.1	Able to Design Finite State Machine with and without output for a given problem.
C301.2	Able to Construct Regular Expression for a given formal language.
C301.3	Able to Identify Context Free Grammar and apply grammar rules for syntax analysis.
C301.4	Able to Design Pushdown Automata, Post Machine and Turing machine for a given formal language.

C301.5	Able to Interpret the problems of decidability, reducibility and time complexity.
C302	Database Management Systems
C302.1	Describe the basic functionality of RDBMS and analyze database model for a sample system.
C302.2	Design a database and implement a database schema for a given problem domain using SQL commands.
C302.3	Apply transaction management concepts and advanced features of SQL to solve given problem.
C302.4	Describe techniques for concurrency control and recovery management, different database architectures.
C302.5	Describe the impact of big data on the information industry using Emerging Database Technologies.
C302.6	Describe the concept of data warehousing and data mining.
C303	Software engineering & Project Management
C303.1	To analyze and apply appropriate lifecycle model of software development
C303.2	To identify software requirements by applying various modeling techniques.
C303.3	To apply project planning and scheduling techniques in given project management task
C303.4	To understand principles of agile development, SCRUM process and analyze agile process model from other process models.
C303.5	To apply various software tools and techniques for project monitoring and control with risk and quality management.
C303.6	To practice current and future trends of IT industry in software engineering and project management.
C304	Operating System

C304.1	Describe the concept of Operating system and Implement Shell programming as well as kernel programming.
C304.2	To apply the concept of process, thread and Implement Process management System call.
C304.3	To implement Classical Synchronization Problems and describe the concept of memory management.
C304.4	To apply the concept of Disk scheduling and Implement File Handling System Calls.
C305	Human-Computer Interaction
C305.1	To explain importance of HCI study and principles of user-centered design (UCD) approach.
C305.2	To develop understanding of human factors in HCI design.
C305.3	To develop understanding of models, paradigms and context of interactions.
C305.4	To design effective user-interfaces following a structured and organized UCD process.
C305.5	To evaluate usability of a user-interface design.
C305.6	To apply cognitive models for predicting human-computer-interactions.
C310	Computer Network Technology
C310.1	Classify the routing protocols and analyses how to assign the IP addresses for the given network
C310.2	To implement a network protocol based on socket programming.
C310.3	Configure servers by demonstrating different servers with their applications.
C310.4	Describe different wireless technologies and IEEE standards.
C310.5	Analyze Routing Protocols for Ad-hoc Wireless Networks and Implement wireless sensor network.

C310.6	To develop applications on emerging trends in communication networks
C306	SOFTWARE LABORATORY - I
C306.1	To install and configure database systems.
C306.2	To analyze database models & entity relationship models
C306.3	To design and implement a database schema for a given problem-domain
C306.4	To understand the relational and document type database systems.
C306.5	To populate and query a database using SQL DML/DDL commands.
C306.6	To populate and query a database using MongoDB commands.
C307	SOFTWARE LABORATORY – II
C307.1	To understand the basics of Linux commands and program the shell of Linux
C307.2	To develop various system programs for the functioning of operating system.
C307.3	To implement basic building blocks like processes, threads under the Linux
C307.4	To develop various system programs for the functioning of OS concepts in user space like concurrency control and file handling in Linux.
C307.5	To design and implement Linux Kernel Source Code.
C307.6	To develop the system program for the functioning of OS concepts in kernel space like embedding the system call in any Linux kernel.
C308	**SOFTWARE LABORATORY – III**
C308.1	To identify the needs of users through requirement gathering.

C308.2	To apply the concepts of Software Engineering process models for project development.
C308.3	To apply the concepts of HCI for user-friendly project development.
C308.4	To deploy website on live webserver and access through URL.
C308.5	To understand, explore and apply various web technologies.
C308.6	To develop team building for efficient project development.
C309	**Audit Course 3:Professional Ethics and Etiquettes**
C309.1	To summarize the principles of proper courtesy as they are practiced in the workplace.
C309.2	To describe ways to apply proper courtesy in different professional situations.
C309.3	To practice appropriate etiquettes in the working environment and day to day life.
C309.4	To learn and build proper practices for global corporate world.
C310	**Computer Network and Security**
C310.1	Know Responsibilities, services offered and protocol used at application layer of network
C310.2	Understand wireless network and different wireless standards.
C310.3	Recognize the Adhoc Network's MAC layer, routing protocol and Sensor network architecture.
C310.4	Define the principal concepts of network security and Understand network security threats,security services, and countermeasures
C310.5	Apply basic cryptographic techniques in application development.
C310.6	Gain a good comprehension of the landscape of cyber security Vulnerabilities & describe typical threats to modern digital systems.

C311	Data Science and Big Data Analytics
C311.1	Understand Big Data primitives
C311.2	Learn and apply different mathematical models for Big Data.
C311.3	Demonstrate Big Data learning skills by developing industry or research applications.
C311.4	Analyze and apply each learning model comes from a different algorithmic approach and it will perform differently under different datasets.
C311.5	Understand, apply and analyze needs, challenges and techniques for big data visualization.
C311.6	Learn different programming platforms for big data analytics.
C311	Web Application Development
C312.1	Develop Static and Dynamic website using technologies like HTML, CSS, Bootstrap.
C312.2	Demonstrate the use of web scripting languages.
C312.3	Develop web application with Front End & Back End Technologies.
C312.4	Develop mobile website using JQuery Mobile.
C312.5	Deploy web application on cloud using AWS.
C313	Elective –II (Software Modeling and Design)
C313.1	Understand basics of object oriented methodologies and Unified Modeling Language (UML).
C313.2	Understand and apply analysis process, use case modeling, domain/class modeling
C313.3	Design and apply interaction and behavior modeling on a given system.

C313.4	Comprehend OO design process and business, access and view layer class design.
C313.5	Recognize the software design principles and patterns to be applied on system.
C313.6	Getstarted on study of architectural design principles and guidelines in the various type of application development.
C314	Internship
C314.1	To develop professional competence through industry internship
C314.2	To apply academic knowledge in a personal and professional environment
C314.3	To build the professional network and expose students to future employees.
C314.4	To Apply professional and societal ethics in their day to day life.
C314.5	To become a responsible professional having social, economic and administrative considerations.
C314.6	To make own career goals and personal aspirations.
C315	Computer Network Security Lab
C315.1	Design and configure small size network and associated networking commands.
C315.2	Understand various client/server environments to use application layer protocols.
C315.3	Use basic cryptographic techniques in software and system design.
C315.4	Apply methods for authentication, access control, intrusion detection.
C316	DS & BDA Lab
C316.1	Apply Big data primitives and fundamentals for application development.

C316.2	Explore different Big data processing techniques with use cases.
C316.3	Apply the Analytical concept of Big data using Python.
C316.4	Visualize the Big Data using Tableau.
C316.5	Design algorithms and techniques for Big data analytics.
C316.6	Design and develop Big data analytic application for emerging trends.
C317	Laboratory Practice-II (Web Application Development)
C317.1	Develop Static and Dynamic responsive website using technologies HTML, CSS, Bootstrapand AJAX.
C317.2	Create Version Control Environment.
C317.3	Develop an application using front end and backend technologies.
C317.4	Develop mobile website using JQuery Mobile.
C317.5	Deploy web application on cloud using AWS.
C318	Laboratory Practice-II (Software Modeling Design)
C318.1	Develop use case model with the help of UML notations.
C318.2	Develop and implement analysis model and design model.
C318.3	: Develop and implement Interaction and behavior Model.

BE[IT]

C401	**Information and Cyber Security**

C401.1	Design and implement the solution to the complex engineering problem of Information and
	Cyber using Number theory.
C401.2	Able to analyze, implement various security algorithm and Develop analytical competency to
	identify the solutions to various security principles.
C401.3	Able to identify risk analysis for information security.
C401.4	To identify need of Cyber Security and cyber-crime techniques to state Laws that govern
	cyber crime.
C402	Machine Learning and Applications
C402.1	Explain the concept of machine learning.
C402.2	Apply classification methods to measure performance and accuracy.
C403.3	Apply regression methods to measure performance and accuracy and discuss the concept of theory of generalization.
C404.4	Demonstrate logic based ,algebraic ,probabilistic model.
C404.5	To describe trends in machine learning.
C403	Software Design and Modelling
C403.1	Define and understand object oriented methodologies, basics of Unified Modeling Language (UML).
C403.2	Analysis of Object oriented process, use case modeling, domain/class, Interaction and Behavior modeling.
C403.3	Discuss and design process of business, access and view layer of class design.

C403.4	Compute study of GRASP principles and GoF design patterns.
C403.5	Study of architectural design principles and guidelines in the various type of application development.
C404	Elective-I: Business Intelligence
C404.1	To Comprehend the Information Systems and development approaches of intelligent system.
C404.2	To Evaluate and rethink business processes using information systems.
C404.3	To Propose the Framework for business intelligence.
C404.4	To Get acquainted with the Theories, techniques, and considerations for capturing organizational intelligence.
C404.5	To align business intelligence with business strategy.
C404.6	To apply the techniques for implementing business intelligence systems.
C405	Elective-II: Software Testing and Quality Analysis
C405.1	Describe software testing process and to illustrate the role of software tester in software development process.
C405.2	Investigate the scenario and to select the proper testing technique to test the software.
C405.3	Explore the test automation concepts and tools and estimation of cost, schedule based on standard metrics.
C405.4	Choose appropriate quality assurance models and develop quality.
C405.5	Describe different software quality assurance trends.
C406	Computer Laboratory VII
C406.1	The students will be able to implement and port controlled and secured access to software systems and networks.

C406.2	The students will be able to build learning software in various domains.
C407	Computer Laboratory VIII
C407.1	Draw, discuss different UML 2.0 diagrams, their concepts, notation, advanced notation, forward and reverse engineering aspects.
C407.2	Identify different software artifacts used to develop analysis and design model from requirements.
C407.3	Develop use case model.
C407.4	Develop, implement analysis model and design model.
C407.5	Develop, implement Interaction and behavior Model.
C407.6	Implement an appropriate design pattern to solve a design problem.
C408	Project Phase-I
C408.1	To show preparedness to study independently in chosen domain of Information Technology and programming languages and apply their acquired knowledge to variety of real time problem scenarios.
C408.2	To function effectively as a team to accomplish a desired goal.
C408.3	An understanding of professional, ethical, legal, security and social issues and responsibilities related to Information Technology Project.
C409	Audit Course V:Green Computing
C409.1	Understand the concept of green IT and relate it to sustainable development.
C409.2	Apply the green computing practices to save energy.
C409.3	Discuss how the choice of hardware and software can facilitate a more sustainable operation.
C409.4	Use methods and tools to measure energy consumption.

C410	Distributed Computing System
C410.1	Apply the principles of distributed systems to develop new applications.
C410.2	Develop the interface between different distributed applications using message passing communication techniques.
C410.3	Analyze different Synchronization and Election techniques used in distributed system.
C410.4	Analyze different security issues in distributed and multimedia systems.
C411	Ubiquitous Computing
C411.1	Describe the design of Ubicomp and its applications.
C411.2	Explain smart devices and services used by Ubicomp Systems.
C411.3	Describe the significance of actuators and controllers in real time application design.
C411.4	Explain the concept of HCI in the design of automation applications.
C411.5	Explain taxonomy of Ubicomp privacy and ways of addressing Ubicomp privacy.
C411.6	Describe Ubicomp communication and management.
C412	Elective III: Information Storage and Retrieval
C412.1	To understand the concept of Information retrieval.
C412.2	To deal with storage and retrieval process of text and multimedia data.
C412.3	To evaluate performance of any information retrieval system
C412.4	To understand importance of recommender system.

C412.5	To understand concept of multimedia and distributed information retrieval.
C413	Elective IV: RTCD
C413.1	To understand rural development and rural economy of India.
C413.2	To identify different measures and paradigms of rural development.
C413.3	To Understand and learn importance of technologies in rural development and use of ICT.
C413.4	To learn different measures of community development.
C413.5	To learn different forms of rural entrepreneurship.
C413.6	To understand challenges and opportunities in rural development by learning different case studies.
C414	Information Storage and Retrieval Laboratory
C414.1	Implement Retrieval algorithm for ISR.
C414.2	Apply Performance evaluation, storage and searching techniques on information storage retrieval.
C414.3	Discuss distributed multimedia IR and recommender systems for ISR.
C414.4	Analyze various web searching techniques and implement web crawler.
C415	COMPUTER LABORATORY-IX
C415.1	Demonstrate knowledge of the core concepts and techniques in distributed systems
C415.2	Learn how to apply principles of state-of-the-Art Distributed systems in practical application.
C415.3	Design, build and test application programs on distributed systems.

C416	COMPUTER LABORATORY-X
C416.1	Set up the Android environment and explain the Evolution of cellular networks (BT-2)
C416.2	Develop the User Interfaces using pre-built Android UI components (BT -6)
C416.3	Create applications for performing CURD SQLite database operations using Android(BT-6)
C416.4	Create the smart android applications using the data captured through sensors (BT-6)
C416.5	Implement the authentication protocols between two mobile devices for providing security (BT-3)
C416.6	Analyze the data collected through android sensors using any machine learning algorithm (BT4).
MCA	
Course Code	Course Title
IT11	Java Programming
CO1	Understand Basic Concepts of OOPs, Java, Inheritance, Package. (Understand)
CO2	Understand Exception handling, arrays and Strings and multi-threading in Java (Understand.)
CO3	Understand collection framework (Understand)
CO4	Develop GUI using Abstract Windows Toolkit (AWT) and event handling (Apply) CO5: Develop Web application using JSP and Servlet, JDBC (Apply)
IT12	Data Structure and Algorithms
CO1	Demonstrate linear data structures linked list, stack and queue (apply)
CO2	Implement tree, graph, hash table and heap data structures (apply)

CO3	Apply brute force and backtracking techniques (apply)
CO4	Demonstrate greedy and divide-conquer approaches (apply)
CO5	Implement dynamic programming technique (apply)
IT13	Object Oriented Software Engineering
CO1	Distinguish different process model for a software development. (Understand)
CO2	Design software requirements specification solution for a given problem definitions of a software system. (Analyze)
CO3	Apply software engineering analysis/design knowledge to suggest solutions for simulated problems (Analyze)
CO4	Design user interface layout for different types of applications (Apply)
CO5	CO5: Recognize and describe current trends in software engineering (Understand)
IT14	Operating System Concepts
CO1	Understand structure of OS, process management and synchronization. (Understand)
CO2	Understand multicore and multiprocessing OS. (Understand)
CO3	Explain Realtime and embedded OS (Understand)
CO4	Understand Windows and Linux OS fundamentals and administration. (Understand)
CO5	Solve shell scripting problems (Apply)
IT15	Network Technologies
CO1	Understand the basic concepts of Computer Network, and principle of layering (Understand)

CO2	Apply the error detection and correction techniques used in data transmission (Apply)
CO3	Apply IP addressing schemes and sub netting (Apply)
CO4	Understand the concept of routing protocols, Application layer protocols and Network Security (Understand)
CO5	Apply the socket programming basics to create a simple chat application (Apply)
	* Practicals
IT11L	Practical
CO1	Demonstrate Collection framework (Apply)
CO2	Develop GUI using awt and swing (Apply)
CO3	Develop Web application using JSP and Servlet, JDBC (Apply)
CO4	Apply Data Structure to solve problems using JavaScript (Apply)
ITC11	Mini Project
CO1	Create working project using tools and techniques learnt in this semester (Create)
IT21	Python Programming
CO1	Understand Demonstrate the concepts of python and modular programming. (Understand)
CO2	Apply the concepts of concurrency control in python (Apply)
CO3	Solve the real-life problems using object-oriented concepts and python libraries (Apply)
CO4	Demonstrate the concept of IO, Exception Handling, database (Apply)

CO5	Analyze the given dataset and apply the data analysis concepts and data visualization. (Analyze)
IT22	Software Project Management
CO1	Understand the process of Software Project Management Framework and Apply estimation techniques. (Apply)
CO2	Learn the philosophy, principles and lifecycle of an agile project. (Understand)
CO3	Demonstrate Agile Teams and Tools and Apply agile project constraints and trade-offs for estimating project size and schedule (Apply)
CO4	Explain Project Tracking and Interpretation of Progress Report (Understand)
CO5	Analyze Problem statement and evaluate User Stories (Analyze)
MT21	Optimization Techniques
CO1	Understand the role and principles of optimization techniques in business world (Understand)
CO2	Demonstrate specific optimization technique for effective decision making (Apply)
CO3	Apply the optimization techniques in business environments (Apply)
CO4	Illustrate and infer for the business scenario (Analyze)
CO5	Analyze the optimization techniques in strategic planning for optimal gain. (Analyze)
IT23	Advanced Internet Technologies
CO1	Outline the basic concepts of Advance Internet Technologies (Understand)
CO2	Design appropriate user interfaces and implements webpage based on given problem Statement (Apply)
CO3	Implement concepts and methods of NodeJS (Apply)

CO4	Implement concepts and methods of Angular (Apply)
CO5	Build Dynamic web pages using server-side PHP programming with Database Connectivity (Apply)
IT24	Advanced DBMS
CO1	Describe the core concepts of DBMS and various databases used in real applications (Understand)
CO2	Design relational database using E-R model and normalization (Apply)
CO3	Demonstrate XML database and nonprocedural structural query languages for data access (Apply)
CO4	Explain concepts of Parallel, Distributed and Object-Oriented Databases and their applications (Understand)
CO5	Apply transaction management, recovery management, backup and security – privacy concepts for database applications (Apply)
Practical	IT21L
CO1	Implement python programming concepts for solving real life problems. (Apply)
CO2	Implement Advanced Internet Technologies (Apply)
Mini Project	ITC21
CO1	Create working project using tools and techniques learnt in this semester (Create)
IT31	Mobile Application Development
CO1	Understand Various Mobile Application Architectures. (Understand)
CO2	Apply different types of widgets and Layouts. (Apply)
CO3	Describe Web Services and Web Views in mobile applications. (Understand)

CO4	Implement data storing and retrieval methods in android. (Apply)
CO5	Demonstrate Hybrid Mobile App Framework. (Apply)
IT32	Data Warehousing and Data Mining
CO1	CO1: Understand Data warehouse concepts, architecture and models (Understand) (Understand)
CO2	CO2: Learn and understand techniques of preprocessing on various kinds of data
CO3	CO3: Apply association Mining and Classification Techniques on Data Sets (Apply)
CO4	CO4: Apply Clustering Techniques and Web Mining on Data Sets (Apply)
CO5	CO5: Understand other approaches of Data mining (Understand)
IT33	Software Testing and Quality Assurance
CO1	Understand the role of software quality assurance in contributing to the efficient delivery of software solutions. (Understand)
CO2	Demonstrate specific software tests with well-defined objectives and targets. (Apply)
CO3	Apply the software testing techniques in commercial environments. (Apply)
CO4	Construct test strategies and plans for software testing. (Analyze)
CO5	Demonstrate the usage of software testing tools for test effectiveness, efficiency and coverage (Apply)
IT34	Knowledge Representation & Artificial Intelligence - ML, DL
CO1	Understand basic building block of Artificial Intelligence and Knowledge Representation.(Understand)
CO2	Apply Propositional Logic for knowledge representation. (Apply)

CO3	Design various models based on Machine Learning methodology (Apply) various hardware and software aspect used for AI and its application.(Understand)
CO4	Design various models based on Deep Learning methodology (Apply)
CO5	Understand various hardware and software aspect used for AI and its application.(Understand)
IT35	Cloud Computing
CO1	Describe the concepts of Cloud Computing and its Service Models& Deployment Models. (Understand)
CO2	Classify the types of Virtualization. (Understand)
CO3	Describe the Cloud Management and relate Cloud to SOA. (Understand)
CO4	Interpret Architecture and Pharrell Programing of Cloud Computing. (Apply)
CO5	Demonstrate practical implementation of Cloud computing. (Apply)
Practical	IT31L
CO1:	Develop mobile application. (Apply)
CO2:	Develop ML, DL models using Python (Apply)
Mini Project	ITC31
CO1:	Create working project using tools and techniques learnt in this semester (Create)
DevOps	IT41
CO1	describe the evolution of technology & timeline (Understand)
CO2	explain Introduction to various Devops platforms (Remember)

CO3	demonstrate the building components / blocks of Devops and gain an insight of the Devops Architecture. (Understand)
CO4	apply the knowledge gain about Devops approach across various domains (Apply)
CO5	build DevOps application (Apply)
PPM and OB	BM41
CO1	Describe and analyze the interactions between multiple aspects of management. (Understand)
CO2	Analyze the role of planning and decision making in Organization (Analyze)
CO3	Justify the role of leadership qualities, Motivation and Team Building. (Analyze)
CO4	Analyze stress management and conflict management (Analyze)
CO5	Describe Personality and Individual Behavior (Understand)
Project	ITC41
CO1:	Create working project using tools and techniques learnt in the programme (Create)

PRINCIPAL JSCOE