

D. Y. Patil College of Engineering & Technology, Kolhapur

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Department – Computer Science & Engineering

Course Name	Course Objectives	Course Outcomes
Applied Mathematics	<ol style="list-style-type: none">1. To develop mathematical skills and enhance thinking power of students.2. To give the knowledge to the students of fuzzy set theory, numerical methods probability and statistics with an emphasis on the application of solving engineering problems.3. To prepare students to formulate a mathematical model using engineering skills & interpret the solution in real world.	<ol style="list-style-type: none">1. Describe the statistical data numerically by using Lines of regression and Curve fittings.2. Solve basic problems in probability theory, including problems involving the binomial, Poisson, and normal distributions.3. Calculate numerical Integration.4. Define fuzzy sets using linguistic words and represent these sets by membership functions, convexity, Normality, support, etc.5. Solve examples on the principle in performing fuzzy number arithmetic operations such as Addition, Multiplication & fuzzy equation.6. Solve assignment problems by using different techniques of operation research.
Discrete Mathematics & Structures	<ol style="list-style-type: none">1. To expose the students to the mathematical logic related to computer science areas.2. To enhance the problem solving skills in the areas of theoretical computer science.3. To use mathematical concepts in the development of computer applications.	<ol style="list-style-type: none">1. Apply logic concepts in designing a program.2. Illustrate basic set concepts & apply operations onset.3. Minimize the Boolean Function.4. Apply basic concepts of probability to solve real world problem.5. Represent data structures using graph concepts.



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		6. Design abstract machine, detect deadlocks.
Data Structures	<ol style="list-style-type: none"> 1. To make the students familiar with basic data structures. 2. To provide students with foundation in computer programming/problem. 3. To teach the students to select appropriate data structures in computer applications. 4. To provide the students with the details of implementation of various data structures. 	<ol style="list-style-type: none"> 1. Identify the appropriate data structure for specific application. 2. Design and analyze programming problem statements. 3. Chose appropriate sorting and searching algorithms. 4. Outline the solution to the given software problem with appropriate data structure.
Computer Networks – I (PCC-CS304)	<ol style="list-style-type: none"> 1. To understand layered architecture and basic networking protocols 2. To illustrate the TCP/IP protocol internal details 	<ol style="list-style-type: none"> 1. Demonstrate concepts of Computer Networks. 2. Explain OSI and TCP/IP layered architecture 3. Implement network and data link layer. 4. Demonstrate TCP protocol in detail. 5. To analyze the protocol structure using network analyzing tools. 6. Apply the principals of socket programming in the networks.
Microprocessors	<ol style="list-style-type: none"> 1. To learn the Architecture and Basic Programming model. 2. To give the hands on experience of Assembly language programming for 8085 and 8086 Microprocessors 3. Differentiate between Microprocessors and Microcontrollers 4. To differentiate the 	<ol style="list-style-type: none"> 1. Describe the Architecture of 8085 microprocessors and microcontroller. 2. Classify the 8086 Assembly Instructions set and use in Assembly language Programs. 3. Explain Programming models of 8086 microprocessors. 4. Classify the 8086 Assembly Instructions set and use in Assembly language Programs.

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	microprocessor family.	5. Understand the higher processor architecture. 6. Understand the need for other Microprocessors.
C Programming	<ol style="list-style-type: none"> 1. To learn concepts of arrays and pointers in C. 2. To learn file handling in C. 3. To learn memory management in C. 4. To learn structures in C. 	<ol style="list-style-type: none"> 1. Articulate the principles of procedure oriented problem solving and programming. 2. Explain programming fundamentals including statements, control flow and recursion 3. Able to formulate problems and implement algorithms in C . 4. Analyze and use data structures to solve the complex problem statements. 5. Demonstrate file operations using file handling concepts through developing applications.
Soft Skills	<ol style="list-style-type: none"> 1. To make the engineering students aware of the importance, the role and the content of soft skills through instruction, knowledge acquisition, demonstration and practice. 2. To develop and nurture the soft skills of the students through individual and group activities. 3. To expose students to right attitudinal and behavioral aspects and to build the same through activities. 4. To encourage the all-round development of students by focusing on soft skills. 	<ol style="list-style-type: none"> 1. Effectively communicate through verbal/oral communication and improve the listening skills. 2. Actively participate in group discussion / meetings / interviews and prepare & deliver presentations. 3. Function effectively in multi-disciplinary and heterogeneous teams through the knowledge of team work, Inter-personal relationships, conflict management and leadership quality.

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Automata Theory	<ol style="list-style-type: none"> 1. To introduce students to the mathematical foundations of computation, the theory of formal languages and grammars. 2. To strengthen the students' ability to understand and conduct mathematical proofs for computations 3. To make the students understand the use of automata theory in Compilers & System Programming. 4. To analyze and design finite automata, push down automata, grammars & Turing machines. 	<ol style="list-style-type: none"> 1. Understand basic concepts of Regular Language and Regular Expressions. 2. Select appropriate abstract machine to recognize a given formal language. 3. Generate complex languages by applying Union, Intersection, Complement, Concatenation and Kleene * operations on simple languages. 4. Apply parsing concepts for syntax analysis. 5. Be familiar with thinking analytically and intuitively for problem solving situations in related areas of theory in computer science.
Computer Networks-II	<ol style="list-style-type: none"> 1. To understand the Client server model & socket interface. 2. To perceive IPv6 addressing and protocol. 3. To explain and learn basic internet technology protocols. 4. Simulate protocols using software tools. 	<ol style="list-style-type: none"> 1. Program the client server model using sockets. 2. Understand and apply next generation protocol and addressing model. 3. Elaborate the fundamentals of Domain Name Systems. 4. Apply the concepts of Remote login and FTP in network applications. 5. Learn fundamentals of web, HTTP and e-mail communication protocols. 6. Understand multimedia streaming and relevant protocols.

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<p>Computer Organization and Architecture</p>	<ol style="list-style-type: none"> 1. To provide a high-level overview of Computer organization. 2. To discuss the basic of I/O addressing and access. 3. To make the students aware of overall design and architecture of computer and its organization. 4. To analyze performance issues in processor and memory design of a digital computer. 	<ol style="list-style-type: none"> 1. To provide a high-level overview of Computer organization. 2. To discuss the basic of I/O addressing and access. 3. To make the students aware of overall design and architecture of computer and its organization. 4. To analyze performance issues in processor and memory design of a digital computer. 5. Conceptualize instruction level parallelism. 6. Understand the concept of memory techniques.
<p>Operating Systems-I</p>	<ol style="list-style-type: none"> 1. To make the students understand basic concepts of operating system 2. To expose the students to various functions of the Operating system and their usage 3. To give hands on exposure to Linux commands and system calls. 	<ol style="list-style-type: none"> 1. Understand the basic and advance concepts and various types of operating system. 2. Demonstrate Linux commands and implement system calls in their problem statements. 3. Study and implement process and memory management concepts including scheduling, synchronization, deadlocks, paging and segmentation. 4. Read and write into file system and I/O system using Linux platform. 5. Install VMware and use the platform for demonstration purpose.
<p>Software Engineering</p>	<ol style="list-style-type: none"> 1. To expose the students to basic concepts & principles of software engineering. 2. To make the student aware of the importance of SDLC in their project development work. 3. To expose the students to software testing techniques and software quality management. 	<ol style="list-style-type: none"> 1. Comprehend systematic methodologies of SDLC (Software Development LifeCycle) 2. Discriminate competing and feasible system requirements indicating correct real world problem scope and prepare stepwise system conceptual model using stakeholder analysis and requirement validation. 3. Prepare SRS document for a project 4. Apply software design and development techniques

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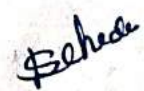
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		<p>5. Develop a quality software project through effective team-building, planning, scheduling and risk</p> <p>6. Understand testing methods at each phase of SDLC</p>
Object Oriented Programming	<p>1. To learn advanced features of the C++ programming language as a continuation of the previous course.</p> <p>2. To learn the characteristics of an object-oriented programming language: data abstraction and information hiding, inheritance, and dynamic binding of the messages to the methods.</p> <p>3. To learn the basic principles of object-oriented design and software engineering in terms of software reuse and managing complexity.</p> <p>4. To enhance problem solving and programming skills in C++ with extensive programming projects.</p> <p>5. To become familiar with the LINUX software development environment.</p>	<p>1. Use the characteristics of an object-oriented programming language in a program.</p> <p>2. Use the basic object-oriented design principles in computer problem solving.</p> <p>3. Use the basic principles of software engineering in managing complex software project.</p> <p>4. Program with advanced features of the C++ programming language.</p> <p>5. Develop programs in the LINUX programming environment.</p>
Mini Project	<p>1. To expose the students to solve the real world problems.</p> <p>2. To utilize the techniques. Skills and modern Engineering tools for building the project.</p> <p>3. To follow the methods and tasks as per SDOLC Approach</p>	<p>1. Define the problem statement.</p> <p>2. Organize, Plan and prepare the detailed project activities.</p> <p>3. Construct Flowchart, System Architecture based on the project description</p> <p>4. Implement the solution for their problem.</p>


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Information Security	<ol style="list-style-type: none"> 1. To introduce the principles of Crypto-Systems. 2. To expose students to various security services and mechanisms used. 3. To make the students aware of the security features of PGP, S/MIME, Digital Signatures, IPsec & SSL. 4. To make the students understand the system level security issues concerning threats, intruders and use of firewalls and trusted systems. 5. To make students to explore non-cryptographic and software vulnerabilities. 	<ol style="list-style-type: none"> 1. Understand principles of Crypto-systems. 2. Compare and analyze various security services and mechanisms. 3. Apply and use the features of PGP, S/MIME, DSA, IPsec, SSL in their profession. 4. Take precautions of their personal computing system from possible threats and attacks. 5. Explore newer vulnerabilities and provide the solutions to them.
System Programming	<ol style="list-style-type: none"> 1. To expose the students to the fundamentals of languages and processing. 2. To make students to learn design of grammars, assemblers and compilers. 3. To provide hands on experience to the students on simulation of linkers, loaders and software tools for UIs. 	<ol style="list-style-type: none"> 1. Student will be able to identify the role of system programs and application programs. 2. Student will be able to understand the basics of system programs like editors, compiler, assembler, linker, loader, interpreter and debugger. 3. Students able to describe the various concepts of assemblers and macro - processors. 4. Students able to understand the various phases of compiler and compare its working with assembler. 5. Students understand how linker and loader create an executable program from an

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		<p>object module created by assembler and compiler.</p> <p>6. Students will be able to create graphical user interfaces for basic programs and learn about terminal input/output through the libraries.</p>
Object Oriented Modeling and Design	<ol style="list-style-type: none"> 1. To Understand the Object Based View of the System 2. To design Problems using Object Oriented Analysis and Design Techniques 3. To Understand UML notations and compare with OMT 4. To inculcate necessary skills to handle complexities in Software Design 	<ol style="list-style-type: none"> 1. Ability to analyze and model software systems 2. Ability to construct OO view of the system 3. Ability to design a Software System using OMT design techniques. 4. Ability to design a Software System using UML design techniques.
Computer Algorithms	<ol style="list-style-type: none"> 1. To introduce algorithm design methods / techniques with analysis 2. To devise algorithm for given problem statement 3. To introduce complex computational problems 4. Introducing parallel algorithms 	<ol style="list-style-type: none"> 1. Understand and demonstrate algorithm design methods with analysis 2. Devise algorithm for given problem statement and analyze its space and time complexity by using recurrence relation 3. Categorize the problem to determine polynomial and non-polynomial based on its nature 4. Understand and demonstrate basic concepts of parallel algorithms

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<p>Computer Graphics and Multimedia</p>	<ol style="list-style-type: none"> 1. To provide knowledge to the students about basics of computer graphics and different display devices. 2. To expose students to the various 2D & 3D transformation & projection techniques. 3. To provide knowledge to the students about basics of Illumination models, surface rendering methods. 4. To make the students aware of multimedia system & Multimedia Authoring, Compression techniques 	<ol style="list-style-type: none"> 1. Express basic ideas of computer graphics and different display devices. 2. Understand & apply various transformation, projection and rendering techniques on graphical objects. 3. Identify & apply the intensity of light on graphical objects using different illumination models. 4. Understand multimedia system & use of Multimedia Authoring & Compression techniques on graphical objects.
<p>Internet of Things</p>	<ol style="list-style-type: none"> 1. To learn Internet of Things Technology 2. To know the basics of RFID, Sensor technologies. 3. To know the basics of IoT systems like Raspberry Pi, Arduino, and Banana Pi. 4. To aware students about wireless communication technologies and IoT applications. 	<ol style="list-style-type: none"> 1. Understand basic concepts of IoT 2. To learn and implement RFID technology in various applications. 3. To write programs for basic applications 4. To understand and implement different communication technologies in IoT systems.
<p>Java Programming</p>	<ol style="list-style-type: none"> 1. To introduce the concept of object-oriented programming using java. 2. To learn how to implement reliable and secure application using exception handling and package concept. 3. Have the ability to write program to perform file 	<ol style="list-style-type: none"> 1. Students will be able to articulate the principle of object-oriented problem solving & programming. 2. Students will be able to illustrate code reusability, security and abstraction using inheritance, package and interface. 3. Students will be able to develop reliable and user-friendly applications using exception handling and file handling.

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	<p>operations.</p> <p>4. To understand how to design components with java Swing API and present mechanism of multithreading.</p> <p>5. To familiarize database connectivity through JDBC and learn the collection framework.</p> <p>6. To explore the concept of networking and web programming using java servlet and jsp.</p>	<p>4. Students will be able to create desktop apps using SWING and event handling and also illustrate multithreading concepts.</p> <p>5. Students will be able to use JDBC & collection framework.</p> <p>6. Students will be able to apply network programming concept & develop web applications using servlet and jsp.</p>
<p>Business English</p>	<p>1. Develop basic skills to deal with people in business situations</p> <p>2. Increase their knowledge of key business concepts worldwide</p> <p>3. Write and read basic business reports, letters, e-mails etc.</p> <p>4. Expand vocabulary related to general business situations</p> <p>5. Develop confidence to deal with people and basic issues in the business world</p>	<p>1. Learn to communicate with others in practical, business oriented situations</p> <p>2. Learn to express themselves in English with greater fluency, accuracy and confidence</p> <p>3. Learn to handle themselves in English in a variety of business contexts, from negotiating, to using the telephone, to making presentations, to socializing</p> <p>4. Enhance the skills of listening, speaking, pronunciation skills, as well as business vocabulary</p> <p>5. Acquire the communicative competencies crucial for appropriate workplace behavior</p>

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Course Name	Course Objectives	Course Outcomes
Compiler Construction	<ol style="list-style-type: none"> 1. To introduce the fundamentals of compilers and their phases. 2. To design and implement phases of a compiler. 3. To expose the students to various tools like LEX and YACC. 	<ol style="list-style-type: none"> 1. Recall the compiler phases and compiler construction tools like LEX and YACC. 2. To design and implement Lexical Analyser for a simple language. 3. To design and implement Syntax analyser for a simple expression. 4. To apply Syntax directed translations and Syntax Directed definitions to generate intermediate code. 5. To identify appropriate code optimizing transformation for the given code. 6. To explain concept of code generation.
Operating System-II	<ol style="list-style-type: none"> 1. Fundamental architecture of UNIX operating system kernel. 2. Detail algorithms of buffer cache management. 3. Internal File system organizations and related algorithms in UNIX. 4. System calls for UNIX file system. 5. Process structure, creation and management in UNIX. 6. Architecture and algorithms of process scheduling and memory management. 7. I/O subsystem architecture and algorithms. 	<ol style="list-style-type: none"> 1. To understand UNIX kernel, its architectural components like file subsystem, process control subsystem, memory management. 2. To understand a concrete way (UNIX i-nodes) of organizing a file system on a physical storage medium. 3. To maintain UNIX directories, files, manage processes, manipulate data with proper use of pipes and file redirection, UNIX filters. 4. To implement and handle various UNIX system calls. 5. To explain the principles of paging, virtual memory (VM) and describe the data structures and components (both

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		hardware and software) that are necessary to implement it. 6. To perform shell programming involving decision control, looping and control flow statements on UNIX based machines.
Database Engineering	<ol style="list-style-type: none"> 1. To understand fundamental concepts and algorithms of Database Systems. 2. To gain familiarity with SQL and DBMS. 3. To learn database design techniques. 	<ol style="list-style-type: none"> 1. Understand fundamentals of database management systems. 2. Represent logical design of database using E-R Diagram. 3. Analyze & construct good database design. 4. Apply SQL queries to design & manage the database. 5. Understand transactions, concurrency control and apply to database system. 6. Understand failures in database and appropriate recovery techniques.
Machine Learning	<ol style="list-style-type: none"> 1. To understand Machine Learning Aspects. 2. To understand primitives in learning process by Computer. 3. To understand nature of problems solved with Machine Learning 	<ol style="list-style-type: none"> 1. Explain Machine Learning concepts. 2. Analyze the Machine Learning model. 3. Design solution using Machine Learning techniques. 4. To tackle real world problems in domain of data mining, information retrieval, computer vision, linguistics and bioinformatics, etc.

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<p>E-Commerce & Digital Marketing</p>	<ol style="list-style-type: none"> 1. To get the knowledge about business advantages of the e-commerce and digital marketing and its Importance. 2. To develop a digital marketing plan and to make SWOT analysis 3. To get introduced with various digital channels, business tools in social networking. 4. To understand the optimization of a Web site and SEO optimization 	<ol style="list-style-type: none"> 1. Students will be able to identify the importance of the e-commerce and digital marketing for business Success. 2. Students will be able to create a digital marketing plan, starting from the SWOT analysis and defining a target group 3. Students will be able to identifying digital channels, business tools used in social networking. 4. Students will be able to demonstrate the optimization of web site using business tools.
<p>Cyber Security</p>	<ol style="list-style-type: none"> 1. To gain knowledge about securing both clean and corrupted systems, protect personal data, and secure computer networks. 2. To examine secure software development practice. 3. To understand key terms and concepts in I.T. ACT. 4. To incorporate approaches for incident analysis and response 	<ol style="list-style-type: none"> 1. Explain the cyber security concepts. 2. Describe the cyber security vulnerabilities and prevention techniques. 3. Explain the different rules and regulations under I.T. ACT. 4. Explain the concepts of digital forensics & incident management
<p>C# Programming</p>	<ol style="list-style-type: none"> 1. Understand code solutions and compile C# projects within the .NET framework 2. Demonstrate knowledge of object-oriented concepts using C#.NET application 3. Create and manipulate GUI components in C# and interact with database using ADO.NET in window based application 4. Create network based and 	<ol style="list-style-type: none"> 1. Students will be able to develop correct, well-documented programs using the C# programming language. 2. Students will be able to learn to develop object-oriented programs using C# classes and objects 3. Students will be able to learn to use Windows Forms and WPF to create GUI-based programs 4. Students will be able to build networking and multithreading based

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	<p>multithreaded applications using C#</p> <p>5. Creating ASP.Net applications using standard .net controls</p> <p>6. Maintain session and controls related information for users in multi-user web applications</p>	<p>programs using C#</p> <p>5. Students will be able to design web applications using ASP.NET using ASP.NET controls in web applications.</p> <p>6. Students will be able to debug and deploy ASP.NET web applications and create database driven ASP.NET web applications.</p>
<p>Domain Specific Mini Project</p>	<p>1. To expose the students to use engineering approach to solve domain specific real time problem.</p> <p>2. To use the appropriate and newer technologies while developing the project.</p> <p>3. To learn the skills of team building and team work</p>	<p>1. Identify specific problem statement from a selected domain.</p> <p>2. Analyze the problem and prepare SRS and design document.</p> <p>3. Write code and carry out testing.</p> <p>4. Write a report covering details of the project and give presentation on a project.</p>

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Course Name	Course Objectives	Course Outcomes
Advanced Computer Architecture	<ol style="list-style-type: none"> 1. To understand different computer architectures 2. To learn concepts of pipeline architectures and different performance measures 3. To understand memory organizations 4. To understand latest technologies in parallel processing 5. To understand loosely coupled architectures 	<ol style="list-style-type: none"> 1. To identify trends in power, energy and cost of integrated circuits. 2. To explain concepts of pipeline, vector processing and different parallel processing architecture. 3. To demonstrate, apply and differentiate the knowledge of loosely and tightly coupled architectures in different case studies. 4. To compare data level parallelism in Vector, SIMD and GPU Architectures. 5. To solve data dependency problem using Bernstein's Condition.
Distributed Systems	<ol style="list-style-type: none"> 1. To present the principles underlying the function of distributed systems and their extension to grid and cloud computing and virtualization techniques 2. To expose students to current technology used to build architectures to enhance distributed computing infrastructures with various computing principles and paradigms, including grid and cloud computing 3. Expose students to past and current research issues in the field of distributed systems and new challenges in cloud computing 4. Enhance students understanding of key issues related to multi-level interoperability across a distributed infrastructure and across multiple heterogeneous and distributed 	<ol style="list-style-type: none"> 1. Apply the acquired knowledge of basic techniques in designing distributed systems using different architectures & styles. 2. Analyze different models for communication and synchronization techniques in distributed system for its appropriate usage. 3. Configure distributed file system and perform operations on files. 4. Develop application and deploy on different cloud types & models. 5. Evaluate virtualization levels / types and use in different scenarios. 6. Develop specified cloud services with security consideration.

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	resources in a dynamically changing computing environment	
Advanced Database Systems	<ol style="list-style-type: none"> 1. To learn basics of design of databases. 2. To acquire knowledge on parallel and distributed databases and its applications. 3. To study the usage and applications of Object Oriented database. 4. To Understand and perform common database administration tasks, such as database monitoring, performance tuning, data transfer, and security. 5. To understand the usage of advanced data models. 	<ol style="list-style-type: none"> 1. Explain concepts of parallel & distributed databases and their applications. 2. Demonstrate the usage of object oriented databases. 3. Understand and apply various security constraints on database. 4. Apply the knowledge of advanced data modeling in their project work. 5. Design distributed database applications.
Elective – I Soft Computing	<ol style="list-style-type: none"> 1. To learn fuzzy set theory and properties of Fuzzy sets. 2. To learn Neuro -Fuzzy modeling concepts. 3. To learn Neural networks and training algorithms. 4. To apply derivative based and derivative free optimization. 5. To demonstrate applications of computational intelligence. 	<ol style="list-style-type: none"> 1. To learn various soft computing tools. 2. To analyze ANN, Fuzzy, GA and Identify their applications in AI or ML. 3. To apply derivative base & derivative free optimization. 4. Demonstrate Different models to solve engineering & other problems.

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<p>Elective – I Mobile Applications</p>	<ol style="list-style-type: none"> 1. To develop problem solving abilities using Mobile Applications. 2. To study different Mobile OS. 3. To study procedure to develop applications using Mobile OS. 4. To study practical applications of Mobile 	<ol style="list-style-type: none"> 1. Understand the best practices for user interface design and problems faced to develop multi-platform application. 2. Identify the platforms, frameworks, tools used for mobile based applications development. 3. Select the different protocol, standards and tools for mobile app development. 4. Analyze the mechanism for client side and server side device detection to check the device compatibility for different services and functionality.
<p>Elective – I Ad-Hoc Wireless Networks</p>	<p>To expose students to:</p> <ol style="list-style-type: none"> 1. Adhoc wireless networks, their unique applications and design issues. 2. How Adhoc N/w works at MAC layer, forwarding mechanism and link recovery strategies. 3. Different routing mechanisms in Adhoc N/w, finding path from source node to destination node, recovery of routes. 4. Forming multicast sessions in Adhoc N/w, efficiently using resources available in networks. 5. Modification in traditional TCP protocol to make it best suitable for Adhoc Wireless Network. 6. Security and strategies for providing QoS& dealing with energy management in ad-hoc 	<ol style="list-style-type: none"> 1. Comparison with cellular network, its applications & issues in ad-hoc wireless network. 2. To Understand MAC protocols and its classification of ad-hoc wireless network. 3. To analyze the wireless unicast & multicast routing protocols including proactive & reactive approach. 4. To understand the Transport layer protocols and security in ad-hoc wireless networks.

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	wireless network.	
Web Technologies –	<ol style="list-style-type: none"> 1. To introduce students to emerging web technologies. 2. To teach front end web designing tools and to develop web applications. 3. To know XML concepts and its applications. 4. To motivate students to develop web applications using Servlets and JSP. 	<ol style="list-style-type: none"> 1. Understand and apply the basics of HTML and CSS to design Static webpage. 2. Understand and apply the basics of writing user defined XML tags and associated rules to organize and validate data in structured format for web application. 3. Write a server side scripting application using Servlet and JSP technology. 4. Design and develop web applications.
Project – I	<ol style="list-style-type: none"> 1. To apply technical knowledge for selected project topic. 2. To understand the problem identification, formulation and Design steps. 3. To illustrate the output of project in written and oral form. 	<ol style="list-style-type: none"> 1. Demonstrate a technical knowledge for their selected project topic. 2. Undertake problem identification, formulation and solution. 3. Communicate with engineers and community at large in written and oral forms.


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Course Name	Course Objectives	Course Outcomes
Data Analytics	<ol style="list-style-type: none"> 1. To understand Business Intelligence, decision support systems in Data warehouse. 2. To study the Data analysis using data mining, data preparation and exploration. 3. To foster the development of data mining capability in Hadoop and R and facilitate sharing of data mining des/functions/algorithms among Hadoop and R users. 	<ol style="list-style-type: none"> 1. Understand Business Intelligence, decision support systems and Data warehouse 2. Study the Data analysis using data mining, data preparation and exploration. 3. Learn basic concepts of Big Data and Hadoop Ecosystem with various tools & approaches. 4. Solve various Data Mining tasks using various rules and classification approaches. 5. Apply various Association rules and clustering methods to solve Data mining applications. 6. Study the concepts for exploring R and facilitate sharing of data mining codes/functions/algorithms among Hadoop and R users.
Project Management	<ol style="list-style-type: none"> 1. To provide students with a basic understanding of project management principles and practices. 2. To demonstrate competency in the creation and management of a project plan. 3. To understanding impact of Scope, Time and Cost management. 4. To understanding the software quality metrics and quality assurance. 	<ol style="list-style-type: none"> 1. Understand fundamental principles of Project Management. 2. Demonstrate the adequacy for project plan creation & management. 3. Apply tools & techniques for Project Management. 4. Identify quality standards and specifications of project performance and end product. 5. Recognize different risk identification strategies.


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	5. To develop strategies to calculate risk factors involved in IT projects.	
Real-time Operating System	<ol style="list-style-type: none"> 1. To understand basic real time operating system concepts. 2. To understand process scheduling in real time operating system. 3. To understand software engineering process for real time system design. 4. To learn programming languages for programming real time systems. 5. To understand different performance measures for real time O.S. 6. To understand different features of commercial real time operating systems. 	<ol style="list-style-type: none"> 1. To understand basic terminologies and hardware architecture in real time operating systems. 2. Students able to evaluate the job scheduling for a particular real time operating system. 3. Students able to analyze software engineering process and methodologies for real time operating system. 4. Students able to evaluate programming language and production process for real time operating process. 5. Students able to understand cost estimation and commercial real time operating systems.
Elective – II Internet of Things	<ol style="list-style-type: none"> 1. To learn Internet of Things Technology 2. To know the basics of RFID, sensor and GPS technologies 3. To aware students about wireless technologies and IoT applications 	
Elective – II Software Testing and Quality Assurance	<ol style="list-style-type: none"> 1. To Provide knowledge about fundamentals of software testing and software quality. 2. To understand the fundamentals of software verification. 3. To understand and evaluate metrics and models used in software testing. 4. To understand and compare testing web applications and desktop applications. 	<ol style="list-style-type: none"> 1. Describe the principles of software development process and phases in software development life cycle/testing. 2. Differentiate between testing, verification and validation. 3. Create the test cases from SRS and Use Cases. 4. Test web applications and automated test data generation

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<p>Web Technologies – II</p>	<ol style="list-style-type: none"> 1. To introduce emerging Web technologies concepts and tools. 2. To introduce client side and server side scripting languages and validation techniques. 3. To learn database access technologies and state management techniques. 4. To develop real life Web applications using ASP.NET and PHP. 	<ol style="list-style-type: none"> 1. Understand the different web technologies and tools used for web application development. 2. Write the programs using client side and server side scripting languages along with proper validations. 3. Integrate web applications with database and maintain the state information. 4. Design and develop real time web applications using the PHP and ASP.NET.
<p>Project – II</p>	<ol style="list-style-type: none"> 1. To train students to perform an engineering project. 2. To motivate the students to design engineering solution to complex problems. 3. To make the students understand the use of algorithmic system approach. 4. To uplift student's attitude and technical knowledge to professional level. 	<ol style="list-style-type: none"> 1. Conduct an engineering project. 2. Design Engineering solution to complex problem utilizing a system approach. 3. Demonstrate the knowledge, skills and attitudes of professional engineers. 4. Illustrate the results and discuss it in professional community at large in written and oral forms.

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<p>Community Services</p>	<ol style="list-style-type: none"> 1. To create an awareness among the common man of Western Maharashtra region and area coming under jurisdiction of the Shivaji University regarding the e-services provided by various public sector organization. 2. To promote the use of technological services in day-to-day activities. 3. To understand the problems of the locality. 4. To make the student aware of the various engineering tools and techniques used in eservices. 5. Creating awareness of RTI (Right to Information) among general public for procuring public documents and its appropriate use. 	<ol style="list-style-type: none"> 1. Study e-services provided by various public sector organization. 2. Promote the use of technological services for citizens of society in day-to-day activities. 3. Create awareness of RTI (Right To Information) in society by technical students.
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D.Y. Patil College of Engineering & Technology, Kolhapur

Course Objective and Course outcome

Department Name - First Year Engineering - 2020-21 (Autonomous Syllabus)

Course Name	Course Objectives	Course Outcomes
Engineering Mathematics-I	<ul style="list-style-type: none">• To teach mathematical methodology and models.• To develop mathematical skills and enhance logical thinking power of students.• To provide students with skills in Linear Algebra and Differential calculus and numerical techniques.• To imbibe graduates with mathematical knowledge, computational skills and the ability to deploy these skills effectively in solution of engineering problems.	<ul style="list-style-type: none">• Apply the knowledge of matrices to find rank, solutions of Simultaneous Linear Equations, Eigen values & Eigen vectors.• Calculate the roots of Complex numbers and use in engineering applications.• Apply the numerical techniques to solve Algebraic & Transcendental equations.• Use knowledge of derivative for Expansion of functions, Indeterminate form, Partial differentiation & its applications.
Engineering Physics	<ul style="list-style-type: none">• To provide basic concept of modern optics.• To expose electrical properties of materials for semiconductors from quantum mechanical point of view• To perceive the concepts of acoustics, ultrasonic and nanomaterials for their applications in engineering fields.• To make the students grasp the working principles of Laser and optical fibre.	<ul style="list-style-type: none">• Use the principles of diffraction, polarization in thin Diffraction grating, polarimeter.• Describe the knowledge of Ultrasonics & damped wave equation in engineering fields• Explain electronic properties of materials, many electron systems, semiconductors from a quantum mechanical point of view and Fundamentals of quantum mechanics• Describe the basics of LASER, optical fibre and synthesis methods for nanoparticles & size dependent properties

<p align="center">Engineering Physics Laboratory</p>	<ul style="list-style-type: none"> • To make the students understand the concept of physics for the effective application in the field of engineering and technology. • To use the knowledge of electron transport in semiconductors. • To summarize the factors affecting the speed of ultrasound through liquids. 	<ul style="list-style-type: none"> • Apply knowledge related to optics, Fibre Optics, Lasers to use for suitable purposes in engineering fields. • Apply the theory of semiconductors to calculate band gap energy and carrier concentration. • Use ultrasonic interferometer to calculate velocity of ultrasound in given liquid
<p align="center">Engineering Graphics and Design</p>	<ul style="list-style-type: none"> • Bring awareness that engineering drawing is the language of engineers. • To impart basic knowledge and skills required to prepare engineering drawings. • To visualize and present the orthographic and isometric views with proper dimension and scale. • Enable them to use computer aided drafting tools for the generation of drawing. 	<ul style="list-style-type: none"> • Interpret basic concepts of engineering drawing. L2 • Prepare projection of solid. L3 • Prepare orthographic projection & isometric projection. L3 • Understand modern engineering tools used for engineering drawing. L2
<p align="center">Engineering Graphics and Design Laboratory</p>	<ul style="list-style-type: none"> • Bring awareness that engineering drawing is the language of engineers. • To impart basic knowledge and skills required to prepare engineering drawings. • To visualize and present the orthographic and isometric views with proper dimension and scale. • Enable them to use computer aided drafting tools for the generation of drawing. 	<ul style="list-style-type: none"> • Implement knowledge of fundamentals of engineering graphics and follow basic drawing standards and conventions. • To visualize and communicate three dimensional shapes by representing three-dimensional objects into two-dimensional views vice versa. • Develop lateral surfaces of solids for various applications. • Use modern engineering techniques, tools and skills for engineering practice.
<p align="center">Fundamentals of Computer and Programming</p>	<ul style="list-style-type: none"> • To provide basic knowledge of Computer and C Programming language. • To develop computer programming logics this will help them to write 	<ul style="list-style-type: none"> • Identify computer system components and Programming constructs • Use knowledge of C language to write the programs. • Use the concepts of array and structure to solve the Engineering problems.

	<p>programs and applications in C.</p> <ul style="list-style-type: none"> • To build the foundations required to learn other programming languages. 	
Fundamentals of Computer and Programming Laboratory	<ul style="list-style-type: none"> • The course is designed to provide complete knowledge of basics of Computer and C language. Students will be able to develop logics which will help them to create programs, applications in C. Also by learning the basic programming constructs they can easily switch over to any other language in future 	<ul style="list-style-type: none"> • Recognize hardware components & software applications. • Solve the problems on number conversion. • Use knowledge of operator, control and looping statements, arrays and structures to give solution to the Engineering problem.
Professional Communication-I	<ul style="list-style-type: none"> • To make the students learn proper usage of language, style and vocabulary. • To make the students use key elements of structure and style in drafting short and long documents. 	<ul style="list-style-type: none"> • Identify various types of communication and barriers. • Prepare grammatically correct sentences. • Demonstrate basic communication skills -LSRW (Listening, Speaking, Reading, and Writing) skills. • Demonstrate various types of professional correspondence.
Professional Communication-II Laboratory	<ul style="list-style-type: none"> • To practice and assess LSRW skills of the students i.e. Listening, Speaking, Reading and Writing. • To learn better pronunciation through accent, intonation, rhythm and stress. 	<ul style="list-style-type: none"> • Illustrate correct practices of English Grammar usage for effective speaking and writing. • Demonstrate effectively LSRW skills. • Prepare oral presentations effectively.
Workshop Practice -I	<ul style="list-style-type: none"> • To follow all safety Precautions in lab / shop / workshop/industry. • To develop and utilize skills in carpentry, smithy, plumbing practices. • To utilize the skills of Welding, soldering operations. • To perform various operations of basic assemblies. 	<ul style="list-style-type: none"> • Recognize importance of safety precautions on work shop floor. • Demonstrate the skills of Carpentry Smithy and Plumbing Operations. • Perform Welding, soldering, operations. • Carry out activities related to basic assemblies.

<p>Engineering Mathematics-II</p>	<ul style="list-style-type: none"> • To teach Mathematical methodology and models. • To develop mathematical skills and enhance logical thinking power of students. • To provide students with skills in Integral calculus, Differential Equations and Numerical Technique. • To imbibe graduates with mathematical knowledge, computational skills and the ability to apply these skills effectively in solution of engineering problems. 	<ul style="list-style-type: none"> • Apply the knowledge of Ordinary differential equation. • Solve the differential equation by numerical methods & calculate the derivative using interpolation formulae. • Use special functions and their properties during their higher learnings. • Apply multiple integration in various applications.
<p>Engineering Chemistry</p>	<ul style="list-style-type: none"> • To study the different water based concepts and its importance. • To impart the basic concepts of instrumental techniques. • To give the basic knowledge of fuel and some advanced materials. • To explain corrosion, engineering materials and green chemistry. 	<ul style="list-style-type: none"> • Interpret hardness, acidity, alkalinity and chloride content of water and methods for water softening. • Explain principles of chemical analysis by instrumental techniques • Illustrate types, properties, applications of fuel and some advanced materials. • Describe Nanomaterials, engineering materials, green chemistry with their applications.
<p>Engineering Chemistry Laboratory</p>	<ul style="list-style-type: none"> • To calculate the different water quality parameters and its importance. • To impart the basic concepts of instrumental techniques. • To give the basic knowledge of fuel and some advanced materials. 	<ul style="list-style-type: none"> • Analyze hardness, acidity, alkalinity and chloride content of water and percentage of elements in some alloys. • Produce various advanced materials and analyze aqueous solutions using instruments. • Perform various experiments by following written instructions.
<p>Fundamentals of Civil Engineering</p>	<ul style="list-style-type: none"> • Use basic Civil Engineering knowledge of surveying and construction material in real life. • Apply concepts of static and dynamics in engineering problems. 	<ul style="list-style-type: none"> • Explain the importance of various branches of Civil Engineering and concept of surveying. • Explain the use of various construction materials and Building Components. • Solve numerical on force system and equilibrium conditions.

		<ul style="list-style-type: none"> • Apply knowledge of engineering dynamics to solve numerical. • Identify centroid and moment of inertia of composite figures.
<p align="center">Fundamentals of Civil Engineering Laboratory</p>	<ul style="list-style-type: none"> • Handle surveying instruments for field measurements. • Apply knowledge of static and dynamic force system. 	<ul style="list-style-type: none"> • Explain the use of surveying instruments for Horizontal and Vertical Measurement and Concept of surveying & levelling. • Sketch the cross section of Super structure and substructure • Demonstrate the use of digital instruments. • Identify the forces and Reaction by experimentally and graphically.
<p align="center">Fundamentals of Electrical & Electronics Engineering</p>	<ul style="list-style-type: none"> • To make the students learn basic knowledge of electrical and magnetic circuits. • To impart the skill to identify working of single phase and three phase AC circuits • To make the students understand basic knowledge of semi-conductor devices. • To expose then students to the working principles of different types of transducers and measuring devices 	<ul style="list-style-type: none"> • Explain the basic concept of electric and magnetic circuits. • Interpret the Single Phase and Three Phase AC Circuits and their uses. • Describe and classify basic knowledge on the working of semi-conductor devices. • Use different types of transducers and measuring devices
<p align="center">Fundamentals of Electrical & Electronics Engineering Laboratory</p>	<ul style="list-style-type: none"> • To make the students learn working principal of different Electrical & Electronic Circuits • To impart the skills to identify types of transformers and the their losses • To expose the students to working of various measuring devices used in electronic applications. • To make the students use the semiconductor devices and transducers. 	<ul style="list-style-type: none"> • Understand the working principal of different Electrical & Electronic Circuits • Illustrate differences between the types of transformers and the their losses • Describe the working of various measuring devices used in electronic applications • Use semiconductor devices and transducers

<p align="center">Fundamentals of Mechanical Engineering</p>	<ul style="list-style-type: none"> • Impart knowledge in concepts of thermodynamics. • Acquire fundamental knowledge of energy conversion devices and refrigeration systems. 	<ul style="list-style-type: none"> • Discuss concepts and laws of thermodynamics. • Describe principle of energy conversion devices. • Explain the working of Refrigeration systems.
<p align="center">Professional Communication-II</p>	<ul style="list-style-type: none"> • To make the students to identify the conditions to be effective communicators as engineers. • To analyze & articulate student's interests, skills, and relate them to education & career plans. 	<ul style="list-style-type: none"> • Implement various types of technical writing skills. • Make use of soft skills such as understanding self, leadership skills, teamwork, etc. • Utilize the oral communication skills for better performance. • Demonstrate effectively as a member or leader of team.
<p align="center">Professional Communication-II Laboratory</p>	<ul style="list-style-type: none"> • To inculcate employability skills among the students. • To train the students professionally by conducting practice sessions. 	<ul style="list-style-type: none"> • Utilize professional behavior and etiquettes at the workplace. • Use effectively verbal and nonverbal communication skills. • Demonstrate effectively as a member and a leader of team.

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Course Objective and Course outcome

Department Name - Architecture

Course Name	Course Objectives	Course Outcomes
Aesthetics And Visual Arts – I	<ol style="list-style-type: none">1. To develop artistic orientation, artistic skills of students & enhance their artistic sensitivity.2. To inculcate sensitivity to understand relevance of all art forms to Architectural spaces and forms.3. To Create holistic understanding of grammar of design with specific reference to Architecture.4. To make the students understand effect of human dimensions, human actions, human emotions and human behavior affecting both Architectural form and space.	<p>101.1 Sketch in various media & material, to use drawing for co-ordination of eye & hand in studio & field observation, judge scale, proportion, spatial relationships.</p> <p>101.2 Appraise aesthetics in everyday life</p> <p>101.3 Create 2D compositions with the use of elements and apply principles of design.</p> <p>101.4 Apply the knowledge of color theory and rendering techniques for Architectural design assignments and portfolio</p>
Architectural Graphics and Drawing - I	<ol style="list-style-type: none">1. To introduce fundamental drafting techniques.2. To develop an ability to present elements of design in graphical forms.3. To develop an ability to visualize objects in 2 Dimensions and 3Dimensions.4. To enhance the potential of students in presenting concepts and ideas in terms of sketches, drawings, and models using different techniques.	<p>102.1 Prepare drawing sheets of simple nature using various drafting techniques.</p> <p>102.2 Represent elements of design in graphical forms.</p> <p>102.3 Represent simple and complex objects in 2D and 3D graphical form.</p> <p>102.4 Develop a skill to represent concepts and ideas in terms of sketches, drawings, and models using different techniques and media.</p>

<p>Architectural Design - I</p>	<ol style="list-style-type: none"> 1. To get familiarized with human scale, basic ergonomics. 2. To develop perception for basic principles of space making and form building. 3. To understand the functionality of single use and small functional spaces. 4. To use drawing as a communication tool for design information. 	<p>103.1 Analyze requirements for specific user and function.</p> <p>103.2 Understand the fundamentals of Architectural design, elements and principles</p> <p>103.3 Design the given assignment by using the knowledge gained.</p> <p>103.4 Apply graphical representation skills to represent design concepts and ideas.</p>
<p>Human Settlement & History of Civilization - I</p>	<ol style="list-style-type: none"> 1. To study the settlements and the history of civilization from prehistoric period and ancient civilizations. 2. To understand the influence of geography, geology, climate, socio-climate and religious aspect of that particular place on settlement patterns and architectural built form. 3. To carry out comparative study of various civilizations. 	<p>104.1 Compare specific planning and design approach to human settlements during various periods.</p> <p>104.2 Apply knowledge of human settlements and civilization and relate it to modern concepts of planning.</p> <p>104.3 Analyze the settlement pattern and architectural built form which has influence of geography, geology climate etc.</p> <p>104.4 Evaluate comparative study of various civilizations.</p>
<p>Carpentry and Model Making Workshop – I</p>	<ol style="list-style-type: none"> 1. To introduce different materials such as paper, mount board, foam board, clay, wood, etc. and tools and techniques of architectural model making and basic processes for carpentry. 2. To demonstrate relationship of models with other courses like ‘Architectural Design’, ‘Building Technology’ and ‘Graphics’ 	<p>105.1 Select appropriate material for model making.</p> <p>105.2 Apply the knowledge of material and techniques used in process of two dimensional and three dimensional model making.</p> <p>105.3 Create three dimensional scaled models.</p>

	3. To give hands on skill experience of simple building material and construction Techniques.	
Scope of Architecture - I	<p>1. To explain the scope of architectural education.</p> <p>2. To introduce the scope of field of architectural profession.</p> <p>3. To explain role of architect in architectural profession</p>	<p>106.1 Describe the scope of architectural education.</p> <p>106.2 Describe the scope of field of architectural profession.</p> <p>106.3 Describe role of architect in architectural profession and society.</p>
Building Construction and Materials - I	<p>1. To introduce building construction techniques, components, conventions and application of basic building materials brick and stone.</p> <p>2. To help students in developing a clear understanding of the basic principles of construction and materials suitable for load bearing construction and framed structure.</p> <p>3. To gain knowledge of structural components sub-structure & super structure.</p> <p>4. To encourage a mix of classroom work, field learning and hands on experiment.</p>	<p>107.1 Understand structural typology and building components.</p> <p>107.2 Select suitable techniques. materials for buildings and adopt suitable construction</p> <p>107.3 Apply knowledge of construction process for supervise the construction of different building elements based on suitability.</p>
Basics of Structural Engineering For Architecture - I	<p>1) To introduce basic concepts of structural engineering.</p> <p>2) To explain different force systems and their equilibrium.</p> <p>3) To introduce the concept of support, support reactions, loads, bending, shear and friction.</p>	<p>108.1 Classify various structural materials based on their properties.</p> <p>108.2 Apply knowledge of structural system.</p> <p>108.3 Select proper thinking path for problem analysis.</p> <p>108.4 Develop an aesthetical attitude</p>

	4) To take structural engineering to exerted level of art.	towards structural engineering.
Literary and Communication Skills in Architecture – I	<ol style="list-style-type: none"> 1. To explore the relationship between architectural discourse and architectural communication 2. To understand the intersection of allied fields of architectural communication 3. To apply communication techniques and skills learnt in creative manner 	<p>109.1 Describe the importance of verbal and nonverbal communication in architecture.</p> <p>109.2 Develop a critical approach through the small exercises like debates, role play etc.</p> <p>109.3 To present himself /herself efficiently through group presentations.</p> <p>109.4 To read a book, analyze, summarize and express his/her learning outcomes through literary medium.</p>
Computer Technology In Architecture - 1	<ol style="list-style-type: none"> 1) To teach basic computer skills required for architectural profession and to make all students proficient in computer technology. 2) To teach technical aspects of software this will be used in the academic work. 3) To develop design ideas and draft construction documents using computer-aided design (CAD) software. 	<p>110.1 Express essential skills which will help them to use in daily academic work</p> <p>110.2 Apply knowledge of computer software in their academic work</p> <p>110.4 Create projects using different technologies and apply in the competitive world which makes their work easier & faster</p>
Aesthetics And Visual Arts – II	<ol style="list-style-type: none"> 1) To develop proficiency in artistic orientation, artistic skills of students & to enhance their artistic sensitivity. 2) To enable to think graphically, practice to think in 3rd and 4th dimension. 3) To enable change in perception 	<p>112.1 Apply rendering skills, graphical presentation skills to design assignments.</p> <p>112.2 Appraise aesthetics in built environment of everyday life</p> <p>112.3 Select principles of 3D composition for any given design</p>

	<p>regarding good taste leading to clear vision and resulting in good design.</p> <p>4) To understand the effect of human form, emotions & behavior affects on Architectural form and space.</p>	<p>assignment</p> <p>112.4 Create architectural forms & spaces for simple human activities.</p>
Architectural Graphics and Drawing - II	<p>1) To understand objects graphically in 2 dimensional forms.</p> <p>2) To develop an ability to analyze simple and complex objects graphically and represent them in orthographic projection methods.</p> <p>3) To apply knowledge of orthography and represent objects in form of 3D views such as Isometric, Axonometric, Oblique.</p> <p>4) To implement various graphical forms in their design ideas using different media and different rendering techniques.</p>	<p>113.1 Represent objects graphically in two dimensional forms.</p> <p>113.2 Analyze simple and complex objects graphically and represent them in orthographic projection methods.</p> <p>113.3 Represent objects in form of 3D views such as Isometric, Axonometric, Oblique.</p> <p>113.4 Implement various graphical forms in their design ideas using different media and different rendering techniques.</p>
Architectural Design - II	<p>1) To study contemporary design practices of houses in town and urban contexts.</p> <p>2) To explore effect of materials, color, texture, light on the quality of architectural space and form.</p> <p>3) To explain the relationship between built forms open space and explore the connectivity between indoor and outdoor spaces.</p> <p>4) To use architectural drawings as communication tool to convey design</p>	<p>114.1 Analyze design practices of houses for various contexts for small scaled projects of human habitat.</p> <p>114.2 Create the architectural spaces and forms using fundamentals of design for given architectural program.</p> <p>114.3 Develop the connectivity between indoor and outdoor spaces.</p> <p>114.4 Demonstrate Architectural drawings with the help of various rendering media and techniques.</p>

	information.	
Human Settlement & History of Civilization - II	<ol style="list-style-type: none"> 1. To study the settlements and the history of civilization from prehistoric period and ancient civilizations. 2. To understand the influence of geography, geology, climate, socio-climate and religious aspect of that particular place on settlement patterns and architectural built form. 3. To carry out comparative study of various civilizations. 	<p>115.1 Understand and study the history of human settlements and civilizations from medieval period to modern period.</p> <p>115.2 Analyze and study the development phases of civilization with reference to socio cultural, religion, climate geography and geological aspect.</p> <p>115.3 Evaluate by making comparative study of various periods in civilizations.</p>
Carpentry And Model Making Workshop – II	<ol style="list-style-type: none"> 1) To introduce different materials such as wood, bamboo etc. and tools and techniques of architectural model making and basic processes for carpentry. 2) To demonstrate relationship of models with other courses like ‘Design’, ‘Building Technology’, ‘Graphics’, etc.. 3) To give hands on skill experience of simple building material and construction Techniques. 	<p>116.1 Prepare simple models using carpentry techniques.</p> <p>116.2 Apply the knowledge of material and techniques used in process of two dimensional and three dimensional model making.</p> <p>116.3 Create three dimensional scaled models.</p>
Scope of Architecture - II	<ol style="list-style-type: none"> 1. To introduce various factors affecting architectural design. 2. To introduce role of various services in building construction. 3. To introduce various typologies of architecture. 	<p>117.1 Describe various factors affecting architectural design.</p> <p>117.2 Describe role of various services in building construction.</p> <p>117.3 Interpret various architectural expressions.</p>

<p align="center">Building Construction and Materials – II</p>	<p>1) To introduce building construction techniques, components, conventions and application of basic building materials sand, lime, timber & bamboo.</p> <p>2) To help students in developing a clear understanding of the basic principles of construction and materials suitable for building components..</p> <p>3) To encourage a mix of classroom work, field learning and hands on experiment.</p>	<p>118.1 Classify structural typology and building components.</p> <p>118.2 Select suitable techniques. materials for buildings and adopt suitable construction</p> <p>118.3 Apply knowledge of construction process for Supervise the construction of different building components based on suitability.</p>
<p align="center">Basics of Structural Engineering For Architecture - II</p>	<p>1) To introduce different roofing systems according to span of the structure.</p> <p>2) To introduce the concept of composite material, center of gravity, moment of inertia.</p> <p>3) To introduce analysis method for beams.</p> <p>4) To take structural engineering to exerted level of art.</p>	<p>119.1 Predict the effect of different roofing system</p> <p>119.2 Analyze the behavior of member under load.</p> <p>119.3 Draw shear force diagram and bending moment diagram.</p> <p>119.4 Develop an aesthetical attitude towards structural engineering.</p>
<p align="center">Literary and Communication Skills in Architecture – II</p>	<p>1) To explore the relationship between architectural discourse and architectural communication.</p> <p>2) To understand the intersection of allied fields of architectural communication.</p> <p>3) To apply communication techniques and skills learnt in creative manner.</p>	<p>120.1 Understand the importance of digital communication into architecture.</p> <p>120.2 Analyze a research paper, summarize and express learning outcomes though literary medium.</p> <p>120.3 Present himself /herself efficiently singly and through group presentations.</p> <p>120.4 Letter writing (Formal),</p>

		Applying for Job, Resume Preparation.
Computer Technology in Architecture - II	<ol style="list-style-type: none"> 1. To teach them to create 3D modeling ,required to make a clear understanding from all sides of building 2. To develop creative ideas using different rendering techniques 3. To teach word processing software to write specifications, proposals and other documents. 	<p>121.1 Apply technical knowledge of computer software in the academic work</p> <p>121.2 Analyze 3D software to learn design development</p> <p>121.3 Apply advanced skills which will help them to use in daily design and rendering work</p> <p>121.4 Create documentation using different technologies and apply in the competitive world which makes their work easier &faster</p>
Architectural Graphics And Drawing - III	<ol style="list-style-type: none"> 1. To understand methodology of perspective drawing. 2. To draw perspective views with various angles, stationary points and eye levels. 3. To apply knowledge of one point and two point perspective in design projects. 4. To develop rendering skills with manual presentation as well as by using software. 	<ol style="list-style-type: none"> 1 Draw perspectives of simple and complex objects. 2 Analyze effects of various angles, stationary points and eye levels on perspective. 3 Draw sketches in perspective as a part of design process. 4 Represent perspective drawings with rendering.
Architectural Design-III	<ol style="list-style-type: none"> 1. Solve progressively complex exercises involving spatial relations in two dimensions, three dimensions and time. 2. Apply fundamental designs skills as a response to architect's wider responsibilities towards Society, culture and the environment. 3. Experiment with design solutions 	<ol style="list-style-type: none"> 1 Analyze site potential with respect to built environment and surroundings. 2 Correlate small social spaces with architectural design. 3 Understand design intervention w.r.t social cultural, environmental, economical, political and aesthetic

	<p>using analytical and creative framework with respect to site development.</p> <p>4. Correlate built and unbuilt spaces to social spaces with an understanding of design principles, services, structural behaviour and construction techniques and materials.</p>	<p>aspects.</p> <p>4 Create a design solution in consideration with aesthetic, functional and technical aspects</p>
<p>History of Architecture-I</p>	<p>1. To introduce different concepts of settlement pattern and their evolution.</p> <p>2. To explain the philosophy ,evolution, characteristics and style of temple forms in various parts of India.</p> <p>3. To illustrate various components of temple complexes and their functions.</p> <p>4. To explain characteristic features of early Islamic architecture in India.</p>	<p>1 Understand development of construction technology of Indian temples in a particular time era.</p> <p>2 Understand architectural ornamentation in a particular time era.</p> <p>3 Distinguish , different architectural styles and situations evolved within the restraints imposed by prevalent social and cultural environment and availability of material, climate and geography.</p> <p>4 Appraise a historical structure.</p>
<p>Building Construction & Materials – III</p>	<p>1. To acquire the knowledge of construction technology and materials.</p> <p>2. To understand the importance of specifications.</p> <p>3. To apply knowledge of building construction and materials as an integral part of Architectural designs.</p> <p>4. To introduce modern techniques of land survey.</p>	<p>1 Understand building components and construction methods.</p> <p>2 Design specifications for various building and construction components.</p> <p>3 Prepare design of buildings with due consideration to construction technology & materials.</p> <p>4 Apply survey data for designing purpose.</p>
<p>Structural Engineering For</p>	<p>1. To introduce concept of different stresses developed in beam due to loading</p> <p>2. To explain concept of stress analysis</p>	<p>1 Evaluate the different stresses developed in component.</p> <p>2 Select proper path for stresses</p>

Architecture - I	<p>in horizontal and vertical components.</p> <p>3. To introduce different properties of soil and their application in design.</p> <p>4. To develop architectural vision towards structural components.</p>	<p>analysis in horizontal and vertical component.</p> <p>3 Recognize different characters of soil and its application.</p> <p>4 Develop an aesthetic attitude towards structural components.</p>
Climatology and Architecture	<p>1. To understand the climate at micro and macro level and the factors responsible for change of climate</p> <p>2. To analyze various tools to modulate different types of climate to the comforts of human being.</p> <p>3. To apply the gained knowledge from objective 1 and 2 through various illustrations of various architects work in different climatic conditions</p> <p>4. To create climate responsive design by implementing the gained knowledge on first year semester</p> <p>II design assignment for all climatic conditions in sketch form.</p>	<p>1 Understand the different types of climate at global level.</p> <p>2 Analyze the climatic forces on built spaces</p> <p>3 Apply the climate responsive design process</p> <p>4 Create the unique design requirements according to climate</p>
Basic Building Services-I	<p>1. To develop awareness about building services, their need and importance.</p> <p>2. To know how a building functions with the help of various services.</p> <p>3. To identify the need of a particular service needed -here supply of water and drainage disposal system.</p> <p>4. To estimate water demand and draw plumbing, drainage and sewage networks for residential and public buildings.</p>	<p>1 Apply knowledge while planning a building.</p> <p>2 Understand what services are required for a building.</p> <p>3 Incorporate technology required to provide services for the building they design.</p> <p>4 Design certain details required for various services in a building and allot spaces for the same.</p>
Professional Elective –I -	<p>1. To understand the relevance of art in human life and society in general.</p>	<p>1 Understand the role of different art forms in defining tradition and culture</p>

<p>Art Appreciation</p>	<p>2. To develop an ability to recognize design principles and elements in selected works of art. 3. To analyze a given art form through its critical appreciation. 4. To co-relate different art forms with space and architecture.</p>	<p>of a place. 2 Experiment and have hands on skill for given art form assignment. 3 Analyze and critically appreciate various art forms. 4 Develop a creative framework to understand the different art forms in relation to space and in relation to architectural design studio assignment.</p>
<p>Computer Technology in Architecture - III</p>	<p>1. To teach students various commands required for 2D and 3D drafting. 2. To teach the techniques to generate required results from the software. 3. To teach theoretical concepts for different methods of presentation skills.</p>	<p>1 Develop understanding of computer aided drafting. 2 Comprehends computer aided drafting and its parameter as tools and its application in architecture. 3 Evaluates CAD techniques for quicker methods and presentation skills.</p>
<p>Indian Crafts (Mandatory Course)</p>	<p>1. To introduce Indian crafts for understanding integral role of crafts community to the cultural Environment of a place. 3. To develop among students values of conservation for Indian crafts heritage. 4. To develop an understanding of Indian crafts to the aesthetics of built spaces. 5. To apply knowledge of Indian crafts to create artifacts and crafts objects for enhancement of built environment.</p>	<p>1 Understand the various Indian crafts and its relation to built-spaces. 2 Create awareness for conservation of Indian crafts. 3 Introduce Indian culture through the crafts and learn variety of skills for different crafts making through hands on experiment 4 Apply the knowledge of crafts making to for assignments and in their design solutions.</p>
<p>Architectural Graphics and</p>	<p>1. To understand methodology of drawing shadows in two and three</p>	<p>.1 Draw shadows of simple and complex objects.</p>

Drawing - IV	<p>dimensional objects.</p> <p>2. To apply knowledge of sciography in design projects.</p> <p>3. To develop rendering skills with manual presentation as well as by using software.</p>	<p>2 Use of sciography as a tool of design.</p> <p>3 Represent two dimensional and perspective drawings with rendering.</p>
Architectural Design-IV	<p>1. Solve progressively complex exercises involving spatial relations in two dimensions, three dimensions and time.</p> <p>2. Apply fundamental design skills as a response to architect's wider responsibilities towards society, culture and the environment.</p> <p>3. Experiment with design solutions using analytical and creative framework with respect to site development.</p> <p>4. Correlate built and unbuilt spaces to residential spaces with an understanding of design principles, services, structural behaviour and construction techniques and materials.</p>	<p>1 Analyze site potential with respect to built environment and surroundings.</p> <p>2 Correlate potential of multilevel residential spaces with architectural design.</p> <p>3 Understand design intervention with respect to social, cultural, environmental, economical, political and aesthetic aspects.</p> <p>4 Create a design framework in consideration with aesthetic, functional and technical aspects.</p>
History of Architecture- II	<p>1. To explain relation between culture and architecture of historic period in India.</p> <p>2. To identify phases of historic, modern&contemporary architecture in India</p> <p>3. To explain the innovative building construction techniques of historic & contemporary Architecture.</p> <p>4. To illustrate the impact of social, economical& political factors on Architectural styles.</p>	<p>1 Analyze impact of culture on architecture of historic period in India.</p> <p>2 Differentiate between various phases of architecture in India.</p> <p>3 Compare construction techniques of historic and contemporary Architecture.</p> <p>4 Analyze socio-cultural & economic impact on architecture.</p>
Building Construction & Materials – IV	<p>1. To familiarize students to market survey of building materials.</p> <p>2. To explain various details of construction.</p> <p>3. To explain construction process</p>	<p>1 Select appropriate building materials through market surveys.</p> <p>2 Prepare construction drawings</p> <p>3 Supervise the construction process.</p>

	through visits to ongoing construction sites.	
Structural Engineering For Architecture - II	<ol style="list-style-type: none"> 1. To introduce concept of Fixed and Continuous beam. 2. To explain concept of Elastic stability of columns and its uniaxial and biaxial bending. 3. To select the appropriate section for tension and compression member. 4. To explain steel trusses. 	<ol style="list-style-type: none"> 1 Predict the behavior of fixed and continuous beam. 2 Explain concept of Elastic stability of column. 3 Select proper steel section for tension and compression member. 4 Explain steel trusses and girders.
Basic Building Services-II	<ol style="list-style-type: none"> 1.To develop awareness about building services, their need and importance. 2.To know how a building functions with the help of various services. 3.To identify the need of a particular service needed -here lighting requirements (Natural and artificial) and electrical outlets inside residential and public buildings. 4.To be able to draw electrical layout, gas pipeline layout and design lighting needs. 	<ol style="list-style-type: none"> 1 Apply knowledge while planning a building. 2 Are able to understand what services are required for a building. 3 Incorporate technology required to provide Services for the building they design. 4 Design certain details required for various Services in a building and allot spaces for the same.
Professional Elective – II - Photography	<ol style="list-style-type: none"> 1. To understand photography as a means of communication. 2. To give exposure to photography as means of documentation. 3. To develop skill of composition through photography. 	<ol style="list-style-type: none"> 1 Use effectively photography in various presentations. 2 Prepare photographic documentation. 3 Apply photography as a tool of design
Professional Elective – II - Painting	<ol style="list-style-type: none"> 1. To give exposure to painting as a primary medium for artistic expression. 2. To explain processes in painting art. 3. To apply knowledge of painting in portfolio presentation. 	<ol style="list-style-type: none"> 1 Develop painting as a medium of artistic expression. 2 Develop ability to create ideas in painting art. 3 Apply painting art in architectural presentations.

<p>Professional Elective - III - Furniture Design</p>	<p>To develop vision for interior spaces. 2. To inculcate sensitivity to understand relevance of Architectural spaces and forms with reference to furniture and its material and structure. 3. To apply holistic understanding of furniture design and detailing with reference to Architecture. 4. To make the students to create the design of furniture as an integral part of Architectural form and space.</p>	<p>1 Able to draw furniture with respect to scale, proportion, spatial relationships. 2 Appraise aesthetics in furniture design 3 Create compositions with the use of principles of design. 4 Apply the knowledge of structure ,material , rendering techniques for furniture design assignments and portfolio</p>
<p>Professional Elective - III - Graphic and Product Design</p>	<p>1. To understand principals of Graphic and Product design. 2. To create awareness about sustainable use of materials for Graphic & Product design. 3. To coordinate multiple, interdisciplinary tasks in order to achieve a common objective.</p>	<p>1 Apply functionality, ergonomics and aesthetics for a usable product. 2 Understand environmental issues of products. 3 Develop entrepreneurial skills & soft skills towards Specialization field.</p>
<p>Computer Technology in Architecture - IV</p>	<p>1. To teach students various commands required for 3D drafting 2. To teach the techniques to prepare presentation drawings. 3. To teach theoretical concepts for documentation and working in the Construction Phase</p>	<p>1 Develop understanding of computer aided drafting in 3D.2 Comprehend computer aided drafting and its parameter as tools and its application in architecture 3 Evaluate techniques for quicker methods</p>
<p>Environmental Studies (Mandatory Course)</p>	<p>1. Recognize the structure and functions of ecosystems with their importance. 2. Understand the environmental and social problems with global concern. 3. Understand the importance of environmental management for its protection. 4. Acquire problem solving skills through visits to different locations, identifying the environmental problems,</p>	<p>1 Understand the importance of ecosystem and biodiversity in view of its conservation. 2 Understand the concept of hazardous waste and to promote healthier environment. 3 Explain the importance of environmental management through</p>

	<p>proposing the solution models and exhibiting to the society and government authorities.</p>	<p>pollution control boards.</p> <p>4 Propose solutions for problems related with environmental well beings through location visits and model exhibitions.</p>
<p>ARCHITECTURAL DESIGN - V</p>	<p>To understand the socio-cultural aspects on Architectural design.</p> <ul style="list-style-type: none"> • To understand the climatical considerations bearing on Architectural design. • To be exposed to suitable building materials and construction technologies to evolve a design solution 	<p>1 Analyze site potential with respect to built environment and surroundings.</p> <p>2 Correlate small social spaces with architectural design.</p> <p>3 Understand design intervention w.r.t social cultural, environmental, economical, political and aesthetic aspects.</p> <p>4 Create a design solution in consideration with aesthetic, functional and technical aspects</p>
<p>Building Construction & Material – V</p>	<p>To introduce structural concepts of various parts of buildings</p> <ul style="list-style-type: none"> • To introduce construction techniques • To explain construction details through case studies • To explain process of construction and supervision 	<p>1 Select appropriate building materials through market surveys.</p> <p>2 Prepare construction drawings</p> <p>3 Supervise the construction process.</p>
<p>Theory of Structure V</p>	<p>Student shall be able to understand the behavior of Structure systems, feasibility of different structure systems, limitation of forms, spans, choice of proper structural materials, strength consideration, behavior, and response of loads.</p>	<p>1 Evaluate the different stresses developed in component.</p> <p>2 Select proper path for stresses analysis in horizontal and vertical component.</p> <p>3 Recognize different characters of soil and its application.</p> <p>4 Develop an aesthetic attitude towards</p>

		structural components.
HISTORY OF ARCHITECTURE-II	<p>Subject includes introductory study of Architectural development in chronological manner in Europe or western countries. Objective is to expose the students to the evolution of different architectural solutions through historical periods within the restraints of prevalent social and religious customs, geography, climate, building materials and techniques, aesthetical influences, structural complexities and technology available at the time. The study shall actively help students in preservation of rich Architectural Culture in evolution of Design process.</p>	<p>1 Analyze impact of culture on architecture of historic period in India.</p> <p>2 Differentiate between various phases of architecture in India.</p> <p>3 Compare construction techniques of historic and contemporary Architecture.</p> <p>4 Analyze socio-cultural & economic impact on architecture.</p>
Estimation Costing & Specification-I	<ul style="list-style-type: none"> • To make the students' aware of the factors that affect the cost of construction. • To understand the concept of rate analysis for various items in building construction. • To create ability of taking out of quantities from drawings and to determine estimated cost of building projects as per standard procedures. • To inculcate habit of systematic recording of all the statistics 	<p>Recognize the methods of estimation</p> <p>Select the proper method of estimation</p> <p>Analysis quantity of materials and also the rate of different materials.</p>

	concerned to estimating & costing	
BUILDING SERVICES – III	<p>The students should be able to a lot spaces in their design for the topics below.</p> <ul style="list-style-type: none"> • Electrical requirements for given situation, its calculations and design. • Artificial Illumination and its application in buildings. • Overview and introduction to heating, ventilation, and air conditioning focusing on different HVAC systems. • Lift, escalator and travelator requirements for given situation • Introduction to building’s firefighting system, security system and pumps and water. <p>Integrating natural and artificial illumination.</p>	<ol style="list-style-type: none"> 1 Apply knowledge while planning a building. 2 Are able to understand what services are required for a building. 3 Incorporate technology required to provide Services for the building they design. 4 Design certain details required for various Services in a building and allot spaces for the same.
WORKING DRAWING -I	<p>Introduction of working drawing for composite construction based on design problem done in second year architecture which should include. R.C.C. framed structure, steel framed structure and load bearing structure.</p>	<ol style="list-style-type: none"> 1 Select appropriate building materials through market surveys. 2 Prepare construction drawings 3 Supervise the construction process.
Landscape Architecture	<p>The objective of the subject is to enable students to understand landscape design as an allied field of architecture; to introduce landscape architecture and the scope of it. It will create awareness regarding the process of landscape</p>	<ol style="list-style-type: none"> 1 Select appropriate building materials through market surveys. 2 Prepare construction drawings 3 Supervise the construction process.

	design for small and large buildings; Indoor and outdoor spaces.	
ARCHITECTURAL DESIGN - VI	<p>To understand the visual interaction between indoor – outdoor spaces and landscape elements.</p> <ul style="list-style-type: none"> • To understand the spatial and structural implications of basic services involved • To be aware of the local building bye laws. 	<ol style="list-style-type: none"> 1 Analyze site potential with respect to built environment and surroundings. 2 Correlate small social spaces with architectural design. 3 Understand design intervention w.r.t social cultural, environmental, economical, political and aesthetic aspects. 4 Create a design solution in consideration with aesthetic, functional and technical aspects
Building Construction & Material – VI	<p>To introduce structural concepts of various parts of buildings</p> <ul style="list-style-type: none"> • To introduce construction techniques • To explain construction details through case studies • To explain process of construction and supervision 	<ol style="list-style-type: none"> 1 Apply knowledge while planning a building. 2 Are able to understand what services are required for a building. 3 Incorporate technology required to provide Services for the building they design. 4 Design certain details required for various Services in a building and allot spaces for the same.
Theory of structure VI	<p>Student shall be able to understand the behavior of RCC Structural systems, feasibility of different structure systems, limitation of forms, spans, choice of proper structural section, strength consideration, behavior, and response of loads. Students are able to select proper structural section with concept of factor</p>	<ol style="list-style-type: none"> 1 Evaluate the different stresses developed in component. 2 Select proper path for stresses analysis in horizontal and vertical component. 3 Recognize different characters of soil and its application. 4 Develop an aesthetic attitude towards

	of safety, characteristic strength of material.	structural components.
HISTORY OF ARCHITECTURE-III	<p>Subject includes the study of various styles in Architecture mainly of Europe, America and India through various ages of Renaissance, Gothic, Industrial revolution and Modern period. Objective is to expose the students to the evolution of different architectural solutions through historical periods within the restraints of prevalent social and religious customs, geography, climate, building materials and techniques, aesthetical influences, structural complexities and technology available at the time. More emphasis is given to know the evolution of architecture in India after Independence. The study shall actively help students in preservation of rich Architectural Culture in evolution of Design process.</p>	<ol style="list-style-type: none"> 1 Analyze impact of culture on architecture of historic period in India. 2 Differentiate between various phases of architecture in India. 3 Compare construction techniques of historic and contemporary Architecture. 4 Analyze socio-cultural & economic impact on architecture.
Estimation Costing & Specification - II	<p>To make the students' aware of the factors that affect the cost of construction.</p> <p>To understand the concept of rate analysis for various items in building construction.</p> <p>To create ability of taking out of quantities from drawings and to determine estimated cost of building</p>	<ol style="list-style-type: none"> 1. Various elements of environmental design. 2. Various elements, theories , concepts and issues of environment with relevance to macro and micro level 3. Details of micro and macro level environment 4. Application of knowledge of environmental design principles for better environment . 5. Creation of better environmental design solutions .

	<p>projects as per standard procedures.</p> <p>To inculcate habit of systematic recording of all the statistics concerned to estimating & costing</p>	
<p>BUILDING SERVICES – IV</p>	<p>The objective of the subject is to enable students to understand and apply in design knowledge about: Hot water supply design in hospitals and hotels, Hospital services like CSSD, hospital gases and incinerators, Community kitchens, laundry and housekeeping services, Swimming pools, Sustainable Services for hospitals and hotels, Solar electrical panels for electricity generation, Water treatment plant for hospitals and hotels. (STP / ETP).</p>	<p>1 Apply knowledge while planning a building.</p> <p>2 Are able to understand what services are required for a building.</p> <p>3 Incorporate technology required to provide Services for the building they design.</p> <p>4 Design certain details required for various Services in a building and allot spaces for the same.</p>
<p>Environmenta l Design-I</p>	<p>1. Various elements of environmental design.</p> <p>2. Various elements, theories , concepts and issues of environment with relevance to macro and micro level</p> <p>3.Details of micro and macro level environment</p> <p>4. Application of knowledge of environmental design principles for better environment .</p> <p>5. Creation of better environmental design solutions.</p>	<p>1. Various elements of environmental design.</p> <p>2.Various elements, theories , concepts and issues of environment with relevance to macro and micro level</p> <p>3.Details of micro and macro level environment</p> <p>4. Application of knowledge of environmental design principles for better environment .</p> <p>5. Creation of better environmental design solutions .</p>

<p>Adv. Arch. Design-I</p>	<ol style="list-style-type: none"> 1. To introduce students to progressively complex exercise involving special relations in 2D or 3D. 2. To make students aware of fundamental design skills in context of social, cultural and environmental responsibilities. 3. To familiarize students with large scale Architectural building projects with emphasis on building services & systems, architectural controls & building bye laws. 	<ol style="list-style-type: none"> 1. Comprehend the fundamentals of Architectural design elements and principles. 2. Analyze issues in urban & rural context and produce design solutions accordingly. 3. Apply design strategies to meet requirements. 4. Design buildings and spaces responding to social, economic & cultural needs of society & also climatic factors.
<p>Urban & regional planning</p>	<ol style="list-style-type: none"> 1. To understand the concept of human settlements in its origin study different parameters, distinguishing urban & rural settlement during prehistoric period. 2. To study evolution of human settlement history of human civilization and study paleolithic, Neolithic river valley civilization, Greek, Roman, Medieval periods, Baroque city, Industrial civilization. 3. To study ancient planning practices in Indian context - Vedic planning, Mansara, Maya mamta etc. 4. To bring out salient features and each period planning, philosopher and progress made till ultra-modern planning design, philosopher's concept. 5. To study laws and legal aspects of planning, town planning principles, 	<ol style="list-style-type: none"> 1. Understand a town planning principles through ages. 2. Acquire a solid base of knowledge in the principles and practices of learning urban & regional planning. 3. Develop the skills necessary for the effective practice of planning principles of urban & rural areas.

	study different levels and planning byelaws & DC rules.	
Environmenta I Design-II	<ol style="list-style-type: none"> 1. Various elements of environmental design. 2. Various elements, theories , concepts and issues of environment with relevance to macro and micro level 3.Details of micro and macro level environment 4. Application of knowledge of environmental design principles for better environment . 5. Creation of better environmental design solutions. 	<ol style="list-style-type: none"> 1. Various elements of environmental design. 2.Various elements, theories , concepts and issues of environment with relevance to macro and micro level 3.Details of micro and macro level environment 4. Application of knowledge of environmental design principles for better environment . 5. Creation of better environmental design solutions .
Adv. Arch. Design-II	<ol style="list-style-type: none"> 1.To introduce students to progressively complex exercise involving special relations in 2D or 3D. 2.To make students aware of fundamental design skills in context of social, cultural and environmental responsibilities. 3.To familiarize students with large scale Architectural building projects with emphasis on building services & systems, architectural controls & building bye laws. 	<ol style="list-style-type: none"> 1. Comprehend the fundamentals of Architectural design elements and principles. 2.Analyze issues in urban & rural context and produce design solutions accordingly. 3.Apply design strategies to meet requirements. 4.Design buildings and spaces responding to social, economical& cultural needs of society & also climatic factors.
Urban Design	<ol style="list-style-type: none"> 1.To understand the emerging concept of urban deisgn. 2.To study appraisal of urban centre or public space. 	<ol style="list-style-type: none"> 1.Understand the fundamentals of Urban design elements and principles. 2.Analyze issues in urban context and produce design solutions accordingly.

	<p>3.To study urban morphology and principles of urban design.</p> <p>4.To learn building byelaws and zoning regulations.</p>	<p>3.Deal with urban design elements in planning & designing urban spaces.</p>
<p>Project Management</p>	<ul style="list-style-type: none"> •To introduce the importance of intercreativity between fundamentals of Project management and architecture. •To explain the role of latest software's used for Project management in construction sector. •To develop the vision of students towards completion of a project in a systematic and scientific manner. 	<p>Understand the intercreativity between fundamentals of Project management and architecture</p> <p>Understand the role of latest software's used for Project management in construction sector.</p> <p>Understand the vision towards systematic and scientific completion of a project</p>

Department of Civil Engineering

Course Name	Course Objectives	Course Outcomes
Engineering Mathematics III	1. To introduce the concept of linear differential equations of higher and their applications.	At the end of successful completion of course, the students will be able...
	2. To introduce concept of vector calculus.	1. To take use of Linear Differential Equations to solve the Civil Engineering problems.
	3. To learn the concept of Probability.	2. To apply knowledge of vector differentiation to find directional derivatives, curl and divergence of vector fields.
	4. To familiarize the students with concepts and applications of Laplace Transforms.	3. To describe the statistical data numerically by using Lines of regression and Curve fittings.
	5. To understand the concept of Complex variable.	4. To solve basic problems in probability theory, including problems involving the binomial, Poisson, and normal distributions.
		5. To find Laplace transforms of given functions and use it to solve linear differential equations. 6. To calculate numerical Integration.
Surveying-I		At the end of successful completion of course, the students will be able...
	1. To obtain a full understanding of the methods of measurement, errors to be expected, and their control.	1. To determine linear and angular measurement.
	2. To know the basics of levelling and theodolite survey in elevation and angular measurements.	2. To record various measurements in the field book.
	3. To find out area and volumes using various instruments.	3. To find areas of irregular figures.
	4. To study the significance of plane table surveying in plan making.	4. To prepare plans and sections required for civil engineering projects.
	5. To be able to use minor instruments with efficiency.	
6. To understand the importance of surveying in the field of civil engineering.		
Strength of Materials		At the end of successful completion of course, the students will be able...
	1. To develop an understanding of the basic principles of Structural Analysis.	1. To evaluate the response of elastic body for external actions and compute design forces
	2. Study the internal effects and deformations caused by the applied loads.	2. To evaluate shear force and bending moment of statically determinate structure
	3. Understand the analysis and design aspects of structural engineering.	3. To analyze the stress, strain and deformation of elastic bodies under bending and shear actions.
		4. To analyze the stress, strain and deformation of elastic bodies under external actions
Fluid Mechanics-I		At the end of successful completion of course, the students will be able...
	1. To study processes and science of fluid and their properties.	1. To study the basic properties of fluids and their behavior under application of various force systems.
	2. To study pressure measuring devices and pressure diagram.	2. To discuss the basic concepts and principles in fluid statics, fluid kinematics and fluid dynamics with their applications in fluid flow problems.
	3. To apply basic principles in fluid flow problems.	3. To recognize the principles of continuity, momentum and energy as applied to fluid in motion.
	4. To identify the losses in pipes.	4. To apply the equations to analyze problems by making proper assumptions and learn systematic engineering methods to solve practical fluid mechanics problems.
Building Construction and Materials		At the end of successful completion of course, the students will be able...
	1. To understand the properties and suitability of building materials.	1. To state the properties and suitability of building materials
	2. To understand the different building components.	2. To state requirements of building as a whole and functions of different building components with its requirement
	3. To understand the masonry work by using stones, bricks, blocks.	3. To demonstrate the knowledge of masonry work by using stones, bricks, blocks
	4. To understand the various types of doors and windows with their components.	4. To prepare the drawings for different building components like door, windows, staircases etc
	5. To understand the requirements of good stairs and design of stairs.	
6. To understand different types of roofs and floors.		
Numerical Methods		At the end of successful completion of course, the students will be able...
	1. To introduce the concept of Numerical differentiation.	1. To interpret the techniques, skills, knowledge of mathematics, science and modern engineering tools necessary for engineering practice.
	2. To introduce Numerical methods for evaluating definite integrals.	2. To illustrate basic theory of correlation and regression.
	3. To learn fitting of straight lines and parabola.	3. To form and solve Linear Programming Problem.
	4. To introduce the concept of Linear Programming Problem.	4. To deploy skills effectively in the solution of problems in civil engineering.
	5. To understand methods of solution of partial differential equations.	
6. To solve problems in civil engineering.		

Structural Mechanics		At the end of successful completion of course, the students will be able...
	1. Introduction to structural systems, and to methods of analyzing these systems under various loading conditions.	1. Identify the response of elastic body for external actions.
	2. To understand behavior of structure.	2. Distinguish engineering properties of the materials are understood.
	3. To analyze the structures subjected to moving loads.	3. Compute the design forces in the structures.
		4. Analyze the stress, strain and deformation of elastic bodies under external forces.
Surveying-II		At the end of successful completion of course, the students will be able...
	1. To understand tacheometric surveying in distance and height measurements.	1. Adopt the principles of advanced surveying instruments.
	2. To get introduced to different geodetic methods of survey such as triangulation.	2. Formulate triangulation stations, Flight planning and Ground control points (GCPs).
	3. To get introduced to modern advanced surveying techniques involved such as Remote sensing, Total station, GPS, Photogrammetry etc.	3. Apply GIS and GPS concepts to civil engineering problems.
	4. To understand the elements of different types of curves and preliminary survey for road.	4. Design and setout curves by different methods.
Concrete Technology		At the end of successful completion of course, the students will be able...
	1. To study materials used in concrete production.	1. Impart knowledge of physical properties of ingredients of concrete and their effect on strength and durability.
	2. To understand process of concrete manufacturing and to study properties of fresh concrete.	2. Explain the fundamentals of process of making good quality concrete and its elastic properties.
	3. To study relationship between compressive strength and tensile strength.	3. Understand the factors affecting properties of concrete.
	4. To study mix design of concrete by using IS code method and ACI method	4. Design the concrete mix proportion as per Indian standard code of practice.
	5. To study different Non Destructive Tests (NDT).	5. Demonstrate Non Destructive Testing (NDT) and evaluate quality of existing concrete.
	6. To study different types of special concrete and their manufacturing.	6. Understand different types of concrete and their applications.
Fluid Mechanics-II		At the end of successful completion of course, the students will be able...
	1. To study uniform and non-uniform flow in open channel.	1. Provide students with basic knowledge of fluid properties and utilizing principles developed in fluid mechanics.
	2. To apply basic principles in fluid flow problems.	2. Develop the principle and equation for pressure flow and momentum analysis.
	3. To study velocity and discharge measurement devices.	3. Provide the students with the analytical knowledge of pressure and velocity distribution in an open channel in order to solve practical problems.
	4. To study impact of jet, Pumps and turbines.	4. Illustrate and develop the equations and design principles for open channel flows, including sanitary and storm sewer design and flood control hydraulics.
Building Design and Drawing		At the end of successful completion of course, the students will be able...
	1. To understand Principles of Building planning and building planning bye laws.	1. Know principles of building planning.
	2. To understand planning of residential buildings with procedure.	2. Describe Building Bye-Laws and regulations.
	3. To understand Low cost housing and Maintenance, Repairs, Rehabilitation of Structures Per IS 1893.	3. Plan and draw residential building considering principle of planning and Building Bye- Laws and regulations.
	4. To understand various systems such as plumbing, electrification, Air conditioning, fire resistance, thermal insulation Per IS 13920.	4. Explain techniques of maintenance, repair and rehabilitation of structure.
	5. To understand various building finishes.	5. Draw the working drawing of foundation detail, plumbing and electrification of building.
		6. Illustrate the concept of ventilation, air conditioning and thermal insulation.
	7. Describe different types of building finishes.	
Water Resource Engineering-I		At the end of successful completion of course, the students will be able...
	1. To impart the basic knowledge of importance of Hydrology & irrigation in water resources development.	1. Apply the knowledge of estimation of hydrometeorological parameters.
	2. To know various hydrometeorological parameters and their estimation.	2. Estimate direct runoff and peak discharge using hydrograph technique.
	3. To create awareness about floods, their estimation using various methods.	3. Apply different methods of efficient irrigation and water conservation.
	4. To understand the importance of irrigation in Indian agricultural industry considering cropping patterns.	4. Determine reservoir capacity based on crop water requirement.
	5. To understand the principles of watershed management and water harvesting.	

Design of Steel Structures	1. To understand the behavior of elements of steel structure.	At the end of successful completion of course, the students will be able... 1. Describe the design philosophy, behavior of steel structure and failure mechanism.
	2. To understand the design concept of steel structure and its members by LSM.	2. Analyze and design different types of bolted & welded connections. 3. Assess the strength of structural members as per Indian Standards. 4. Analyze and design members subjected to tension, compression and flexure.
Environmental Engineering-I	1. To understand various sources of water with respect to quality and quantity of water.	At the end of successful completion of course, the students will be able... 1. Describe the various sources of water with respect to quality and quantity of water.
	2. To describe and design the various water treatment units.	2. Design the various water treatment units.
	3. To learn the special water treatments and sequencing of treatment for various qualities of surface & ground water.	3. Illustrate the special water treatments and sequencing of treatment for various qualities of surface & ground water.
	4. To design the various components related to transmission and distribution of water.	4. Describe the various components related to transmission and design of distribution of water.
	5. To understand various water supply appurtenances.	5. Summarize the different water supply appurtenances.
Geotechnical Engineering I	1. To provide a coherent development to the students for the courses in sector of Geotechnical Engineering & Soil Improvement Techniques etc.	At the end of successful completion of course, the students will be able... 1. Able to evaluate the Index and Engineering properties of soil
	2. To present the foundations of many basic Engineering tools and concepts related Geotechnical Engineering.	2. Understand the fundamental relationships in properties of soils
	3. To give an experience in the implementation of Engineering concepts which are applied in field of Geotechnical Engineering	3. Evaluate the stress calculations in soil under different soil conditions
	4. To involve the application of scientific and technical principles of planning, analysis, design of foundation along with soil improvement techniques.	4. Understands the process and importance of compaction and consolidation
		5. Know the shear strength of soil and its determination
		6. Analyze the lateral pressure on vertical retaining walls
Building Planning and Design	1. To study dimensions and space requirements for various elements of the building in relation to human body measurements.	At the end of successful completion of course, the students will be able... 1. Specify dimensions and space requirements for various elements of the building in relation to human body measurements.
	2. To study Planning, designing of various public buildings considering principles of planning and Building Bye- Laws and regulations.	2. Plan, design public building considering principles of planning and Building Bye- Laws and regulations.
	3. To study procedures for preparing perspective drawings of various objects as well as buildings.	3. Prepare the submission and working drawings of public building.
	4. To study Architectural composition and terms.	4. Illustrate the procedures for preparing perspective drawings of various objects as well as buildings.
		5. Apply knowledge of architectural composition and terms for betterment of aesthetic view.
Open Elective-I (E&E)	1. To study energy needs, demand and various renewable alternatives.	At the end of successful completion of course, the students will be able... 1. Compare conventional and renewable energy resources
	2. To understand potential of renewable energy resources.	2. Identify scope and potential of renewable energy
	3. To study technologies to harness the energy.	3. Analyze suitability of renewable energy resource.
	4. To understand advantages, limitations of resources and energy management.	4. Explain energy management principles and strategies
Open Elective-I (WM)	1. To study the effects of the various types of waste on human being, animals and environment.	At the end of successful completion of course, the students will be able... 1. To evaluate the effects of various wastes on human beings, animals and on Environment.
	2. To study the water & wastewater management and solid waste of urban area.	2. To solve the water and wastewater treat by using conventional and advanced treatment methods.
	3. To study the various techniques and options for handling industrial wastewater, hazardous waste and air pollution of urban area.	3. To estimate quantity of solid waste, E-waste and biomedical wastes and to suggest their disposal methods.
		4. To suggest reuse and recycles techniques of solid waste, E-waste and biomedical wastes and to suggest their disposal methods.
		5. To characteristics and to select treatment options for selected industrial wastewater.
		6. To discuss the impacts of hazardous waste and air pollution.

Theory of Structures		At the end of successful completion of course, the students will be able...
	1. To impart principles of elastic structural analysis and behavior of indeterminate structures.	1. Understand the concept of determinacy and indeterminacy.
	2. To analyze indeterminate structures by using different methods.	2. Apply various techniques of structural mechanics to solve indeterminate structures.
	3. To compare suitability of different methods.	3. Analyze indeterminate structures by using various approaches.
Engineering Management	4. To make aware of the limitations of the methods of solution and their outcomes.	4. Know the limitations of the methods of solution and their outcomes.
		At the end of successful completion of course, the students will be able...
	1. To introduce management theories.	1. Understand importance of management in construction.
	2. To learn project management tools.	2. Use the Project planning and management tools in Construction.
Environmental Engineering-II	3. To understand Resource management.	3. Evaluate and draw project network for estimating time and cost.
	4. To get acquainted with financial management.	4. Know the techniques of Material Management.
		5. Explore and understand the concepts of Economics in construction.
		6. Know the advance concepts in management.
Geotechnical Engineering II		At the end of successful completion of course, the students will be able...
	1. To describe wastewater, its sources, characteristics and collection systems.	1. Explain sources, characteristics and methods of wastewater collection.
	2. To design the various treatment processes for wastewater treatment and low cost treatment methods.	2. Design the primary and secondary wastewater treatment units and describe low cost wastewater treatment units.
	3. To interpret various methods of wastewater disposal.	3. Understand various methods of wastewater disposal
Open Elective-II (SWCT)	4. To explain various aspects of solid waste management.	4. Explain the necessity and importance of solid waste management.
	5. To outline the effects of air pollution and its control measures.	5. Describe air pollution, its effect and controlling techniques.
		At the end of successful completion of course, the students will be able...
	1. Know Various concepts of different soil/rock strata and use of this data for interpretation of bearing capacity	1. Use engineering science principles to develop foundation engineering knowledge.
Open Elective-II (DRM)	2. Understand the importance and basics of foundation engineering in the civil engineering projects.	2. Apply foundation engineering knowledge in the civil engineering projects.
	3. Evaluate the load bearing capacity and settlement of foundations by classical theories.	3. Calculate bearing capacity theoretically as well as practically.
	4. Analyze the geotechnical aspects of shallow and deep foundations	4. Calculate settlement and design shallow and deep foundation
	5. Understand the concepts of the stability of slopes and study various methods of evaluating the stability of slopes.	5. Apply basics concepts of slope stability on field.
Structural Design and Drawing-I	6. Know the modern foundation techniques.	6. Apply modern foundation techniques.
		At the end of successful completion of course, the students will be able...
	1. To understand the concept of soil and water conservation.	1. Understand methods of soil and water conservation.
	2. To apply the knowledge of conservation for societal benefit.	2. Develop an integrated model for sustainable natural conservation.
Seminar	3. To evaluate the specific needs of soil and water conservation in given area.	3. Explain the groundwater exploration techniques and its artificial recharge.
		4. Analyze the needs for protection of banks and preservation of soil.
		At the end of successful completion of course, the students will be able...
	1. To provide basic conceptual understanding of disasters and its relationships with development.	1. Gain the ability to understand and categories the disaster.
Theory of Structures	2. To gain understand approaches of disaster preparedness, response and recovery.	2. Apply preparedness plans for disaster response.
	3. To enhance awareness of Disaster Risk Management institutional processes in India	3. Setting up of early warning systems for risk reductions
	4. To build skills to respond to disasters.	4. Application of Sphere Standards Indian context
		At the end of successful completion of course, the students will be able...
Engineering Management	1. To analyze and design steel structures.	1. Analyze and design different types of bolted & welded connections
	2. To prepare the working drawing for various structural elements.	2. Demonstrate the knowledge of common sections subjected tension and compression members & its design,
		3. Analyze and design of steel column, flexural members and its elements.
		4. Aware of application of software in structural analysis and design.
Environmental Engineering-II		5. Prepare the working drawing as per requirement of project execution.
		At the end of successful completion of course, the students will be able...
	1. To understand, develop research ability & present the knowledge gained from curriculum/field etc.	1. Summarize the present status and make literature review on the selected topic with current issues to give a state of an art of technological progress in the past through technical report.
	2. To study the recent trends, technological innovations in civil engineering & interdisciplinary areas.	2. Deliver seminar presentation using modern tools highlighting the distinguishing features of the studies conducted.
Open Elective-II (SWCT)	3. To enhance presentation skills.	3. Prepare the technical report of seminar work in given format.

Design of Concrete Structure -I		At the end of successful completion of course, the students will be able...	
	1. To understand the concept of RCC structural design	1. Explain properties of concrete , concrete behavior and design methods	
	2. To conceive the elementary deign of different structural elements.	2. Analyse and design of singly, doubly, flanged sectiobs for flexure	
		3. Analyse and design of singly, doubly, flanged sectiobs for shear	
		4. Design of slab and stair case for flexure and shear	
		5. Analyse and design of axially loaded columns	
6. Design of isollated footing for axial load and bending moment			
Earthquake Engineering		At the end of successful completion of course, the students will be able...	
	1. To understand behavior of earth during earthquake.	1. Understand behaviour of earth during EQ.	
	2. To understand the concepts of mathematical modeling.	2. Understand concepts of mathematical modelling.	
	3. To understand dynamic behavior of structure.	3. Understand dynamic behaviour of structure.	
	4. To understand earthquake resistant philosophy of structure.	4. Understand EQ resistant design philosophy.	
	5. To understand modern techniques of earthquake resistant method.	5. To study modern techniques of EQ resistant design.	
Quantity Surveying & Valuation		At the end of successful completion of course, the students will be able...	
	1. To explain the importance of estimation & specification of work in building construction.	1. To explain the importance of estimation & specification of work in building construction.	
	2. To prepare building estimate by various methods.	2. To prepare building estimate by various methods.	
	3. To explain & compare various types of contracts and knowledge about tendering procedure.	3. To explain & compare various types of contracts and knowledge about tendering procedure.	
	4. To explain importance of valuation in civil engineering.	4. To explain importance of valuation in civil engineering.	
Project Management & Construction Equipments		At the end of successful completion of course, the students will be able...	
	1. To understand the importance of Project Mangement tools.	1. To understand the importance of Project Mangement tools.	
	2. To plan and schedule the projects by using CPM, PERT and MSP.	2. To plan and schedule the projects by using CPM, PERT and MSP.	
	3. To understand the working of various construction equipment.	3. To understand the working of various construction equipment.	
	4. To know the imprtance of safety and risk management in construction.	4. To know the imprtance of safety and risk management in construction.	
Elective-I (SWM)		At the end of successful completion of course, the students will be able...	
	1. To state the importance of solid waste management	1. To state the importance of solid waste management	
	2. To describe different types and sources of solid waste	2. To describe different types and sources of solid waste	
	3. To illustrate different solid waste collection methods and process	3. To illustrate different solid waste collection methods and process	
	4. To identify the various process of solid waste	4. To identify the various process of solid waste	
	5. To understand the disposal of solid waste by sanitary land filling, composting and Incineration methods	5. To understand the disposal of solid waste by sanitary land filling, composting and Incineration methods	
Elective-I (AFE)		At the end of successful completion of course, the students will be able...	
	1. To explain and express the knowledge of different types of foundation	1. To explain and express the knowledge of different types of foundation	
	2. To analyze the different types of foundation	2. To analyze the different types of foundation	
	3. To explain design criteria for Machine foundation	3. To explain design criteria for Machine foundation	
	4. To explain and apply knowledge of sheet piles and coffer dam	4. To explain and apply knowledge of sheet piles and coffer dam	
	5. to solve problems associated with foundations in difficult soils	5. to solve problems associated with foundations in difficult soils	

Design of Concrete Structures -II		At the end of successful completion of course, the students will be able...
	1. To understand of concept of Section subjected to torsion	1. To understand of concept of Section subjected to torsion
	2. To analyze the Continuous beam slab	2. To analyze the Continuous beam slab
	3. To design Water tank resting on ground	3. To design Water tank resting on ground
	4. To explain the concept of prestressed sections	4. To explain the concept of prestressed sections
Water Resource Engg. -II		At the end of successful completion of course, the students will be able...
	1. To Plan and design the reservoir depending upon water resources potential.	1. To Plan and design the reservoir depending upon water resources potential.
	2. To analyze and design gravity dam,earth dam and arch dam etc.	2. To analyze and design gravity dam,earth dam and arch dam etc.
	3. To Demonstrate design principle of arch dam.	3. To Demonstrate design principle of arch dam.
	4. To Solve seepage problem for weirs on permeable foundation.	4. To Solve seepage problem for weirs on permeable foundation.
	5. To Demonstrate knowledge of hydro power engineering.	5. To Demonstrate knowledge of hydro power engineering.
Transportation Engg. -II	6. To Design canal section using various theories.	6. To Design canal section using various theories.
		At the end of successful completion of course, the students will be able...
	1. Provides a basic knowledge on Urbanisation and its trend.	1. Provides a basic knowledge on Urbanisation and its trend.
	2. Deals with different types of plan, its implementation, regional development and management for sustainable urban growth.	2. Deals with different types of plan, its implementation, regional development and management for sustainable urban growth.
	3. To expose the various aspects of planning and designing of rail transportation system.	3. To expose the various aspects of planning and designing of rail transportation system.
Elective-II (SDFRS)	4. Identify the input parameters required for design of a bridge structures.	4. Identify the input parameters required for design of a bridge structures.
		At the end of successful completion of course, the students will be able...
	1. To Design & detailing of combined & raft foundation	1. Design & detailing of combined & raft foundation
	2. To Design & detailing of pile cap	2. Design & detailing of pile cap
	3. To Design & detailing of retaining wall	3. Design & detailing of retaining wall
Elective-II (DOB)	4. To Explain and demonstrate knowledge of well foundations and breakwaters.	4. Explain and demonstrate knowledge of well foundations and breakwaters.
		At the end of successful completion of course, the students will be able...
	1. To Explain types, specifications and loads considered for road bridges	1. To Explain types, specifications and loads considered for road bridges
	2. To State design considerations and design of RCC deck slab, abutment, pier and approach slab	2. To State design considerations and design of RCC deck slab, abutment, pier and approach slab
	3. To Explain different construction and strengthening techniques of substructure and superstructure	3. To Explain different construction and strengthening techniques of substructure and superstructure
Elective-III (ACT)	4. To Explain different types of bridge bearings and expansion joints	4. To Explain different types of bridge bearings and expansion joints
		At the end of successful completion of course, the students will be able...
	1. To Explain types of construction and various type of formwork.	1. To Explain types of construction and various type of formwork.
	2. To Select advanced construction material for construction from different categories.	2. To Select advanced construction material for construction from different categories.
	3. To Describe methods of Land reclamation and drainage for land reclamation.	3. To Describe methods of Land reclamation and drainage for land reclamation.
	4. To Explain the construction of various power-generation structures.	4. To Explain the construction of various power-generation structures.
Structural Design and Drawing-II	5. To Explain the fundamentals of Rehabilitation of bridges and retaining structures.	5. To Explain the fundamentals of Rehabilitation of bridges and retaining structures.
	6. To Describe various advanced techniques for infra-structure and construction of concrete pavement.	6. To Describe various advanced techniques for infra-structure and construction of concrete pavement.
		At the end of successful completion of course, the students will be able...
	1. To apply holistic approach of planning, analysis, segmentation & design of RCC building & other Civil Engineering Structures	1. Translate the ideas into workable plans
	2. To get an exposure to the method of analysis & design using software.	2. Classify the components
	3. Design the units & hence the structure as a whole	
	4. Draft the details for execution	
	5. To read and understand the supplied drawing for execution on site.	

Department Name –E & TC		
Course Name	Course Objectives	Course Outcomes
Engineering Mathematics-I	1.To develop mathematical skills and enhance thinking power of students	Make use of Linear Differential Equations to solve the Electrical En
	2.To give the knowledge to the students of fuzzy set theory, Linear Differential Equations probability, Laplace transforms, Fourier series with an emphasis on the application of solving engineering problems	Apply knowledge of vector differentiation to find directional.
	3.To prepare students to formulate a mathematical model using engineering skills & interpret the solution in real world.	Define fuzzy sets using linguistic words and represent these sets.
		Develop Fourier series expansion of a function over the given inte
		Find Laplace transforms of given functions and use it to solve linea
		Solve basic problems in probability theory, including problems inv
Electronic Circuit Design-I	1.Provide an introduction and basic understanding of Semiconductor Devices viz. diodes and BJT, JFET.	Analyze and design electronic circuits such as rectifiers & unequal
	2.Provide basic analog electronic circuit design techniques using diodes and bipolar junction transistors and to develop analytical skills	Analyze and design electronic circuits such as regulated power.
	3.Develop student ability to apply basic engineering sciences to understand the operation& analysis of electronic circuits using diodes and bipolar junction transistors	Analyze & Design of BJT & FET Biasing.
	4. Design electronic circuits to meet the desired specifications.	Explain the hybrid model of transistor and analyze the transistor a
		Analysis of CE Amplifier for low frequency & High frequency repo.
Network Analysis	1.To understand basic theorems used for network analysis.	Analyze AC and DC circuits using different network Theorems and
	2.To understand two port networks and its parameters	Identify and analyze the series, parallel resonance circuits.
	3.To understand series and parallel resonance and its effects	Evaluate two port parameters and Understand network transfer.
	4.To understand system behavior using	Analyze and design prototype LC

	pole zero plot	filters.
	5.To understand and implement filter approximations	Evaluate initial conditions and solve differential equation for RL, R
Transducers and Measureme	1.Provide introduction to different types of Transducers with their classification, construction & application	Students will be able to select appropriate transducer & sensors.
	2.Provide knowledge of different sensors and their applications	Students will get acquainted with different DAS
	3.Provide knowledge of signal conditioning and instrumentation system	Students will be able to design instrumentation system
	4.Provide basic knowledge of measurement system	Students will be able to understand measurement basics & select proper instrument for particular measurement of electrical parameters.
	5.Provide basic understanding of different Electronic instruments	
	6.Provide knowledge of different types of bridges	
Analog Communication	1.The basic objective of this course is to introduce the students with analog communication, AM, FM modulation techniques, their analysis, bandwidth calculations	Explain and identify the fundamental concept of analog comm.
	2.It also focuses on the performance analysis of analog communications systems under the presence of noise and finally introduces the pulse and digital modulation techniques.	Compare various analog modulation scheme
		Interpret the performance of analog communication system und
		Draw & Explain the operations of various receiver systems
		Define sampling theorem
Differentiate between various Pulse modulation techniques		
Programming Lab-I	1.To understand how to design flowchart and algorithms for procedure oriented programs.	understand the basic concepts of procedure oriented programming
	2.To develop programming skills using the fundamentals and basics of C Language, control structures and looping statements.	use the control statements, looping statements and functions.
	3.To enable effective usage of arrays, structures, functions, pointers and to implement the memory management concepts.	Student will be able to design programs using user defined function
	4.To design and implement programs using files handling and	design & apply the skills for solving the engineering problems.

	user defined types.	
Environmental studies	1.To learn the basic concepts of environment and environmental education with the need of public awareness.	Explain basic concepts of environment and environmental education with the need of public awareness.
	2. To understand the problem of environmental degradation and how to achieve sustainable goals.	The importance of judicious use and conservation of natural resources
	3.to understand the components of Ecosystem and recognize the need of conservation of biodiversity.	Explain the components of Ecosystem and recognize the need of conservation of biodiversity.
	4.to understand the severity and bad effect of pollutions and make people aware about laws.	Illustrate the severity and bad effect of pollutions and make people
	5.to Collect data from site visit and represent it in the form of project work copy with poster or model.	Collect data from site visit and represent it in the form of project work copy with poster
Electronic Circuit Design-II	1.Provide an introduction and basic understanding of feedback amplifiers, power amplifiers, oscillators, multivibrators	Analyze & Design Multistage Amplifier
	2.Develop student ability to apply basic engineering sciences to understand the operation & analysis of electronic circuits using diodes, bipolar junction transistors and field effect transistors	Analyze & Design Feedback Amplifier
	3.Provide analogy electronic circuit design techniques using diodes, bipolar junction transistors and field effect transistors and to develop analytical skills	Analyze & Design Power Amplifier
	4.Design electronic circuits to meet desired specifications	Describe & Design Different types of Oscillators using BJT
	5.Apply knowledge of mathematics, science and engineering to design, analyze and implement electronic circuits	Describe & Design Different types of Multivibrators using BJT
		Describe & Design IC voltage Regulators
Linear integrated Circuits	Explain the internal circuit of operational amplifier and its parameters	Explain operational amplifier with its parameters
	Explain the application of Op-amps.	Classify different configuration of op-amp
	Design various Active filters.	Identify and explain different applications of op-amp
	Analyze and design of various wave	Design and implement various filters

	generators	Analyze different waveform generator circuits
		Apply knowledge of op-amp in various industrial applications
Control System Engineering	1.To provide an introduction and basic understanding of Control System	Apply knowledge of mathematics, science, and engineering to des
	2.To develop time & frequency domain analysis	Explain time & frequency domain analysis for different control sys
	3.To analyze & compare different control systems	Demonstrate & compare different control systems
	4.To understand the concept of stability & state space variables	Describe state variables
		Design model for control system
Digital Communication	1.Study the random signal theory with its mathematical analysis base	Describe the probability of random signal
	2.Understand the concept of information theory in detail with different coding theorems.	Solve the problem based on information theory
	3.Elaborate the different source coding techniques with the help of their block diagrams and function.	Classify different source coding technique
	4.Explain the different digital modulation techniques.	Explain different line coding techniques.
	5.Describe the baseband transmission and reception system.	Compare different digital modulation technique.
Data Structures	1.Provide basic concept of data structure & it's types.	Elaborate the basic concept of data structure & it's types.
	2.Provide the knowledge of arrays & records as well as relevant operations on it.	Design and Implement the various algorithms on arrays & records.
	3.Provide the knowledge of linked list & relevant operations on it.	Implement algorithms on linked list.
	4.Provide the concept of stacks, queues & it's applications.	Understand the concept of stacks, queues & its applications.
	5.Provide the knowledge of various types of trees & relevant operations.	Construct various types of trees & their applications.
	6.Provides the Knowledge of Graphs & Hashing techniques.	Understand the concept of Graph & Hashing.
Programming Lab-II	1.To understand features of object-oriented programming and design C++ classes	Student will be able to understand the basic concepts of procedure
	2.To understand how to overload functions and operators in C++.	Student will be able to use the class, objects, function and operator

	3.To learn how to implement copy constructors and class member functions.	Student will be able to understand and implement the concept of
	4.To learn how inheritance and virtual functions implement dynamic binding with polymorphism.	Student will be able to design & apply solving the eng
	5.To learn how design inheritance for code reuse in C++.	
	6.To learn how to design and implement generic classes with C++ templates and exception handling	
Signal & Systems	1 To understand basic of CT & DT signals and their representation.	Demonstrate use of signals and their representation.
	2 To understand basic of CT & DT system and their representation	Represent CT & DT system
	3 To analyze CT & DT signals using Fourier transform	Use Fourier transform for analysis of CT & DT signals
	4 To compute DFT and IDFT	Compute DFT and IDFT
	5 To analyze signals using Z-transform	Analyze signals using Z-transform
	6 To apply realization techniques for systems	Realize the system
Ectromagnetic Engineering	1 Explain basic of Vector calculus & co-ordinate systems.	Explain the fundamentals of mathematical skills related with differential, integral and vector calculus.
	2 Define & derive different laws in steady electric & magnetic fields.	Apply and analyse the concepts of steady electric & magnetic fields.
	3 Apply Maxwell's equations in different forms to Develop wave equations.	Develop field equations from understanding of Maxwell's Equations.
	4 Explain concepts of transmission lines	Extend the knowledge of basic properties of transmission lines to analyse electromagnetic wave propagation in generic transmission line geometries.
Digital & VLSI Design	1 Understand principles and operations of combinational & sequential logic circuits.	Apply Boolean laws/K-Map-method, to reduce a given Boolean function

	2 Design & implement digital circuits (combinational & sequential) using VHDL	Design & realize combinational logic circuits using logic gates.
	3 Explain students the fundamental concepts of Hardware Description Language and design flow of digital system design.	Demonstrate the operation of flip-flops, counters , shift registers Synchronous sequential machine using Moore and Mealy machine
		Design combinational and sequential logic circuits using various description techniques in VHDL
Optical Communication	1 Describe the basics optical communication along with optical fiber structure and light propagating mechanisms in detail.	Differentiate the different types of optical fiber structures and light propagating mechanisms.
	2 Analyze the signal degradation mechanisms	Acquire knowledge of signal degradation mechanism in optical fiber.
	3 Explain the construction and working of optical sources and detectors.	Understand the construction of and working of optical sources and detectors
Simulation & Modelling	1 To develop problem solving skills and their implementation through basic Python	Understand the python programming basics
	2 To understand and implement concepts of decision making statements	Able to solve programs on decision making & looping statements in python
	3 To implement programs based on looping statements	Understand python list, tuple, and dictionary collection concepts
	4 To understand & implement programs based on built in functions	Understand simulation programs using SimPy Library
	5 To develop simulations using python Simpy package	Design & Apply Simpy library functions to model real time problems.
Digital Signal Processing	1 To understand Fast Fourier Transform and Fast Convolution	Make use of FFT algorithm for filtering of long duration sequences
	2 To understand design of digital FIR	Design digital FIR filters

	filters using various methods	
	3 To understand design of digital IIR filters using various methods	Design digital IIR filters
	4 To understand the key architectural features of DSP Processor	Implement FIR and IIR filters using DSP Processor
	5 To understand the basic concept of Multirate digital signal processing	Apply the basic concept of Multirate digital signal processing
	6 To understand the basic concept of wavelet transform	Apply the basic concept of wavelet transform
Microprocessor & Microcontroller	1. Understand fundamentals of 8085 Architecture and Programming.	Describe Architecture of 8085 and write various Programs.
	2. To apply the knowledge of Interrupts and interfacing of memory, 8255 with 8085.	Implement Interrupts and interfacing of memory, 8255 with 8085.
	3. Understand fundamentals of 8051 Architecture and Programming.	Describe Architecture of 8051 and write various Programs.
	4. Analyze Real time requirements using ON-Chip resources of 8051.	Perform experiment using ON-Chip resources of 8051.
	5. Evaluate need of I/O peripherals to satisfy system design requirements.	Select I/O peripherals to satisfy system design requirements.
	6. Develop Embedded 'C' Programs for I/O Peripherals	Design Embedded 'C' Programs for I/O Peripherals
Power Electronics	1 Make students aware of semiconductor power devices with its firing circuits.	Understand the characteristics of various power electronics devices and Compare the different firing circuits.
	2 Prepare students to design and simulate Controlled rectifier circuits.	Analyze converters, Inverters and Choppers.
	3 Make students aware to the Utilization of Choppers and Inverters	Understand the Industrial applications of Power circuits
	4 Explain Industrial applications of Power Electronics Circuits.	

Antenna and Wave Propagation	1 Basic parameters of antennas and their principle of operation	Realize the importance of basics of antenna systems to differentiate the applicability of each type of antenna
	2 Different Antenna types to know their applications in various domains.	Analyze the utilization of Antenna systems in wide areas like wireless communication, fixed line communication, computer communication etc.
	3 Different types of wave propagation Techniques	Practice acquired knowledge within the chosen area of technology for project development.
Mini Project	1 Provide students for knowledge of Electronics Components and soldering techniques and its package information for electronics circuit design	Identify, discuss and justify the technical aspects of the chosen project with a Practice acquired knowledge within the chosen area of technology for project
	2 Provide students for knowledge of the assembling of electronics circuit with components on PCB (Printed Circuit Board) of circuit design.	Reproduce, improve and refine technical aspects for engineering projects comprehensive and systematic approach.
	3 Design and development of Small electronic project based on hardware and software for electronic systems.	4 Work as an individual or in a team in development of technical projects.
		5 Communicate and report effectively project related activities and findings.
Information Theory & Coding Techniques	1.To introduce information theory, the fundamentals of error control coding techniques and their applications.	Students will be able to demonstrate the knowledge of analysis of
	2.To calculate the information content of a random variable from its probability distribution, Related to the joint, conditional, and marginal entropies of variables in terms of their probabilities.	Students will be able to introduce to the basic notions of information.
	3.To understand the types of channels, Channel and their Capacities to construct efficient codes for data on imperfect communication channels.	Students can analyze the channel models mathematically.

	4.To understand the need & Objective of error control coding with encoding & decoding procedure to analyze error detecting & correcting capability of different codes.	Students will be able to design encoder and decoder for various co
Embedded System Design	1.To learn and understand the characteristics of Embedded systems and its Architectures	Differentiate and apply important attributes of Embedded system
	2.To develop skill of ARM programming.	Use ARM programmers model to encode instructions so as to writ
	3.To introduce devices and buses used for embedded networking	Design small applications of UART, I2C, SPI.
	4.To study key features of Microcontroller LPC214X	Demonstrate scaling of execution speed using MAM and PLL.
	5.To develop skill of programming on chip resources of LPC214X	Design small applications of GPIO, Timers, PWM, Real time clock,
	6.To understand the concept of real time operating systems.	Understand the concepts of RTOS & its use in Embedded system
Computer Network	1.To provide students with an overview of the concepts and fundamentals of data communication and computer networks	State the evolution of Computer network, classifies different type
	2.Review the state of art in open research area such as LAN, MAN, WLAN & applications Computer Networking	Design, implements, and analyzes simple computer networks
	3.Acquire the required skill to design simple computer networks.	Identify, formulate, and solve network engineering problems. Understand basics of network security.
Image Processing	1.To learn the fundamental concepts of Digital Image Processing and study basic image processing operations.	Apply principles and techniques of digital image processing in appl.
	2.To cover the basic analytical methods which are widely used in image processing; linear and nonlinear filtering; and image transformations for coding and restoration	Analyze and implement image processing algorithms.
	3.To design and implement algorithms for advanced image analysis.	Hands-on experience in using software tools for processing digital
	4.To expose students to current applications in the field of digital image processing	
Elective-I (SCOM)	1.To learn the basic concepts of satellite communication.	Students will able to understand basic concepts of satellite comm.

	2.To explain the orbital mechanics, launch vehicles and satellite subsystems.	Students will able to understand the orbital mechanics, launch veh
	3.To learn the satellite link design	Ability to calculate satellite link budget.
	4.To understand V-SAT system.	Students will able to describe multiple access system.
	5.To understand satellite navigation and GPS	Student will able to understand satellite navigation and GPS.
Project-I	1.to gain mathematical, analytical and engineering knowledge to design products and will be able to analyse verify and test by using modern tools.	Students will be able to gain mathematical, analytical.
	2.to give Selection/ Solution of problem suitable / useful for society, industry, personal uses which are not harmful for the environment.	Students will be able to give Selection/ Solution of problem suitable
	3.create their own work by co-ordination and equal distribution.	Students will create their own work by co-ordination.
	4.Write synopsis and present themselves through Oral and power point presentation.	Students will be able to Write synopsis.
	5.Budgeting and optimizing cost of project which will be useful for their start up, higher education and employment.	Students will be able to do the Budgeting and optimizing cost of project
Microwave Engineering	1.Understand the basic concept of microwave engineering, and apply EM wave theory	Analyse the microwave waveguides and passive circuit component
	2.Understand the theoretical and experimental design and analysis of microwave tube devices and circuits	Identify and differentiate the state of art in microwave tubes.
	3.Learn the basics of Monolithic Microwave Integrated Circuits (MMIC)	Identify materials used in MMIC and microwave hazards
	4.Study Microwave semiconductor devices & applications	Differentiate solid state devices used in microwave based on their
	5.To understand various microwave measurement techniques	Measure the output power, VSWR, impedance, frequency.
	6.Expose students to different microwave antennas	Apply the microwave antenna knowledge for industrial.
	1.To elaborate and show how wireless networks are penetrating our daily lives for data, multimedia and voice services.	Explain wireless networking protocols (Bluetooth, Security etc.), architectures, and standards used for

Wireless Communication Network		wireless communication systems
	2.To explain them about the techniques in accessing, analyzing and transferring of remote end data with high reliability and security	Apply communication engineering concepts in preparing a link budget and design of cell geometry.
	3.To understand different Hand off concepts, channel assignment and frequency reuse concept	Discuss call establishment procedure
	4.To understand concept of GSM architecture and framing structure	Explain the importance of Multiple Access techniques, voice coding techniques and mobility management in GSM network
	5.To understand different Wireless LAN protocols and communication protocol such as IEEE802.11	
	6.To understand wireless access protocols and WAP security.	
Power Electronics & Drives	1.To motive the students to develop the knowledge about various configurations of three phase controlled Rectifiers.	Ability to analyze and evaluate the three phase controlled convert
	2.To motive the students to develop the knowledge about various configurations of cyclo converter.	Ability to build power electronic circuits using matlab tools.
	3.To enable students to gain knowledge and understanding aspects of three phase inverter.	Understand the fundamental principles and applications ac drives
	4.To enable students to gain knowledge and understanding of ac & dc drives	Ability to design, analyze and understand the operation of inverter
	5. Applying matlab tools and methodologies for a design of power converter circuits.	
Elective-II	1.to understand techniques of digital image processing in applications related to digital imaging system design and analysis.	Apply principles and techniques of digital image processing in appl
	2.to learn the image processing algorithms.	Analyze and implement image processing algorithms.
	3.to get Hands-on experience in using software tools for processing digital images.	Hands-on experience in using software tools for processing digital
	1.to gain mathematical, analytical and engineering knowledge to design products and will be able to analyse verify and test by	Students will be able to gain mathematical, analytical.

	using modern tools.	
Project-II	2.to give Selection/ Solution of problem suitable / useful for society, industry, personal uses which are not harmful for the environment.	Students will be able to give Selection/ Solution of problem.
	3.create their own work by co-ordination and equal distribution.	Students will create their own work by co-ordination.
	4.Write synopsis and present themselves through Oral and power point presentation.	Students will be able to Write synopsis.
	5.do the Budgeting and optimizing cost of project which will be useful for their start up, higher education and employment.	Students will be able to do the Budgeting and optimizing cost of project which will be useful for their start up, higher education.

Chemical Engineering

Course Name	Course Objective	Course Outcome
Engineering Mathematics - III	1.To develop mathematical skills and enhance logical thinking power of students.	1Solve Linear Differential Equations with constant coefficients..
	2.To give knowledge to students statistics ,Linear differential equation ,Laplace transform, Probability with emphasis of solving engineering problems	2.Make use of linear Differential Equation to solve the ChemicalEngineering problems.
	3.To prepare students to formulate mathematical model using engineering skills and interpret the solution in real world .	3.Solve basic problems in probability theory, including problemsinvolving the binomial, Poisson, and normal distributions.
		4Find Laplace transforms of given functions.
		5Apply Laplace transforms to solve Linear Differential Equations..
		6.Describe the statistical data numerically by using Lines of regression and Curve fittings.
Chemistry -I	1. To impart the basic concepts of physical chemistry	Analyze the basic concepts of physical chemistry
	2. To give the basic knowledge of chemical reaction engineering using catalyst.	Describe the basic knowledge of chemical reaction engineering using catalyst.
	3. To study the different analytical chemistry.	Illustrate the different analytical chemistry.
	4. To study the concepts of organic chemistry.	Apply the concepts of organic chemistry.
	5. To develop awareness of industrially importance of organic reactions	Distinguish the awareness of industrially important organic reactions
	6. To understand mechanism of organic reactions in soaps and detergents	Differentiate the mechanism of organic reactions in soaps and detergents
	1. Define the relations between simple stress and strains.	1.Explain the relation between simple stress and strain to study the behaviours of material under loading.

SOM & MOC	2. Analyze two dimensional stress system and torsion in shaft	2. Analyze two dimensional stress system and behavior of material under twisting moment and power transmitted by shaft.
	3. Classify thin cylinders, thick cylinders and spheres	3. Classify thin cylinders, thick cylinders and spheres and effect of fluid pressure on it.
	4. Explain the theories of failure.	4. Analyze behavior of material under direct and bending stresses and calculate stresses developed in section due to eccentric loading
	5. Select right material of construction to avoid the material failure	5. Apply concept of material failure by the study of various theories.
	6. Estimates economics in material selections	6. Understand the economics in material selections and select correct material of construction for process equipment.
Fluid Mechanics	1. The students completing this course are expected to understand the importance of fluid mechanics and fluid moving machineries in the field of chemical Engg.	1. Understand the importance of unit conversion and the static fluid behaviour and pressure measurement devices in the field of chemical Engineering.
	2. They will be able to develop the logic to calculate the momentum balance with consideration of nature of fluids.	2. Able to understand the fluid behaviour and basic equations regarding fluid flow.
	3. They will be able to understand behaviour of fluids and their basic equations like Bernoulli's equation with and without friction.	3. To understand compressible and incompressible fluid behaviours and calculation of friction factor with consideration of all parameters like roughness, pipe fittings.
	4. They are expected to understand transportation, Ergun's equation and concept of fluidization and agitation of fluids.	4. To recognize the fluid behavior changed due to immersed bodies and related friction and pressure drop of fluid due to it along with fluidization concept.
	5. They are expected to aware about flow past immersed bodies.	5. To aware about measurement of fluid flow, fluid behaviour in case of fluidization and all affecting factors.
	6. They are expected understand metering of fluids.	6. To aware about measurement of power requirements for agitator, fluid behaviour in case of agitations of fluids

Mechanica I Operations	1. To develop the fundamental/basics of solid phase	1. Learn fundamentals/basics such as characterization of particles, properties, storage, transporting solid particles and design equations
	2. To develop the knowledge of Size reduction of solid and screening of solids	2. Students will be able to understand the basics of size reduction, equipment details and calculation of energy requirement. Identify basics of screening, solid-solid separation equipment and calculating efficiency of screening equipment
	3. To study the mixing and blending of solid-liquid & solid-solid	3. Students will learn basics of mixing and blending and also learn the principles, working and construction of mixing equipments
	4. To study the filtration and sedimentation for solid-liquid separation	4. Students will be able to understand the details of filtration and sedimentation, design equations of filtration, also identify principles, working and construction of separation of solid- liquid
	5. To conceive the different solid-gas separation equipment	5. Identify industrial applications and principles, working and construction of separation of solid-gas
	6. To conceive the different liquid-solid and solid-solid separation equipment	6. Identify industrial applications and principles, working and construction of separation of solid-liquid and solid-solid
Soft Skills	1.To Understand Soft Skills Awareness	Understand Soft Skills Awareness
	2.To Summarize methods for effective learning, reviewing and leadership styles	Summarize methods for effective learning, reviewing and leadership styles
	3.To Apply team work skills	Apply team work skills
	4.To Apply knowledge to present effectively	Apply knowledge to present effectively
	5.To Apply skills to communicate effectively	Apply skills to communicate effectively
	6.To Analyze skills to develop personal self awareness	Analyze skills to develop personal self awareness
	1. To develop mathematical skills and enhance thinking power of students..	1.Apply knowledge of vector differentiation to find directional derivatives, curl and divergence of vector fields..

Engineering Mathematics - IV	2. To give the knowledge to the students of Vector Differential Calculus, 2 Partial Differential Equations, Numerical Differentiation, Fourier Series, with an emphasis on the application of solving engineering problems..	2. Form and solve partial differential equations
	3. To prepare students to formulate a mathematical model using engineering skills & interpret the solution in real world.	3. Find values of first, second and third derivative at a particular point
		4. Calculate numerical Integration.
		5. Develop Fourier series expansion of a function over the given interval.
Chemistry -II	6. Make use of Partial Differential Equation to solve the Mechanical Engineering problems.	6. Make use of Partial Differential Equation to solve the Mechanical Engineering problems.
	1. To impart the basic concepts of physical chemistry	1. Analyze the basic concepts of physical chemistry
	2. To give the basic knowledge of chemical reaction engineering using catalyst.	2. Describe the basic knowledge of chemical reaction engineering using catalyst.
	3. To study the different analytical chemistry.	3. Illustrate the different analytical chemistry.
	4. To study the concepts of organic chemistry.	4. Apply the concepts of organic chemistry.
	5. To develop awareness of industrially importance of organic reactions	5. Distinguish the awareness of industrially important organic reactions
6. To understand mechanism of organic reactions in soaps and detergents	6. Differentiate the mechanism of organic reactions in soaps and detergents	
Process Calculations	1. Apply the fundamental principles of units and conversions on different systems.	1. Students will be able to calculate composition of solid, liquid and gaseous mixtures
	2. Understand basic chemical calculations for solids, liquids and gases	2. Students will be able to do material balance on different unit operations.
	3. Evaluate material balance on different unit operations and unit processes	3. Students will be able to do material balance on different unit processes
	4. Evaluate energy balance on different unit processes.	4. Students will be able to evaluate enthalpy change for unit operations.
		5. Students will be able to evaluate enthalpy change for unit processes

		6. Students will be able to evaluate calorific values of fuels and combustion calculations
Heat Transfer	1. To Introduce basic fundamentals to students regarding Heat Transfer like Mechanism of heat flow with governing laws: Conduction, Convection, Radiation in Chemical Engineering	1. Students could understand basic knowledge of modes of heat transfer and various aspect of heat propagation.
	2. To aware students about Principles of heat flow in fluids as well to get familiar about design and use of heat exchange equipment with consideration of fouling factor.	2. Students could understand principal of heat flow.
	3. To avail knowledge about Heat transfer to fluids without phase change, individual as well overall heat transfer coefficients with consideration of heat losses and resistances and natural and forced convection along with effect of various parameters and dimensionless groups. Viz. Nusselt number, Greatz & Peclet numbers.	3. Students could understand how to calculate heat flux with respect to geometrical dimensions and various modes of heat transfer.
	4. To aware/Train students about Heat transfer to fluids with phase change boiling liquids along with critical heat flux and various types of boiling.	4. Students could understand heat transfer without and with phase change.
	5. To avail knowledge about various heat exchange equipments and to get aware about all parts of heat exchange equipments in design aspect.	5. Students could able to design heat exchange equipments with respect to process requirement as well process conditions in optimistic way.
	6. To aware about evaporation process and various types of evaporators and classification on basis of feeding.	6. Students could become aware about evaporation and would technically sound to design and operate evaporator.
Chemical Engineering Thermodynamics	1. Ability to apply fundamental of thermodynamics in engineering applications.	1. To understand the fundamental of thermodynamics in engineering applications.
	2. Ability to apply first law of thermodynamics in chemical process operations.	2. To apply the first law of thermodynamics in chemical process operations.
	3. Ability to apply thermodynamic properties of substance in fluid state.	3. To understand the thermodynamic properties of substance in fluid state.
	4. Ability to calculate efficiencies of various chemical engineering operations	4. To learn to calculate efficiencies of various chemical engineering operations.

	5. Ability to relate thermodynamic properties of different processes.	5. To learn relation of thermodynamic properties of different processes.
	6. Ability to calculate energy change in heat and work conversion devices.	6. To learn to calculate energy change in heat and work conversion devices.
Computer Practices	1.To understand basic concept of programming skills	Ability to understand basic concept of programming skills
	2.To understand control statements & loops	Ability to understand control statements & loops
	3. To understand & apply functions ,it's type & Recursive function	Ability to understand & apply functions ,it's type & Recursive function
	4.To understand & apply Arrays, it's type & multidimensional array	Ability to understand & apply Arrays, it's type & multidimensional array
	5.To create structure & it's application	Ability to create structure & it's application
	6.To understand & apply classes & objects & it's type	Ability to understand & apply classes & objects & it's type
Fluid Moving Machinery	1. To study the construction and working of centrifugal pump.	1. Students will be able explain the construction and working of centrifugal pump.
	2. To study the basics theories of Centrifugal Pump.	2. Students will be able to understand the basics of centrifugal pump such as mini. Speed, specific speed, NPSH etc., calculation of horse power, characteristics etc.
	3. To study the basics of positive displacement pump	3. Students will be able to understand the classification of positive displacement pump, equation to calculate work done , efficiency etc.
	4. To study the different types of positive displacement pump.	4. Students will be able to understand the construction and working of different types of positive displacement pump.
	5. To develop the knowledge of selection of pumps in industry.	5. Course will develop the knowledge of selecting the pumps for industry and other application
	6. To study the basics of fans, blowers and compressors	6. Students will be able to understand & explain the construction, working & equations to calculate power required, work done & efficiency of fans, blowers & compressors.

Environmental studies	1. The main objective is to make the students aware of Environmental consequences, present situation what the society is facing.	1 Explain basic concepts of environment and environmental education with the need of public awareness
	2. To inculcate in students the importance of natural resources, it's conservation and further how to achieve Sustainable Development	2 The importance of judicious use and conservation of natural resources and will understand the problem of environmental degradation and how to achieve sustainable goals.
	3. To make understand the students importance of different ecosystems, their interaction and importance of food chain-food web	3 Explain the components of Ecosystem and recognize the need of conservation of biodiversity
	4. To motivate the students to think positively and step for conservation of nature, biodiversity by which we all are blessed through Western Ghats and Eastern Himalayas	4 Illustrate the severity and bad effect of pollutions and make people aware about laws
	5. Understand the severity and ill effects of different types of pollutions on Environment	5 Collect data from site visit and represent it in the form of project work copy with poster or model
	6. To develop lateral thinking through data collection, regarding news papers, referring international journal papers mostly focusing on social issues such as Global warming, water conservation, consumerism and waste products, waste land reclamation	
	7. Understand the subject holistically by undertaking a case study	
Process Instrumentation And Instrumental Methods of Analysis	<p>1) To understand classification, parts and characteristics of instruments.</p> <p>2) To understand basic principle behind measurements and their applicability in chemical processes.</p> <p>3) To understand differences between various analytical methods.</p> <p>4) To understand correct analytical method for sample analysis.</p> <p>5) To understand modern analytical technique like chromatography, its types like gas chromatography, HPLC and its applications.</p>	<p>On completion of the modules students should be able to,</p> <p>1. To impart ability to classify and identify parts of instruments with its characteristics. Also impart ability to measure pressure by using various instruments.</p> <p>2. Select appropriate instruments for a given chemical parameter. Also impart ability to calibrate instruments.</p> <p>3. To impart ability to measure Temperature, Flow, Pressure & level by using various instruments and realize importance of data analysis.</p> <p>4. Use various analytical methods for analysis of various industrial samples.</p> <p>5. To analyze the chemical industrial samples by using modern techniques like flame photometry, chromatography, gas chromatography, HPLC, FTIR, Mass spectroscopy.</p>
Mass Transfer –I	The student completing this course are expected to understand mass transfer operation with the concept of molecular diffusion,	1. To able to design equipment for mass transfer operations, the rate equations are important which can be utilized for

	<p>flux rate, theories of mass transfer, mass transfer coefficient, designed for equipment in which two phases are contacted. Application of Navier-Stoke equation in unsteady state convective mass transfer and mass transfer analogy. It gives details about method of conducting mass transfer operation, concepts of driving force, operating line, designing of stages for operations like adsorption, absorption, distillation, extraction, leaching, drying. Also it helps in process design and study of equipment for above mentioned operations. They will understand implication through laboratory experiments performed.</p>	<p>optimization concept. 2. Concept of steady state & unsteady state diffusional operations studied for controlling parameters in actual industrial process. 3. Student can able and to understand the trouble shooting problem in actual operation. 4. To implement the knowledge of various unit operations in the real plants.</p>
Chemical Engineering Thermodynamics-Ii	<ol style="list-style-type: none"> 1) Students should be able to describe the terminologies associated with engineering thermodynamics. 2) Students should be able to calculate properties of ideal & real mixtures based on thermodynamics principles. 3) Students should be able to explain underlying principles of phase equilibrium in bicomponent & multicomponent systems. 4) Students should be able to communicate effectively, both orally & in writing, regarding scientific & engineering principles and thermodynamics aspects of engineering design. 5) Students should be able to apply knowledge of problem solving to thermodynamics. 6) Students should be should be able to recognize the need for life-long learning in order to remain effective as scientist or an engineer 	<p>The learning outcomes are assessed through graded homework exercises, Assignments, mid semesters and a final exam. Science the course is a prerequisite for other course in the curriculum, there are additional opportunities to evaluate the extent to which course objective are achieved from the feed backs of the faculty teaching professional course such as process design and equipment design that have increased emphasis on application of basic principles, including control mass and volume The acquired knowledge of vapour liquid equilibrium can be applied to various unit operation such as distillation, absorption etc. with the thorough knowledge of thermodynamics purity of products and feasibility can be analyzed.</p>
Chemical Engineering Thermodynamics-Ii	<ol style="list-style-type: none"> 1) Students should be able to describe the terminologies associated with engineering thermodynamics. 2) Students should be able to calculate properties of ideal & real mixtures based on thermodynamics principles. 3) Students should be able to explain underlying principles of phase equilibrium in bicomponent & multicomponent systems. 4) Students should be able to communicate effectively, both orally & in writing, regarding scientific & engineering principles and thermodynamics aspects of engineering design. 5) Students should be able to apply knowledge of problem solving to thermodynamics. 6) Students should be should be able to recognize the need for life-long learning in order to remain effective as scientist or an engineer 	<p>The learning outcomes are assessed through graded homework exercises, Assignments, mid semesters and a final exam. Science the course is a prerequisite for other course in the curriculum, there are additional opportunities to evaluate the extent to which course objective are achieved from the feed backs of the faculty teaching professional course such as process design and equipment design that have increased emphasis on application of basic principles, including control mass and volume The acquired knowledge of vapour liquid equilibrium can be applied to various unit operation such as distillation, absorption etc. with the thorough knowledge of thermodynamics purity of products and feasibility can be analyzed.</p>
Chemical Equipment Design	<p>To introduce the students the Basic concept in design, different types of stresses involved, various types of joints, Design of various types of equipments like pressure vessel, storage vessel, vessel supports, heat exchangers, evaporators, agitator and</p>	<p>On completion of the module students should be able to design individual pieces of equipment.</p>

	reaction vessels.	
Computational Techniques In Chemical Engineering	<ol style="list-style-type: none"> 1. Student will able to Understand, motivation for Computational Technique and do error analysis. 2. Student will able to Understand and solve linear and algebraic system of equations. 3. Student will able to analyze and solve differential equations by different numerical methods. 4. Student will able to Understand C++ Programming basics and analyze Control Structures. 5. Student will able to apply Arrays 6. Student will able to construct function 	<p>At the end of the course, the students will be able to:</p> <ol style="list-style-type: none"> 1. Ability to Understand, motivation for Computational Technique and do error analysis. 2. Ability to Understand and solve linear and algebraic system of equations. 3. Ability to analyze and solve differential equations by different numerical methods. 4. Ability to Understand C++ Programming basics and analyze Control Structures. 5. Ability to apply Arrays. 6. Ability to construct the function.
Applications Of MATLAB In Chemical Engineering	<ol style="list-style-type: none"> 1 To familiarize the student in introducing and exploring MATLAB software. 2 To enable the student on how to approach for solving Engineering problems using simulation tools. 3 To prepare the students to use MATLAB in their project works. 4. To provide a foundation in use of this software for real time applications. 	<ol style="list-style-type: none"> 1 Able to express programming & simulation for engineering problems. 2 Able to find importance of this software for Lab Experimentation. 3 Able to write basic Chemical Engineering problems in Matlab & to use in research by simulation work. 4 Able to connect programming files with GUI Simulink.
Mini Project Work	<ol style="list-style-type: none"> 1. Development of ability to define and design the problem and lead to its accomplishment with proper 2. Planning Learn the behavioral science by working in a group 3. To develop student's abilities to transmit technical information clearly and test the same by delivery of Seminar based on the Mini Project. 4. To understand the importance of document design by compiling Technical Report on the Mini Project work carried out 	<p>After successfully completing this course, the student shall be able to:</p> <ol style="list-style-type: none"> 1. Understand, plan and execute a Mini Project with team. 2. Implement basic engineering knowledge. 3. Prepare a technical report based on the Mini project. 4. Deliver technical seminar based on the Mini Project work carried out
Plant Utility And Process Safety	---	<p>Students will be able to,</p> <ol style="list-style-type: none"> 1. Understand the principles of plant utilities, pollution control and Process safety in industry & modern society. 2. develops an understanding of air, water, steam as utilities and water, air pollution control technologies, as well as better product or process design to mitigate the problems of utilities and pollution both in the chemical industry and other process industries. 3. Tackle the problems of water, air and hazardous waste minimization, generation, treatment and disposal. 4. Analyze the utilities and waste characterization, generation and composition analysis, development of optimum collection routing networks, transfer stations, design, process safety and related social and environmental issues. 5. Interpret & formulate the Boiler classification and thermal

		<p>efficiency calculation as design aspects in industries.</p> <p>6. Apply the principles of utilities and waste minimization, source reduction, material use, process safety and recovery in the design for the environment/industrial safety & economical way.</p>
Mass Transfer – II	<p>The student completing this course are expected to understand mass transfer operation with the concept of molecular diffusion, flux rate, theories of mass transfer, mass transfer coefficient, designed for equipment in which two phases are contacted. Application of Navier-Stoke equation in unsteady state convective mass transfer and mass transfer analogy. It gives details about method of conducting mass transfer operation, concepts of driving force, operating line, designing of stages for operations like adsorption, absorption, distillation, extraction, leaching, drying. Also it helps in process design and study of equipment for above mentioned operations. They will understand implication through laboratory experiments performed.</p>	<p>To able to design equipment for mass transfer operations, the rate equations are important which can be utilized for optimization concept.</p> <p>Concept of steady state & unsteady state diffusional operations studied for controlling parameters in actual industrial process.</p> <p>Student can able and to understand the trouble shooting problem in actual operation.</p> <p>To implement the knowledge of various unit operations in the real plants.</p>
Process Dynamics & Control	<p>The students completing this course are expected to understand the basic principles and problems involved in process control. They are expected to understand dynamic behavior of different order systems with examples and response to various forcing functions. They are able to understand design aspects of process control system, block diagram preparation, various types of controllers and there selection for particular application. To evaluate and analyze the transfer functions for various elements of the various control systems and processes. The students are expected to quantify and acquire knowledge of different stability methods such as standard algebraic method, Root locus method, frequency response. Application of control system to unit operations such as heat exchangers, Absorption column, jacketed kettle, Distillation tower. The students have to perform experiments based on theory to acquire practical knowledge. So that they can understand how the chemical engineering parameters are controlled</p>	<ol style="list-style-type: none"> 1) Students should remember Laplace transform and understand basic principles and objectives of process control 2) To understand basic fundamentals of first and second order process dynamics and its behaviour. 3) Able to know about applying fundamental knowledge to design controllers and the control system 4) To evaluate different parameters affecting on the overall transfer function and response of process control system. 5) To understand stability characteristics for design of process control systems & analyse the frequency response of the control system 6) To develop the practical skill, team work and ethical thinking to choose right career in allied industries or higher studies
Chemical Reaction Engineering –I	<ol style="list-style-type: none"> 1. Write a rate law and define reaction order and activation energy 2. Demonstrate the ability to quantitatively predict the performance of common chemical reactors using simplified engineering models 3. Demonstrate the ability to regress the experimental data from which they determine the kinetic model of a multi-reaction system and use this information to design a commercial reactor. 	<ol style="list-style-type: none"> 1. Ability to size batch reactors, semi batch reactors, CSTRs, PFRs, for isothermal operation given the rate law and feed conditions. 2. Ability to define and develop rate equations for homogeneous reactions 3. Ability to derive design equations for different types of reactors based on mole and energy balance. 4. Ability to relate rate of reaction with design equation for reactor sizing.

Industrial Economics, Management And Entrepreneurship	1) To understand economical aspects in chemical industry. 2) To understand and introduce general common terms related to economics, management and entrepreneurship. 3) To make students to develop skills required for entrepreneurship development and leadership.	1) Upon completion of the course students should: 1) Understand basic models of the behavior of firms and industrial organization and how they can be applied to policy issues. 2) Be able to manipulate these models and be able to solve analytically problems relating to industrial economics. 3) Be able to apply the models to important policy areas while being aware of the limitations of the theory.
Project Management And Smart Technology	1. To understand basic concepts project management and application of PM to process industries 2. To understand project feasibility reports and learn about various clearances required to start an industry 3. To learn various project organizations and basics of contracting 4. To learn various tools and techniques used in PM.	Students will be able to use, 1. concepts and knowledge of project management to manage projects in process industries 2. Students should be able to prepare feasibility reports. 3. Students should be able to understand various clearances required to start industry 4. Students should be able to prepare project organization charts and contracts 5. Students should be able to prepare contracts 6. Students should be able to use tools of PM to solve problems
Process Simulation Laboratory	1) To introduce basic concepts of computer applications to solve chemical engineering problems. 2) To make use of computer oriented methods for solving problems. 3) To develop computer programming skills for solving problems related to fluid mechanics, heat transfer, mass transfer and reaction engineering.	After successfully completing this course, the student shall be able to: 1) Understand, plan and execute a chemical Processes 2) Implement basic engineering knowledge. 3) Prepare a computer based technical report.
Industrial Practices & Case Studies	----	: Students will be able to, 1. Understand the gap between lecture room explanations and real life experiences. 2. Describe various organizations in the chemical industry chain from production, research, to processing and consumption. 3. Opportunities for self-employment in the chemical sector after graduation. 4. acquire basic information of sources of raw materials for chemical industries as well as their products and by- products of such activities and what uses they could be put to. 5. Understand how industrial establishments are administered.
	1. The course focuses on non-ideal flow and finding of conversion in actual reactors from experiment and different models.	1. At the end of the course, student will be able to apply knowledge of non-ideal flow and will find conversion in actual reactors from experiment and different models.
	2. The course focuses on mixing of fluids, macro fluid concept and applications of CFD.	2. At the end of course, student should be able to express basic concepts of mixing of fluids, macro fluid and applications of CFD.

Chemical Reaction Engg.-II	3. The course develops understanding of heterogeneous solid catalyst, different industrial terms related to solid catalyst & finding different characteristics of solid catalysts.	3. At the end of course, student should be able to express working of catalyst & understand industrial terms related to solid catalyst & find different characteristics of solid catalysts.
	4. The course develops understanding & designing of fluid particle reactions with different models for it.	4. Explain underline principles, understanding & designing of fluid particle reactions with different models for it.
	5. The course describes understanding & designing of fluid- fluid reaction and application of fluid-fluid reactions rate equation to equipment design.	5. At the end of course, student should be able to understand fluid-fluid reaction, its design and applications of fluid-fluid reactions rate equation to equipment design.
	6. The course covers concepts, parameters, mechanism & applications of catalyst and deactivating catalyst & also described recent trends in reaction engineering like scale up in reactor design.	6. Explain underline basic concepts, important parameters, mechanism & applications of the catalysis and deactivating catalyst & also described recent trends in reaction engineering.
Chemical Process &	To learn chemical processes and role of chemical engineer in chemical field.	To impart ability to implement knowledge of chemical processes and role of chemical engineer in chemical field and manufacturing processes for industrial gases.
	To learn manufacturing processes for industrial gases, fuel gases.	To impart ability to implement knowledge of ceramic and glass industries, fuel gases.
	To learn manufacturing processes of nitrogen, sulphuric acid, chloro alkali, phosphorous, potassium and Hydrochloric industries.	To impart ability to implement knowledge of chloro alkali and electrolytic industries.

Synthesis	To learn manufacturing processes for sugar, fermentation and agri industry.	To impart ability to implement knowledge of manufacturing of phosphorous and hydrochloric acid industries.
	To learn manufacturing processes for ceramic and glass industries.	To impart ability to implement knowledge of nitrogen and potassium industries.
		To impart ability to implement knowledge of sulphuric acid, sugar, fermentation and agrochemical industry.
Chemical Process Design	1. Students should understand different parameters used for design of process equipment.	Students will be able to understand various design preliminaries.
	2. Students should understand different parts of process equipment & design of these parts.	Students will be able to understand design of various parts of pressure vessel.
	3. Students should understand different testing methods & safety majors for process equipments.	Students will be able to design storage vessel & tall vessel.
		Students will be able to design heat exchanger & evaporator.
		Students will be able to design reactor system & agitator system.
		Students will be able to understand different safety measures.
Modeling & Simulation in Chemical	1. This course explores the basic concepts of modeling and fundamental equations for systems in chemical process industries	1. Student should be able to know the basics of modeling and physical and chemical laws for the given system
	2. To study the basic equations required for modeling the	2. Student should be able to develop model equations for the
	3. The basic objective is to develop system and to visualize the effect of various Processes inputs on system performance and state variables	3. Students will be able to develop mathematical model of system and see the effect of process inputs on system
	4. The basic objective is to develop the model equation for mass	4. Student will learn to develop model equations for the mass
	5. The basic objective is to develop the model equation for plug flow reactor and to differentiate between lumped and distributed system with example	5. Student should be able to develop model equations for the plug flow reactor and will understand the difference between lumped and distributed system with example
	6. To develop the basics of simulation software used in chemical	6. Students will be able to operate simulation software used in
	1. The students completing this course are expected to understand what is crude oil, petroleum resources & scenario of petroleum refineries in India as well across the world.	1. Students get aware about basic information about crude, resources and overall scenario of refineries in India as well across the world.

Petroleum Refinery Engineering	2. Students must aware about origin of petroleum, exploration techniques and drilling techniques in details.	2. Students get aware about origin, exploration techniques, Drilling Rigs and Drilling techniques in detailed manner.
	3. Students are expected to get aware about composition, classification, distillation & separation techniques including pre-treatment.	3. Students understood composition, Classification of crude oil and able to understand various distillation processes & separation methods.
	4. Student must know properties & specification of petroleum products and overall separation processes.	4. Students became able to understand properties and specification of petroleum products and Overall separation processes.
	5. Students are expected to get familiar with various conversion processes, Treatment methods and post production operations of Petroleum refineries.	5. Students are able to understand various steps in conversion processes, treatments and post operations in refinery.
	6. Students must know recent trends, advancement in Petroleum refineries.	6. Students are quite aware about recent trends, capacities of petroleum refineries.
Seminar	1. To make students able to select a topic for seminar in Chemical Engineering by doing proper literature survey.	Ability to select a topic for seminar in Chemical Engineering by doing proper literature survey.
	2. To develop student's abilities to analyze and transmit technical information clearly in the form of one review report (seminar) on selected topics in Chemical Engineering.	Ability to analyze and transmit technical information clearly in the form of one review report (seminar) on selected topics in Chemical Engineering.
	3. To make students to develop Presentation Skills by presenting seminar in front of panel members.	Ability to develop Presentation Skills by presenting seminar in front of panel members.
Comprehensive tests On all subjects from S.E to B.E-I	1. To study the basic concepts of all Chemical Engineering subjects to solve Chemical Engineering problem.	1. Use basic concepts of all Chemical Engineering subjects to solve Chemical Engineering problem.
	2. To revise the knowledge of Chemical Engineering to appear for entrance examinations confidently.	2. Apply the knowledge of Chemical Engineering to appear for entrance examinations confidently.
	3. To inculcate knowledge of Chemical Engineering to perform better in placement drives.	3. Use the basic knowledge of Chemical Engineering to perform better in placement drives.

Industrial Training	1. To Expose students to get aware about Project Management and finance in industries	1. Students are aware about Project Management and finance in industries
	2. To aware students about an importance of team spirit and team work.	2. Students are familiar about an importance of team spirit and team work.
	3. To understand the necessity of sustainable development and eco friendly process design.	3. Students are able to understand the necessity of sustainable development and eco friendly process design.
Project Work	1.To make students able to define and design the problem and lead to its accomplishment with proper planning.	Ability to define and design the problem and lead to its accomplishment with proper planning.
	2.To make students to develop ability to plan properly and execute the project in an multidisciplinary environment.	Ability to plan properly and execute the mini project in an multidisciplinary environment.
	3.To provide students ability to implement basic engineering knowledge.	Ability to Implement basic engineering knowledge.
	4.To provide students ability to Learn the behavioural science by working in a group.	Ability to Learn the behavioural science by working in a group.
	5.To develop student's abilities to analyze and transmit technical information clearly and test the same by presentation based on the Project.	Ability to analyze technical information and transmit it by delivering technical seminar based on the Project work carried out.
	6.To make students understand the importance of document design by compiling Technical Report on the Project work carried out.	Ability to create a technical report based on the project.
Chemical Process &	1.To learn manufacturing processes for food and pharmaceutical industries.	Students will be able to understand and develop manufacturing processes for food and explosive industries.
	2.To learn manufacturing processes of paper, plastic and explosive industries.	Students will be able to understand and develop manufacturing processes of paper & plastic industries.
	3.To learn principles of Green chemistry and engineering.	Students will be able to understand and develop manufacturing processes for pharmaceuticals industries.

Green Technology	4.To learn pragmatic Green chemistry challenges.	Students will be able to understand and apply the principles of green chemistry and technology.
	5.To modify process and products to make them green, safe and economical acceptable.	Students will be able to understand the various ecological treats and various green chemistry challenges.
		Students will be able to understand the various green fuel technologies.
Transport Phenomena	1. To be able to analyze various transport processes with understanding of solution approximation methods and their limitations.	1. Students should relate the similarity between momentum, heat and mass transport and their analogy.
	2. To be able to understand the chemical and physical transport processes and their mechanism.	2. To develop the ability to formulate and solve mathematical problems for momentum transport.
	3. Ability to do heat, mass and momentum transfer analysis.	3. Able to know about applying fundamental knowledge to solve momentum and heat transport problems.
	4. To be able to analyze various transport processes with understanding of solution approximation methods and their limitations.	4. To evaluate different parameters affecting on the mathematical formulation of heat transfer problem and it numerical solution.
		5. To analyze the mass transfer problem, its mathematical formulation and computational fluid dynamics.
		6. Develop the practical skill, team work and ethical thinking to choose right career in industry or higher studies.
Project	1. The students completing this course are expected to	1.The graduates are expected to have ability to apply knowledge
	2.The students completing this course are expected to	2. Students can able and to understand concept of cost
	3. The students are to learn types of interest, taxes, insurances,	3. The graduates are expected to have ability to apply knowledge
	4. The students completing this course are expected to	4. Students can able to apply knowledge of process development
	5. The students completing this course are expected to	5. The graduates are expected to have ability to apply knowledge
	6. At the end of course students should understand concepts	6. The graduates are expected to have ability to apply knowledge
	1. To provide students a thorough understanding of ability to define petrochemicals, explain about history, present scenarioand economics importance of petrochemical industries.	1. Ability to define petrochemicals, sources of petrochemicals, explain about history and present scenario.

Petrochemical Technology	2. To provide students a thorough understanding of chemical processes used in petrochemical technology and its applications.	2. To explain development of petrochemical technology, industries in India and their economic importance.
	3. To make students able to understand new trends in petrochemical industries.	3. Apply knowledge of chemical process to manufacture different types of petrochemicals.
		4. Ability to classify different petrochemicals with their specific applications.
		5. Ability to summarize the present energy crisis and non renewable petroleum resources used in petrochemical technology.
	6. Develop knowledge about future needs of petrochemical technology and industries.	
Distillation	To understand basic principles of vapour liquid equilibrium.	Ability to understand basic principles of vapour liquid equilibrium.
	To understand principles of differential and steam distillation.	Ability to understand principles of differential and steam distillation.
	To study methods of design of distillation column.	Students will be able to design of distillation column.
	To study important features of multi component distillation.	Will make use of multi component distillation technique for separation of mixture of chemicals.
	To make students familiar with types of azeotrope separation techniques.	Apply azeotrope separation techniques for separation azeotrope in Chemical Process Industry.
	To develop understanding of importance of distillation operation in chemical process industry.	Ability to develop better product and process to mitigate the problem of distillation unit in Chemical Industry.
Energy Conservation	1. To study the importance of energy and Indian energy scenario.	1. Students will come to know the importance of energy in production & employment & What is energy scenario in India?
	2. To study the energy available for industrial use and role of energy conservation.	2. Students will be able to understand how to forecast industrial energy supply, demand, price & availability? and What is role of energy conservation in industry?
	3. To study in detail energy management and policy.	3. Course will develop the knowledge of doing energy conservation.

And Recovery	4. To know basic principles of energy conservation, equipments used for heat recover & energy audit.	4. Students will be able to explain basic principles, equations of calculating waste heat, selection of equipments for heat recover & how to conduct energy audit.
	5. To study the energy conservation in utilities.	5. Students will be able to calculate the energy recovery or conservation in utility section of industry.
	6. To know the effect of climate change in India, how to do the energy conservation in sugar industry? & energy conservation act 2001.	6. Students will be able to understand the effect of climate change on energy in India, saving of energy in sugar industry and energy conservation act 2001.
Advanced separation processes	1. To Introduce basic fundamentals to students regarding Reverse osmosis process and its importance in Chemical engineering.	1. Students are able to understand basic knowledge of heat transfer and various aspect of Reverse osmosis process
	2. To aware students about Ultra filtration process by using membrane and its industrial applications in the field of Chemical Engineering.	2. Students are able to understand Ultra filtration process by using various membranes.
	3. To aware students about concept of Micro filtration and its use in treating waste water as well potable water purification.	3. Students are able to understand Micro filtration and its use with respect to process requirement as well process conditions in optimistic way.
	4. To avail fundamental knowledge to students about Pressure swing adsorption and its applications for separation of various mixtures.	4. Students are able to become technically sound about Pressure swing adsorption and its applications for separation of various mixtures.
	5. To expose students about basic knowledge of Electrostatic precipitator and its industrial applications.	5. Students are able to get exposed for Electrostatic precipitator and its industrial applications.
	6. To aware students about supported liquid membrane and supercritical fluid extraction processes and their merits and demerits in fields of Chemical Engineering.	6. Students are able to understand about supported liquid membrane and supercritical fluid extraction processes and their merits and demerits.
	1. To make students able to define and design the problem and lead to its accomplishment with proper planning.	Ability to define and design the problem and lead to its accomplishment with proper planning.
	2. To make students to develop ability to plan properly and execute the project in an multidisciplinary environment.	Ability to plan properly and execute the mini project in an multidisciplinary environment.

Project Work	3.To provide students ability to implement basic engineering knowledge.	Ability to Implement basic engineering knowledge.
	4.To provide students ability to Learn the behavioural science by working in a group.	Ability to Learn the behavioural science by working in a group.
	5.To develop student's abilities to analyze and transmit technical information clearly and test the same by presentation based onthe Project.	Ability to analyze technical information and transmit it by delivering technical seminar based on the Project work carriedout.
	6.To make students understand the importance of document design by compiling Technical Report on the Project work carried out.	Ability to create a technical report based on the project.