2.6.1 Programme Outcomes (POs) and Course Outcomes (COs) for all Programme offered by the institution are stated and displayed on website and attainment of POs and COs are evaluated

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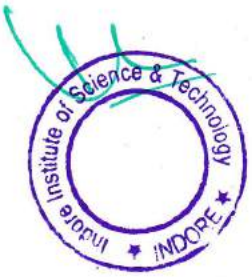
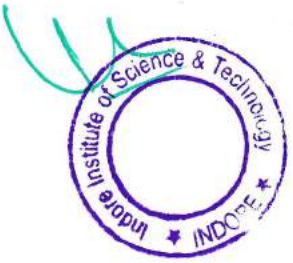


Vision of the Institute

To be a nationally recognized institution of excellence in technical education and produce competent professionals capable of making a valuable contribution to society.

Mission of the Institute

- To promote academic growth by offering state-of-the-art undergraduate and postgraduate programs.
- To undertake collaborative projects which offer opportunities for interaction with academia and industry.
- To develop intellectually capable human potential who are creative, ethical and gifted leaders.



Department of Computer Science and Engineering

Vision of Computer Science and Engineering

To be a center of academic excellence in the field of computer science and engineering education.

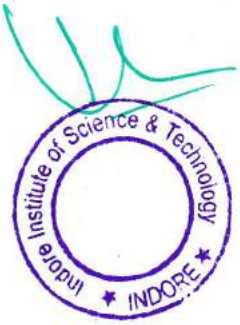
Mission of Computer Science and Engineering

- Strive for academic excellence in computer science and engineering through well designed course curriculum, effective classroom pedagogy and in-depth knowledge of laboratory work.
- Transform under graduate engineering students into technically competent, socially responsible and ethical computer science and engineering professionals.
- Create computing centers of excellence in leading areas of computer science and engineering to provide exposure to the students on latest software tools and computing technologies.
- Incubate, apply and spread innovative ideas by collaborating with relevant industries and R&D labs through focused research groups.
- Attain these through continuous team work by a group of committed faculty, transforming the computer science and engineering department as a leader in imparting computer science and engineering education and research.

Program Educational Objective (PEO's) of Computer Science and Engineering

PEO 1: To provide students with a solid foundation in mathematics, computer science and engineering, basic science fundamentals required to solve the computing problems.

PEO 2: To expose students to latest computing technologies and software tools, so that they can comprehend, analyze, design and create innovative computing products and solutions for real life problems.



PEO 3: To inculcate in students multi-disciplinary approach, professional attitude and ethics, communication and teamwork skills, and ability to relate computer engineering issues with social awareness.

PEO 4: To develop professional skills in students that prepare them for immediate employment and for lifelong learning in advanced areas of computer science and related fields which enable them to be successful entrepreneurs.

Program Specific Outcomes (PSO's) of Computer Science and Engineering

- **PSO 1: Computer Science Specific Skills:** The ability to identify, analyze and design solutions for complex engineering problems in multidisciplinary areas by understanding the core principles and concepts of computer science and thereby engage in national grand challenges.

- **PSO 2: Programming and Software Development Skills:** The ability to acquire programming efficiency by designing algorithms and applying standard practices in software project development to deliver quality software products meeting the demands of the industry.

- **PSO 3: Professional Skills:** The ability to apply the fundamentals of computer science in competitive research and to develop innovative products to meet the societal needs thereby evolving as an eminent researcher and entrepreneur.

Programme Outcomes (PO's) of Computer Science and Engineering

- **PO 1:** Apply the knowledge of mathematics, science and engineering fundamentals for the solution of computer science and engineering problems. (Engineering Knowledge)

- **PO 2:** Ability to identify, formulate and analyze the complex engineering problems. (Problem Analysis)

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- **PO 3:** Ability to design and develop the computer based systems to meet desired needs within realistic constraints such as public health and safety, environmental, agriculture, economic and societal considerations. (Design/Development of Solutions)

- **PO 4:** Ability to demonstrate with excellent programming, analytical, logical and problem solving skills.

- **PO 5:** Ability to use the emerging technologies, skills, and modern software tools to design, develop, test and debug the programs or software.

- **PO 6:** Ability to include and solve the social, cultural, ethical issues with computer science and engineering solutions.

- **PO 7:** Ability to design and develop web based solutions with effective graphical user interface for the need of sustainable development.

- **PO 8:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the computer science and engineering practices.

- **PO 9:** Ability to work individually and as a member or leader in diverse teams to accomplish a common goal.

- **PO 10:** Ability to communicate effectively in both verbal and written forms with engineering community and society.

- **PO 11:** Knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team to manage the software and IT based projects in multidisciplinary environments.

- **PO 12:** Appreciation of technological change and the need for independent life-long learning.

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Course Outcomes (CO's) of Computer Science and Engineering (UG)

Subject Code	Subject Name	CO Description
BT-101	Engineering Chemistry	Differentiate hard and soft water; solve the related numerical problems on water purification and its significance in industry and daily life.
		Select the lubricant for various purposes based on the type of Machines.
		Equipped with basic knowledge of polymer , methods of polymerization and various industrial applications of polymers
		Draw the Phase diagrams of one & two component systems and causes, consequences and methods to minimize corrosion to improve industrial designs.
		Identify the structure of unknown/new compounds with the help of spectroscopy and understand periodic properties such as ionization potential, oxidation states and electro negativity
BT-102	Mathematics -I	To introduce the fallouts of Rolle's Theorem that is fundamental to application of analysis to Engineering problems.
		To introduce the idea of applying differential and integral calculus to notions of curvature and to improper integrals. Apart from some applications it gives a basic introduction on Beta and Gamma function
		To develop the tool of power series and Fourier series for learning advanced Engineering Mathematics.
		To familiarize the student with functions of several variables that is essential in most branches of engineering
		To develop the essential tool of matrices and linear algebra in a comprehensive manner.
BT-103	English for Communication	Effective use of verbal and non-verbal communication for enhanced soft skill beside enhanced reading comprehension as well
		Write the different kinds of letters, reports and technical writing.
		Apply basic rules of grammar in both written as well as oral communication.
BT-104	Basic Electrical & Electronics Engineering	To introduce the concept of Basics of DC electrical Network including network theorems.
		To introduce the concept of Basics of AC electrical Network(single phase & 3 phase)..
		To study of law of Electromagnetism, introduction of transformer.
		To study of various electrical Machines.
		To study Basic Concept Digital Electronics.

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BT-105	Engineering Graphics	Draw various types of scales, and curves.
		Draw orthographic projections of points & lines
		Draw orthographic projections of Planes & Solids
		Draw sections and development of solids including cylinders, cones, prisms and pyramids.
		Draw isometric views of Planes and Solids, Drawing using AUTOCAD.
BT-106	Manufacturing Practices	Use hand and power tools for different manufacturing processes
		Operate machine tools while preparing any component
		Select the appropriate tools required for specific operation.
		Comprehend the safety measures required to be taken while using the tools.
		Prepare Foundry, Fitting, Carpentry, Welding and smithy Job.
BT-107	Internship-I (60 Hrs Duration) at the Institute level	Demonstrate the application of knowledge and skill sets acquired from the course and workplace in the assigned job function/s
		Solve real life challenges in the workplace by analysing work environment and conditions, and selecting appropriate skill sets acquired from the course
		Exhibit critical thinking and problem solving skills by analysing underlying issue/s to challenges
		Demonstrate appreciation and respect for diverse groups of professionals by engaging harmoniously with different company stakeholders
		Exhibit professional ethics by displaying positive disposition during internship
BT-108	Swachh Bharat Summer Internship Unnat Bharat Abhiyan (100Hrs)/ Rural Outreach	This course is to sensitize students about the socio-cultural aspects of the rural areas parochial to their colleges.
		Students are expected to observe, investigate and learn about the following aspects of the rural region: i. Demographics, Literacy, Geographical parameters of the Village; ii. Schemes of government of India and State of Madhya Pradesh in operation in the villages.
		To enhance critical thinking by making them participate in social activities and imbibe human values among them.
		Rural Swachh Bharat Abhiyan is to promote cleanliness and develop healthy habits in people in villages.
		Unnat Bharat Abhiyan: To build an understanding of the development agenda within institutes of Higher Education and an institutional capacity and training relevant to national needs, especially those of rural India.
BT-201	Engineering Physics	The Coursework is designed to provide students the opportunity to learn key concepts of Wave nature of particles and the Schrodinger equation.

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		Student will able to understand the knowledge of Wave optics i.e. interference and diffraction.
		To introduce the idea of solids like semiconductors (P type and N Type semiconductors), Diodes and Hall effect. STudents will also be able to understand the basic concept of superconductivity.
		To develop the understanding of Lasers, fiber optics and their applications in field of engineering sciences.
		To provide you to basic understanding of Electrostatics in vacuum.
BT-202	Mathematics -II	To introduce effective mathematical tools for the solutions of ordinary and partial differential equations that model physical processes.
		To introduce the tools of differentiation and integration of functions of complex variable those are used in various techniques dealing engineering problems.
		To acquaint the student with mathematical tools available in vector calculus needed various field of science and engineering.
BT-203	Basic Mechanical Engineering	Understand the properties of material, stress strain. Properties of alloys and cast iron.
		Understand the concept measurement and machine tools their operations and their applications.
		Understand the concept of fluid flow , properties of fluid, Bernoulli's equation, Pascal's law.
		To Understand the concept of heat and temperature, law of thermodynamics, boilers and their mountings and accessories, basic Refrigeration cycles and its applications.
		To Understand the working of different cycles and 4 strokes, 2 stroke engines and their applications.
BT-204	Basic Civil Engineering & Mechanics	Students will acquire the basic knowledge in different fields of civil engineering and materials used in construction.
		Gain the ability to use modern survey equipment to measure angles and distances.
		Students will understand the basic of contour lines and map
		Students will have the ability to identify, formulate and solve engineering problems related to Engineering Mechanics: Statics
		Students will be able to analyse beam for shear force and bending moment.
BT-205	Basic Computer Engineering	Able to understand the basic applications of computers in various fields, describe operating system, its role and functionalities and to apply concepts of MS word, MS power point, MS Excelefficiently.
		Discuss and apply simple algorithms for arithmetic and logical problems.
		Translate the algorithms to programs applyingobject-oriented concepts in C++ programming language.

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		Understand basics of computer networks, OSI layers and protocols, E commerce applications, impact of securitythreats and attacks on networking systems and also security measures
		Understand the different method for representing and processing data and to get awareness about the impact of cloud computing, its various type of services.
BT-206	Language Lab & Seminars	learners to develop good listening skills.
		Encourages learner to talk freely and lose their shyness when talking in front of the people
		To develop the overall personality of the students by the practical activities
		Helps in confidence building, motivation to be more presentable and help in removing the stage fright
		Develops speaking, writing, reading, listening and presentation skills.
ES-301	Energy & Environmental Engineering	Get the knowledge of energy carriers, energy technologies, renewable energy resources, energy challenges and energy system integration and environment sustainability.
		Learn about the different types of ecosystems present in environment, ecological succession and energy flow in the ecosystem.
		Understand the value of bio-diversity to human societies, threats to bio-diversity, In-situ and Ex-situ conservation of bio-diversity.
		Acquire knowledge of different types of environmental pollution, its effects on life and its remedies.
		Aware about the social issue related to the environment, environment ethics, protection and conservation acts for the environment.
CS-302	Discrete Structure	Students will be able to understand the notion of mathematical thinking and algorithmic thinking and be able to apply them in problem solving such as formula specifications, verifications and basic concepts of set theory.
		Understand the basic principle of boolean algebra, logic and set theory.
		Be able to construct simple mathematical proof and possess the ability to verify them.
		Acquire ability to describe computing problems with the help of graph theory and finite state machines, also express its utility in solving and modeling real time problems.
		Apply basic counting techniques to solve combinatorial problem.
CS-303	Data Structure	To understand the concept of linear, non-linear data structures, the operations performed on them and the applications of various data structures.

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		Understand the arrays, searching and sorting algorithms.
		Implement stacks, queues and its applications.
		Implement linked list and its variations.
		Solve problem involving graphs, trees and heaps.
CS-304	Digital Systems	Understand the concept of number systems & binary arithmetic.
		To study the boolean algebra and minimization of switching function.
		Understand logic gates, universal gate, adders & subtractors.
		Demonstrate linear wave shaping circuits, logic families, multiplexers and memory.
		Understand basic digital communication system.
CS-305	Object Oriented Programming & Methodology	Describe the procedural and object oriented paradigm with concepts of streams, classes, functions, data and objects.
		Understand dynamic memory management techniques using pointers, constructors, destructors etc.
		Describe the concept of function overloading, operator overloading, virtual functions and polymorphism.
		Understand how to apply the major object-oriented concepts to implement object oriented programs in C++, encapsulation, inheritance and polymorphism.
		Classify inheritance with the understanding of early and late binding, usage of exception handling, generic programming.
CS-306	Computer Workshop	Understand the concepts of Java programming.
		Understand fundamentals of programming such as variables, conditional and iterative execution, methods, etc.
		Understand fundamentals of object-oriented programming in Java and be familiar of the important concepts like class, inheritance and multithreading, AWT and JDBC.
		Use the Java SDK environment to create, debug and run Java programs.
		Develop Java applet.
BT-107	Evaluation of Internship-I completed at I year level	To display the utility of information and talent units obtained from the path and place of business withinside the assigned task function.
		Solve actual existence demanding situations withinside the path via way of means of analysing the area and choosing suitable ability units obtained from the path.
		Exhibit important questioning and hassle fixing talents via way of means of analysing underlying issues to challenges.
		Demonstrate the capacity to harness assets with the aid of using analysing demanding situations and thinking about opportunities.
		Articulate profession alternatives via way of means of thinking about possibilities in company, sector, industry, expert and

		academic advancement.
BT-307	90 hrs Internship based on using various softwares – Internship -II	Demonstrate the application of knowledge and skill sets acquired from the course and workplace in the assigned job functions.
		Solve real life challenges in the workplace by analysing work environment and conditions, and selecting appropriate skill sets acquired from the course.
		Exhibit critical thinking and problem solving skills by analysing the challenges.
		Demonstrate appreciation and respect for diverse groups of professionals by engaging harmoniously with different company stakeholders.
		Exhibit professional ethics by displaying positive disposition during internship.
BT-401	Mathematics - III	Understand mathematical tools for the numerical solutions algebraic and transcendental equations.
		Describe mathematical knowledge to understand laplace transformation, inverse laplace transformation and fourier transform which are used in various branches of engineering.
		Work with mathematical tools available in statistics needed in various field of science and engineering.
		Fulfill the needs of engineers to understand applications of numerical analysis, transform calculus and statistical techniques in order to acquire mathematical knowledge.
		Solve wide range of practical problems appearing in different sections of science and engineering.
CS-402	Analysis Design of Algorithm	Implement sorting and searching algorithms.
		Experiment with techniques for obtaining maximum outputs with minimum efforts.
		Make use of dynamic program.
		Solve 8 queens problem and others of the kind for application in real world scenario.
		Distinguish between NP-hard and NP-complete problems and develop their solutions.
CS-403	Software Engineering	Define various software application domains and remember different process models used in software development.
		Understand various measures of software and generate project schedule.
		Describe functional and nonfunctional requirements of software and develop design modules of software.
		Investigate the reasons for bugs and apply the software testing techniques in commercial environment.
		Understand various activities to be performed for improving

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		software quality and software maintenance.
CS-404	Computer Org. & Architecture	Define the structure, function and characteristics of computer systems.
		Design of the various functional units and components of computers.
		Identify the elements of input output in computers.
		Explain the function of each element of a memory hierarchy.
		Understand the function of multi processing and techniques to achieve it.
CS-405	Operating Systems	Gain knowledge of history of operating systems and understand design issues associated with operating systems.
		Understand issues related to file system interfaces and implementation, disk management.
		Identify the process management policies and analyze and compare scheduling of processes by CPU along with memory management.
		Understand concepts of memory management (including virtual memory), I/O and concurrency control.
		Understand network distributed and multiprocessing operating system.
CS-406	Programmin g Practices	Use an integrated development environment to write, compile, run, and test simple object-oriented Java programs.
		Read and make elementary modifications to Java programs that solve real-world problems.
		Validate input in a Java program.
		Identify and fix defects and common security issues in code.
		Document a Java program using Javadoc.
BT-407	90 hrs Internship based on using various software - Internship - II	Exposure to organizational skills and professional practices.
		Efficiently completing tasks, fostering good relationship with seniors and subordinates
		Improved communication & interpersonal skills.
		Exposure to latest technology applications to the specific discipline.
		Identification of relevant problems in the industry and innovative solutions.
CS-501	Theory of Computation	Explain the basic concepts of switching and finite automata theory and languages.
		Relate practical problems to languages, automata the computability and complexity.
		Construct abstract models of computing and check their power to recognise the languages.
		Analyse the grammar, its types, simplification and normal form.
		Interpret rigorously formal mathematical methods to prove properties of languages, grammars and automata.

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CS-502	Database Management Systems	Understand the different issues involved in the design and implementation of a database system.
		Study the physical and logical database designs, database modeling, relational, hierarchical, and network models.
		Understand and use data manipulation language to query, update, and manage a database.
		Develop an understanding of essential DBMS concepts such as: database security, integrity, concurrency.
		Design and build a simple database system and demonstrate competence with the fundamental tasks involved with modeling, designing, and implementing a DBMS.
		Evaluate a business situation and designing & building a database applications.
CS-503	Pattern Recognition	To understand the supervised learning and unsupervised learning.
		Describe the various levels of classification models.
		Describe the various levels of clustering and it's algorithms.
		Understand this feature extraction and its models.
		Construct various types of pattern recognition models.
CS-504	Internet and Web Technology	Describe the concepts of WWW including browser and HTTP protocol.
		List the various HTML tags and use them to develop the user friendly web pages.
		Define the CSS with its types and use them to provide the styles to the web pages at various levels.
		Developed the modern web pages using the HTML and CSS features with different layout as per the need of applications.
		Use of JavaScript to develop the dynamic web pages and PHP.
CS-505	Lab (Linux)	Understand Functions of operating system and its types and Unix system architecture.
		Understand and make use of the basic commands of linux operating system and Work confidently in Linux environment.
		Understand file systems and illustrate various file operations.
		Create shell scripts to automate different tasks as Linux.
		Understand installation of web servers and proxy servers.
CS-506	Lab (Python)	Understand the basic concepts scripting and the contributions of scripting language.
		Examine the core data structures like lists, dictionaries, tuples and sets in Python to store, process and sort the data.
		Identify the external modules and import specific methods form them.
		Demonstrate proficiency in handling Strings and file systems.
		Explore python especially the object oriented concepts, and the built

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		in objects of Python.
CS-507	Evaluation of Internship-II	To display the utility of information and talent units obtained from the path and place of business withinside the assigned task functions.
		Solve actual existence demanding situations withinside the path via way of means of analysing the area and choosing suitable ability units obtained from the path.
		Exhibit important questioning and hassle fixing talents via way of means of analysing underlying issue/s to challenges.
		Demonstrate the capacity to harness assets with the aid of using analysing demanding situations and thinking about opportunities.
		Articulate profession alternatives via way of means of thinking about possibilities in company, sector, industry, expert and academic advancement.
CS-508	Minor Project- I	A fully engaged student shall be able to get exposure to undertake a short research project.
		To enable the students to develop comprehensive solution of identified problems.
		To inculcate the ability to synthesize the results of the detailed analytical studies conducted, lay down validity and design criteria, interpret the result for application to the problem, develop the concept and detailed design solution.
CS-601	Machine Learning	Apply knowledge of computer and mathematics to machine learning problems, models and algorithms.
		Analyse the problem and identify the computing requirements appropriate for its solutions.
		Design, implement, and evaluate an algorithm to meet desired needs.
		Apply mathematical foundations, algorithmic principles, and computer science theory to the modelling and design of computer based systems in a way that demonstrates comprehension of the trade-offs involved in design choices.
		Analyze the co-occurrence of data to find interesting frequent patterns and Preprocess the data before applying to any real-world problem and can evaluate its performance.
CS-602	Computer Networks	Characterise and appreciate computer networks from the viewpoint of components and from the viewpoint of services.
		Display good understanding of the flow of a protocol in general and a network protocol in particular.
		Model a problem or situation in terms of layering consent and map it to the TCP/IP stack.
		Select the most suitable application layer protocol such as (HTTP, STTP, SMTP, DNS bit torrent) and as per the requirements of the network application and work with available tools to demonstrate

		the working of these protocols.
		Design a reliable data transfer protocol and incrementally and develop solutions for the requirements of transport layer.
CS-603	Compiler Design	Demonstrate an understanding of the compilation phases.
		Specify and analyze the lexical, syntactic and semantic structures of advanced language features.
		Write a scanner, parser, and semantic analyser without the aid of automatic generators.
		Describe techniques for intermediate code and machine code optimization.
		Design the structures and support required for compiling advanced language features
CS-604	Project Management	Understanding the evolution and improvement of software economics according to the basic parameters and transition to the modern software management.
		Learning objectives, activities and evaluation criteria of the various phases of the life-cycle of software management process.
		Gaining knowledge about the various artefacts, workflows and check points of the software management process and exploring the design concepts using model-based architecture from technical and management perspective.
		Develop an understanding of project planning, organisation, responsibilities, automation and control of the processes to achieve the desirable results.
		Develop a project scope while considering factors such as customer requirements and internal/external goals.
CS-605	Data Analytics Lab	Understand the basic of data analytics using concepts of statistics and probability.
		Understand the needs of data processing techniques.
		Implement the data analytics techniques using R, Matlab and python.
		Apply the data analytics techniques in real life applications.
		Articulate the limitations and abuses of formal inference and modeling.
CS-606	Skill Development Lab	Demonstrate the basics of software as a product.
		Understand the current requirements of industries.
		Implement the software as a product using different design patterns.
		Apply the software development techniques in real life applications.
CS-607	Internship-III	To display the utility of information and talent units obtained from the path and place of business withinside the assigned task functions.

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		Solve actual existence demanding situations withinside the path via way of means of analysing the area and choosing suitable ability units obtained from the path.
		Exhibit important questioning and hassle fixing talents via way of means of analysing underlying issue/s to challenges.
		Demonstrate the capacity to harness assets with the aid of using analysing demanding situations and thinking about opportunities.
		Articulate profession alternatives via way of means of thinking about possibilities in company, sector, industry, expert and academic advancement.
CS-608	Minor Project II	A fully engaged student shall be able to get exposure to undertake a short research project.
		To enable the students to develop comprehensive solution of identified problems.
		To inculcate the ability to synthesize the results of the detailed analytical studies conducted, lay down validity and design criteria, interpret the result for application to the problem, develop the concept and detailed design solution.
CS-701	Software Architectures	Describe the fundamentals of software architecture, qualities and terminologies.
		Understand the fundamental principles and guidelines for software architecture design,architectural styles, patterns, and frameworks.
		Use implementation techniques of Software architecture for effective software development.
		Apply core values and principles of software architectures for enterprise application development.
		Describe software architecture documentation.
CS-702	Wireless & Mobile Computing	Design and create traditional networks.
		Understand the different issues in MAC and routing issues in multi hop wireless and ad-hoc networks and existing solutions for the same.
		Evaluate the transport layer issues in wireless networks due to errors and mobility of nodes and understand existing solutions for the same.
		Explain the architecture of GSM.
		Discuss the services, emerging issues and future trends in m-commerce.
CS-703	Agile Software Development	Describe the fundamental principles and practices associated with each of the agile development methods.
		Compare agile software development model with traditional development models and identify the benefits and pitfalls.
		Use techniques and skills to establish and mentor Agile Teams for effective software development.

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		Apply core values and principles of Agile Methods in software development.
		Judge and craft appropriate adaptations to existing practices or processes depending upon analysis of typical problems.
CS-704	Departmental Elective Lab CS-702 [Wireless & Mobile Computing]	Demonstrate wireless network with number of nodes and different parameters using simulator.
		Understand the basic concept of inter-networking devices.
		Describe the basic concept of IP addressing.
		Execute the basic network command and Network configuration commands.
		Configure network using routing protocol.
CS-705	Open Elective Lab CS-703 [Agile Software Development]	Understand agile development processes and the principles behind the Agile manifesto.
		Develop a product vision, customer journey, and roadmap.
		Build out a backlog and user stories.
		Leverage Scrum practices in small teams as you build out a working prototype for your class project.
		Explore advanced and emerging topics in the domain of software development.
CS-706	Major Project-I	Demonstrate a sound technical knowledge of their selected project topic.
		Undertake problem identification, formulation and solution.
		Design engineering solutions to complex problems utilising a systems approach.
		Communicate with engineers and the community at large in written and oral forms.
		Demonstrate the knowledge, skills and attitudes of a professional engineer.
CS-607	Evaluation of Internship -III	Demonstrate awareness of the ethics involved in doing an internship.
		Describe, analyze, and synthesize their learning experience in the internship in the form of an internship paper.
		Articulate new learning from the internship experience in the form of an oral presentation.
		Show understanding and assess the challenges carrying out an internship in a cross cultural setting with limited language skills and in a short timeframe;
		Gain meaningful and practical experience in their chosen field.
CS-801	Internet of Things	Understand Internet of Things and its hardware and software components.
		Interface I/O devices, sensors & communication modules.
		Analyze data from various sources in real-time and take necessary actions in an intelligent fashion.

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		Remotely monitor data and control devices.
		Develop real life IoT based projects.
CS-802	Object Oriented Software Engineering	Apply object oriented principles in software design process.
		Understand the phases involved in SDLC.
		Describe the use case and activity diagrams.
		Draw class, object and interaction diagrams.
		Understand testing strategies and test cases for OO software process.
CS-803	Managing Innovation and Entrepreneurship	Students will be able to get knowledge to real-life organisational issues faced by those establishing and managing innovation-driven organisations.
		Students will be able to know about the key concepts underpinning entrepreneurship and its application in the recognition and exploitation of product service process opportunities.
		Key concepts underpinning innovation and the issues associated with developing and sustaining innovation within organisations.
		How to design creative strategies for pursuing, exploiting and further developing new opportunities.
		Issues associated with securing and managing financial resources in new and established organisations.
CS-804	Cloud computing	Configure various virtualization tools such as virtual box, VMware workstation.
		Design and deploy a web application in a PaaS environment.
		Learn how to simulate a cloud environment to implement new schedulers.
		Install and use a generic cloud environment that can be used as a private cloud.
		Manipulate large data sets in a parallel environment.
CS-805	Major Project-II	Learn about different software development process models and software engineering principles and develop an ability to apply them to software design of real life problems.
		Plan, analyze, design and implement a software project using programming languages like Java, ASP, PHP etc.
		Gain confidence at having conceptualized, designed and implemented a working major project with their team.
		Understand the fundamental principles of Software Project management & will also have a good knowledge of responsibilities of project manager and how to handle these.
		Be familiar with the different methods and techniques used for project management.

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Course Outcomes (CO's) of Computer Science and Engineering (PG)

MCSE 101 Ad. Compt. Mathematics	Identify and comprehend linear algebraic structures that appear in computer science
	Use linear algebraic methods to perform computational task.
	Comprehend and apply the algebric processes in real life problems.
MCSE 102 Ad. Data Structures and Algo	Use data structures and algorithms to solve computing problems
	Design algorithms using graph structure and various string matching algorithms to solve real-life problems
	Apply suitable design strategy for problem solving
MCSE 103 ACA	Discuss the issues related to multiprocessing and suggest solutions
	Point out the salient features of different multicore architectures and how they exploit parallelism
	Discuss the various techniques used for optimising the cache performance
MCSE 104 OOT	Understand and describe the project principles and constructs of object-oriented system
	Identify and model/represent domain constraints on the objects and (or) on their relationships
	Understand various modeling techniques to model different perspectives of object-oriented software design
MCSE 105 Ad. CN	Identify the components required for designing a network
	Design a network at a high-level using different networking technologies
	Analyze the various protocols of wireless and cellular networks
MCSE 201 Web Tech and E commerce	To understand the need for interoperable network management and to learn to the concepts and architecture behind standards based network management.
	To understand the concepts and terminology associated with e-commerce and to study the current trends in network management technologies.
MCSE 202 ITC and Cryptography	Understand the core fundamentals of information theory and coding
	Apply the security concepts related to networks in wired and wireless scenario

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	Implement and Manage the security essentials in IT Sector
MCSE 203 Ad Concepts in DBMS	Comprehend the complex query processing techniques
	Design and implement databases and writing query structure
	Develop skill set in file organization, Query Optimization, Transaction management, and database administration techniques
MCSE 204 System Programming	Ability to use theoretical and applied information in these areas to design system software with realistic constraints.
	Ability to devise, select, and use modern techniques and tools needed for the design and implementation of system programs.
	Ability to work efficiently in intra-disciplinary teams and to work individually.
	Adequate knowledge in system programs (assemblers, loaders, linkers, macro-processors, text editors, debuggers, interpreters, compilers, operating systems).
MCSE 205 Soft Computing	Understanding and implementation of different Artificial Neural Network
	Implementation of Artificial Intelligence Algorithms like A*, AO * or Hill-Climbing for Searching methodology.
MCSE 301 Elective 1 (A) Dataware housing and mining	Understand the functionality of the various data mining and data warehousing component
	Appreciate the strengths and limitations of various data mining and data warehousing models
	Explain the analyzing techniques of various data
	Describe different methodologies used in data mining and data ware housing.
	Compare different approaches of data ware housing and data mining with various technologies.
MCSE 302 Elective 2 (C) Network Security	Analyze and design classical encryption techniques and block ciphers.
	Understand key management and distribution schemes and design User Authentication
	Understand and analyze public-key cryptography, RSA and other public-key cryptosystems
	Know about Intruders and Intruder Detection mechanisms, Types of Malicious software
MCSE 302 Elective 2 (D) Simulation and Modeling	Understand the techniques of modeling in the context of hierarchy of knowledge about a system and develop the capability to apply the same to study systems through available software.

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	Students will learn different types of simulation techniques.
	Students will learn to simulate the models for the purpose of optimum control by using software.

Department of Information Technology

Vision of Information Technology

To be a renowned department for imparting quality education, committed to cater the evolving IT industry requirements.

Mission of Information Technology

- To provide the best possible **IT education** to serve the current requirements of the modern IT industry by keeping pace with the **latest technical skills**.

- To inculcate **IT professionalism** among the students by providing an atmosphere for **continuous learning, research, and innovation.**

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Program Educational Objective (PEO's) of Information Technology

- **PEO 1.** To provide students with a solid foundation in information technology skills, basic programming and algorithm designing fundamentals required to solve the computing problems.

- **PEO 2.** To expose students to latest computing technologies and software tools, so that they can comprehend, analyze, design and create innovative projects and provide solutions for real-life problems.

- **PEO 3.** To inculcate spirit of inquiry, team work skills, professional attitude, and ability to relate IT issues with social awareness that prepare them for immediate employment and for lifelong learning in IT field, which enable them to be successful entrepreneurs.

Program Specific Outcomes (PSO's) of Information Technology

A graduate of the Information Technology Program will demonstrate:

PSO 1: IT Specific Skills: The ability to identify, analyze and design solutions for complex engineering problems in multidisciplinary areas by understanding the core principles and concepts of IT and thereby engage in national grand challenges.

PSO 2: Programming and Software Development Skills: The ability to acquire programming efficiency by designing algorithms and applying standard practices in software project development to deliver quality software products meeting the demands of the industry.

PSO 3: Professional Skills: The ability to apply the fundamentals of IT in competitive research and to develop innovative products to meet the societal needs thereby evolving as an eminent researcher and entrepreneur.

Programme Outcomes (PO's) of Information Technology

- **PO 1:** Apply the knowledge of mathematics, science and engineering fundamentals for the solution of IT problems.

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- **PO 2:** Ability to identify, formulate and analyze the complex engineering problems
- **PO 3:** Ability to design and develop the computer based systems to meet desired needs within realistic constraints such as public health and safety, environmental, agriculture, economic and societal considerations
- **PO 4**: Ability to demonstrate with excellent programming, analytical, logical and problem solving skills.
- **PO 5:** Ability to use the emerging technologies, skills, and modern software tools to design, develop, test and debug the programs or software.
- **PO 6:** Ability to include and solve the social, cultural, ethical issues with IT solutions.
- **PO 7:** Ability to design and develop web based solutions with effective graphical user interface for the need of sustainable development.
- **PO 8:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the IT practices.
- **PO 9:** Ability to work individually and as a member or leader in diverse teams to accomplish a common goal.
- **PO 10**: Ability to communicate effectively in both verbal and written forms with engineering community and society
- **PO 11:** Knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team to manage the software and IT based projects in multidisciplinary environments.

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- **PO 12:** Appreciation of technological change and the need for independent life-long learning.

Course Outcomes (CO's) of Information Technology

Univ. Subject Code	Subject Name	CO Description
BT-201	Engineering Physics	The Coursework is designed to provide students the opportunity to learn key concepts of Wave nature of particles and the Schrodinger equation.
		Student will able to understand the knowledge of Wave optics i.e. interference and diffraction.
		To introduce the idea of solids like semiconductors (P type and N Type semiconductors), Diodes and Hall effect. Students will also be able to understand the basic concept of superconductivity.
		To develop the understanding of Lasers, fiber optics and their applications in field of engineering sciences.
		To provide you to basic understanding of Electrostatics in vacuum.
BT-102	Mathematics-I	To introduce the fallouts of Rolle's Theorem that is fundamental to application of analysis to Engineering problems.
		To introduce the idea of applying differential and integral calculus to notions of curvature and to improper integrals. Apart from some applications it gives a basic introduction on Beta and Gamma function
		To develop the tool of power series and Fourier series for learning advanced Engineering Mathematics.
		To familiarize the student with functions of several variables that is essential in most branches of engineering
		To develop the essential tool of matrices and linear algebra in a comprehensive manner.
BT-203	Basic Mechanical Engineering	Understand the properties of material, stress strain. Properties of alloys and cast iron.
		Understand the concept measurement and machine tools their operations and their applications.
		Understand the concept of fluid flow , properties of fluid, Bernoulli's equation, Pascal's law.
		To Understand the concept of heat and temperature, law of thermodynamics, boilers and their mountings and accessories, basic Refrigeration cycles and its applications.
		To Understand the working of different cycles and 4 strokes, 2 stroke engines and their applications.

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BT-204	Basic Civil Engineering & Mechanics	Students will acquire the basic knowledge in different fields of civil engineering and materials used in construction.
		Gain the ability to use modern survey equipment to measure angles and distances.
		Students will understand the basic of contour lines and map
		Students will have the ability to identify, formulate and solve engineering problems related to Engineering Mechanics: Statics
		Students will be able to analyse beam for shear force and bending moment.
BT-205	Basic Computer Engineering	Able to understand the basic applications of computers in various fields, describe operating system, its role and functionalities and to apply concepts of MS word, MS power point, MS Excelefficiently.
		Discuss and apply simple algorithms for arithmetic and logical problems.
		Translate the algorithms to programs applyingobject-oriented concepts in C++ programming language.
		Understand basics of computer networks, OSI layers and protocols, E commerce applications, impact of securitythreats and attacks on networking systems and also security measures
		Understand the different method for representing and processing data and to get awareness about the impact of cloud computing, its various type of services.
BT-206	Language Lab & Seminars	learners to develop good listening skills.
		Encourages learner to talk freely and lose their shyness when talking in front of the people
		To develop the overall personality of the students by the practical activities
		Helps in confidence building, motivation to be more presentable and help in removing the stage fright
		Develops speaking, writing, reading, listening and presentation skills.
BT-101	Engineering Chemistry	Differentiate hard and soft water; solve the related numerical problems on water purification and its significance in industry and daily life.
		Select the lubricant for various purposes based on the type of Machines.
		Equipped with basic knowledge of polymer , methods of polymerization and various industrial applications of polymers
		Draw the Phase diagrams of one & two component systems and causes, consequences and methods to minimize corrosion to improve industrial designs.

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		Identify the structure of unknown/new compounds with the help of spectroscopy and understand periodic properties such as ionization potential, oxidation states and electro negativity
BT-202	Mathematics-II	To introduce effective mathematical tools for the solutions of ordinary and partial differential equations that model physical processes.
		To introduce the tools of differentiation and integration of functions of complex variable those are used in various techniques dealing engineering problems.
		To acquaint the student with mathematical tools available in vector calculus needed various field of science and engineering.
BT-103	English for Communication	Effective use of verbal and non-verbal communication for enhanced soft skill beside enhanced reading comprehension as well
		Write the different kinds of letters, reports and technical writing.
		Apply basic rules of grammar in both written as well as oral communication.
BT-104	Basic Electrical & Electronics Engineering	To introduce the concept of Basics of DC electrical Network including network theorems.
		To introduce the concept of Basics of AC electrical Network(single phase & 3 phase)..
		To study of law of Electromagnetism, introduction of transformer.
		To study of various electrical Machines.
		To study Basic Concept Digital Electronics.
BT-105	Engineering Graphics	Draw various types of scales, and curves.
		Draw orthographic projections of points & lines
		Draw orthographic projections of Planes & Solids
		Draw sections and development of solids including cylinders, cones, prisms and pyramids.
		Draw isometric views of Planes and Solids, Drawing using AUTOCAD.
BT-106	Manufacturing Practices	Use hand and power tools for different manufacturing processes
		Operate machine tools while preparing any component
		Select the appropriate tools required for specific operation.
		Comprehend the safety measures required to be taken while using the tools.
		Prepare Foundry, Fitting, Carpentry, Welding and smithy Job.
BT-107	Internship-I (60 Hrs Duration) at the Institute level	Demonstrate the application of knowledge and skill sets acquired from the course and workplace in the assigned job function/s
		Solve real life challenges in the workplace by analysing work environment and conditions, and selecting appropriate skill sets acquired from the course

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		Exhibit critical thinking and problem solving skills by analysing underlying issue/s to challenges
		Demonstrate appreciation and respect for diverse groups of professionals by engaging harmoniously with different company stakeholders
		Exhibit professional ethics by displaying positive disposition during internship
BT-108	Swachh Bharat Summer Internship Unnat Bharat Abhiyan (100Hrs)/ Rural Outreach	This course is to sensitize students about the socio-cultural aspects of the rural areas parochial to their colleges.
		Students are expected to observe, investigate and learn about the following aspects of the rural region: i. Demographics, Literacy, Geographical parameters of the Village; ii. Schemes of government of India and State of Madhya Pradesh in operation in the villages.
		To enhance critical thinking by making them participate in social activities and imbibe human values among them.
		Rural Swachh Bharat Abhiyan is to promote cleanliness and develop healthy habits in people in villages.
		Unnat Bharat Abhiyan: To build an understanding of the development agenda within institutes of Higher Education and an institutional capacity and training relevant to national needs, especially those of rural India.
ES-301	Energy & Environmental Engineering	Get the knowledge of energy carriers, energy technologies, energy challenges and energy system integration and environment sustainability.
		Learn about the different types of ecosystems present in environment, ecological succession and energy flow in the ecosystem.
		Understand the value of biodiversity to human societies, threats to biodiversity, In-situ and Ex-situ conservation of biodiversity.
		Acquire knowledge of different types of environmental pollution, its effects on life and its remedies
		Aware about the social issue related to the environment, environment ethics, protection and conservation acts for the environment.
IT-302	Discrete Structure	Students will be able to understand the notion of mathematical thinking and algorithmic thinking and be able to apply them in problem solving such as formula specifications, verifications and basic concepts of set theory.
		Understand the basic principle of boolean algebra, logica and set theory
		Be able to construct simple mathematical proof and possess the ability to verify them

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		Acquire ability to describe computing problems with the help of graph theory and Finite state machines, also express its utility in solving and modeling real time problems.
		Apply basic counting techniques to solve combinatorial problem.
IT-303	Data Structure	To understand the concept of linear, non-linear data structures, the operations performed on them and the applications of various data structures
		Understand the arrays, searching and sorting algorithms
		Implement stacks, queues and its applications
		Implement linked list and its variations
		Solve problem involving graphs, trees and heaps
IT-304	Object Oriented Programming & Methodology	Recognise attributes and methods for give an objects
		Define data types and also deal with operations applied for data structures
		Implement algorithms and complex problems
		Understand how to apply the major object-oriented concepts to implement object oriented programs in C++, encapsulation, inheritance and polymorphism
		Classify inheritance with the understanding of early and late binding, usage of exception handling, generic programming.
IT-305	Digital Circuits & System	Perform number base conversion, use Boolean logic to create digital circuits
		Understand use of encoders, decoders, multiplexers and d-multiplexes in communication systems
		By learning design of combinational and sequential circuits students can understand its use in digital systems such as computers, communication systems and other modern technologies
		Study of a ADC and DAC along with display devices with enable students to understand signal conversion and its display and their applications and digital devices
IT-306	JAVA Programming Lab	Understand fundamentals of programming such as variables, conditional and iterative execution, methods etc
		Understand fundamentals of object oriented programming in Java and be familiar with important concepts like class, inheritance and multithreading, AWT and JDBC
		The different data types, design structures, loops, functions to design Java programs
		Develop program using the Java collection API as well as the Java standard class library
		Develop Java Applet

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BT-107	Evaluation of Internship-I completed at I year level	To display the utility of information and talent units obtained from the path and place of business withinside the assigned task function/s"
		Solve actual existence demanding situations withinside the path via way of means of analysing the area and choosing suitable ability units obtained from the path
		Exhibit important questioning and hassle fixing talents via way of means of analysing underlying issue/s to challenges
		Demonstrate the capacity to harness assets with the aid of using analysing demanding situations and thinking about opportunities
		Articulate profession alternatives via way of means of thinking about possibilities in company, sector, industry, expert and academic advancement
BT-307	90 hrs Internship based on using various softwares – Internship -II	Demonstrate the application of knowledge and skill sets acquired from the course and workplace in the assigned job function/s
		Solve real life challenges in the workplace by analysing work environment and conditions, and selecting appropriate skill sets acquired from the course
		Exhibit critical thinking and problem solving skills by analysing underlying issue/s to challenges
		Demonstrate appreciation and respect for diverse groups of professionals by engaging harmoniously with different company stakeholders
		Exhibit professional ethics by displaying positive disposition during internship
BT-401	Mathematics-III	Understand mathematical tools for the Numerical Solutions algebraic and transcendental equations.
		Describe mathematical knowledge to understand Laplace transformation, Inverse Laplace transformation and Fourier Transform which are used in various branches of engineering.
		Work with mathematical tools available in Statistics needed in various field of science and engineering
		Fulfill the needs of engineers to understand applications of numerical analysis, transform calculus and statistical techniques in order to acquire mathematical knowledge
		Solve wide range of practical problems appearing in different sections of science and engineering
IT-402	Computer Architecture	Understand basic structure of computer system, arithmetic operations
		Understand the arithmetic operations, study of hardwired and microprogrammed control units
		Develop the concepts of memory management, interleaving and mapping

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		Analyse the arithmetic and instructional pipelines
		Explain the function of multi processing and techniques to achieve it
IT-403	Analysis and Design of Algorithm	Implement sorting and searching algorithms
		Experiment with techniques for obtaining maximum outputs with minimum efforts
		Make use of dynamic program
		Solve 8 queens problem and others of the kind for application in real world scenario
		Distinguish between np hard and np complete problems and develop their solutions.
IT-404	Analog & Digital Communication	Differentiate Analog and Digital Signal and types of signals.
		Understand the communication of information over the communication channel.
		Understand how information signal of low frequency can be transmitted with the help of modulation techniques over a long distance.
		Differentiate different modulation techniques such as AM, SSB, DSB and FM.
		Explain using block diagrams, modulation and demodulation techniques for digital signal and determine bandwidth requirement.
IT-405	Data base Management System	Compare file system and DBMS and explain how DBMS is better than traditional file processing systems
		Analyse the physical and logical data base designs, database modelling, relational, Hierarchical, and network models
		Analyse and renovate an information model into a relational innovation schema and to use DDL, DML and DCL utilities to implement the schema using a DBMS.
		Formula data retrieval carries in SQL and relational algebra
		Demonstrate an understanding of functional dependencies, normalisation theory and apply such knowledge to the design of a database
		Demonstrate and explain terms like transaction processing, concurrency control, distributed database and big data
IT-406	Introduction to Web Design	Be acquainted with elements, tags and basic structure of HTML files
		Designing of web page-document layout, working with list, working with tables.
		Practice hyper linking, designing of webpage-working with frames, forms and controls.
		Prepare creating style sheet, CSS properties, background, text, font and styling etc.

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		Practice the use of multimedia components in HTML documents.
IT-407	Open Source Software Lab (Linux and R)	Understand the basic commands used in Linux operating system
		Learn the important LinX library functions and system calls
		Write, compiled and debug shell script and Linux environment
		Learn how to program in R and write R functions
		Read data into R, access R packages
BT-408	90 hrs Internship based on using various software – Internship -II	Exposure to Organizational skills and professional practices.
		Efficiently completing tasks, fostering good relationship with seniors and subordinates
		Improved Communication & interpersonal skills.
		Exposure to latest technology applications to the specific discipline.
		Identification of relevant problems in the industry and innovative solutions.
IT-501	Operating System	Gain knowledge of history of operating systems and understand design issues associated with operating systems
		Identify the process management policies and analyze and compare scheduling of processes by CPU along with memory management.
		Understand concepts of memory management (including virtual memory), I/O and concurrency control.
		Describe demand paging and operating system security
		Understand issues related to file system interfaces and implementation, disk management
IT-502	Computer Network	Have a good understanding of the OSI reference model and its layers
		Identify four networking and infrastructure components and the rules they serve and given requirements and constraints, design and IT infrastructure including devices, topologies, protocols, system software, management and security
		Analyse the requirements for a given organisational structure and select the most appropriate networking architecture and technologies
		Specify and identify deficiencies in existing protocols, and then go on to formulate new and better protocols
		Design a reliable data transfer protocol and incrementally and develop solutions for the requirements of transport layer
IT-503	Theory of Computation	Convert between finite automata, regular grammar, and regular expression representation of regular languages
		Play the pumping lemma for regular languages to determine if a language is regular
		Convert between grammars and pushdown automata for context free languages

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		Translate a context free grammar from one form to another and demonstrate is grammar is ambiguous
		Produce simple programmes for a touring machine and explain the concept of undecidability ability and its examples
IT-504	Artificial Intelligence	Be familiar with terminology used in this area
		Explain what constitutes artificial intelligence and how to identify systems with artificial intelligence
		Know how to build simple knowledge based systems
		Have ability to apply knowledge representation, reasoning, and machine learning techniques to real-world problems
IT-505	Advanced Java Lab	Learn to access database through Java programs, using Java Data Base Connectivity (JDBC)
		Create dynamic web pages, using Servlets and JSP.
		Make a reusable software component, using Java Bean. Invoke the remote methods in an application using Remote Method Invocation (RMI)
		Understand the multi-tier architecture of web-based enterprise applications using Enterprise JavaBeans (EJB).
		Develop Stateful , Stateless and Entity Beans. Use Struts frameworks, which gives the opportunity to reuse the codes for quick development.
IT-506	Soft Skills and Interpersonal Communication	To encourage the all round development of students by focusing on soft skills so it helps to bridge the gap between the skill requirements of the employer or industry and the competency of the students.
		To make the engineering students aware of the importance, the role and the content of soft skills through instruction, knowledge acquisition, demonstration and practice.
		To develop and nurture the soft skills of the students through individual and group activities.
		To improve the communication skills & enrich personality development. and to enhance the employability of the students.
IT-507	Evaluation of Internship-II	To display the utility of information and talent units obtained from the path and place of business withinside the assigned task function/s"
		Solve actual existence demanding situations withinside the path via way of means of analysing the area and choosing suitable ability units obtained from the path
		Exhibit important questioning and hassle fixing talents via way of means of analysing underlying issue/s to challenges
		Demonstrate the capacity to harness assets with the aid of using analysing demanding situations and thinking about opportunities

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		Articulate profession alternatives via way of means of thinking about possibilities in company, sector, industry, expert and academic advancement
IT-508	Minor Project-I	A fully engaged student shall be able to get exposure to undertake a short research project.
		To enable the students to develop comprehensive solution of identified problems.
		To inculcate the ability to synthesize the results of the detailed analytical studies conducted, lay down validity and design criteria, interpret the result for application to the problem, develop the concept and detailed design solution
IT-601	Computer Graphics & Multimedia	Understand the core concepts of computer graphics
		Implement various shapes drawing algorithms
		Apply geometric transformation on graphics-based objects and also implement clipping, shading and colour models
		Understand multimedia system architecture, multimedia components and use various multimedia tools
		Perform activities involved in design, development and testing of modelling, rendering, shading and animation
IT-602	Wireless and Mobile Computing	Explain the basic concepts of wireless network and wireless generations
		Demonstrate the different wireless technologies such as CDMA, GSM, GPRS etc
		Explain the design considerations for deploying the wireless network infrastructure
		Appraise the importance of adhoc networks such as MANET and wireless sensor networks
		Differentiate and support to security measures, standards, services and Layer five security considerations
IT-603	Compiler Design	Demonstrate an understanding of the compilation phases.
		Specify and analyze the lexical, syntactic and semantic structures of advanced language features.
		Write a scanner, parser, and semantic analyser without the aid of automatic generators.
		Describe techniques for intermediate code and machine code optimization.
		Design the structures and support required for compiling advanced language features
IT-604	Software Engineering	Define various software application domains and remember different process models used in software development
		Understand various measures of software and generate project schedule

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		Describe functional and non-functional requirements of software and develop design models of software
		Investigate the reasons of bugs and apply the software testing techniques in commercial environment
		Understand various activities to be perform for improving software quality and software maintenance
IT-605	Programming in Python	Install python and have knowledge of syntax of python
		Describe the numbers, math functions, strings, list, tuples and dictionaries in python
		Express different decision making statements and functions
		Develop code in python using functions, loops etc
		Design GUI applications in python and evaluate different database operations
IT-606	Android Programming	Experiment on Integrated Development Environment for Android Application Development.
		Design and Implement User Interfaces and Layouts of Android App.
		Use Intents for activity and broadcasting data in Android App.
		Design and Implement Database Application and Content Providers
		Experiment with camera and location-based service and develop android apps with security features
IT-607	Internship-III	To show the application of statistics and expertise devices acquired from the route and place of job withinside the assigned challenge function/s"
		Solve actual existence demanding situations withinside the path via way of means of analysing the area and choosing suitable ability units obtained from the path
		Demonstrate the ability to harness property with the useful resource of the use of analysing annoying conditions and considering opportunities
		Exhibit critical thinking and problem solving skills by analysing underlying issue/s to challenges
		Articulate career options thru manner of method of considering opportunities in company, sector, industry, professional and educational advancement
IT-608	Minor Project II	A fully engaged student shall be able to get exposure to undertake a short research project.
		To enable the students to develop comprehensive solution of identified problems.
		To inculcate the ability to synthesize the results of the detailed analytical studies conducted, lay down validity and design criteria, interpret the result for application to the problem, develop the concept and detailed design solution

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IT-701	Soft Computing	Understand concept of ANN and explain the XOR problem
		Use supervise neural networks to classify given inputs
		Understand unsupervised neural networks for clustering data
		understand fuzzy inference system using concepts of fuzzy logic
		Obtain an optimal solution to a given problem using genetic algorithm
IT-702	Cloud Computing	Explain the core concepts of the cloud computing paradigm
		Demonstrate knowledge of virtualization
		Explain the core issues of cloud computing such as security, privacy, and interoperability
		Choose the appropriate technologies, algorithms, and approaches for the related issues
		Identify problems, and explain, analyze, and evaluate various cloud computing solutions
IT-703	Internet of Things	Understand internet of things and its hardware and software components
		Interface I/O devices, sensors and communication modules
		Analyse data from various sources in real time and take necessary actions in an intelligent fashion
		Remotely monitor data and control devices
		Developed real life IOT-based projects
IT-704	Cloud Computing Lab	Configure various virtualization tools such as Virtualbox, VMware workstation
		Design and deploy a web application in a PaaS environment
		Learn how to simulate a cloud environment to implement new schedulers.
		Install and use a generic cloud environment that can be used as a private cloud.
		Manipulate large data sets in a parallel environment.
IT-706	Major Project-I	Demonstrate a sound technical knowledge of their selected project topic.
		Undertake problem identification, formulation and solution.
		Design engineering solutions to complex problems utilising a systems approach.
		Communicate with engineers and the community at large in written and oral forms.
		Demonstrate the knowledge, skills and attitudes of a professional engineer.
IT-607	Evaluation of Internship -III	Demonstrate awareness of the ethics involved in doing an internship .
		Describe, analyze, and synthesize their learning experience in the internship in the

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		form of an internship paper
		Articulate new learning from the internship experience in the form of an oral presentation;
		Show understanding and assess the challenges carrying out an internship in a crosscultural setting with limited language skills and in a short timeframe;
		Gain meaningful and practical experience in their chosen field.
IT-801	Information Security	Understand key terms and concepts in information security and Cryptography and evaluate the cyber security needs of an organization
		Acquire knowledge to secure computer systems, protect personal data, and secure computer networks in an organization
		Apply knowledge of various encryption algorithms and authentication mechanisms to secure information in computer systems and networks
		Understand principles of web security to secure network by monitoring and analyzing the nature of attacks and design/develop security architecture for an organization.
		Design operational and strategic information security strategies and policies.
IT-802	Machine Learning	Recognize the characteristics of machine learning strategies.
		Apply various supervised learning methods to appropriate problems.
		Identify and integrate more than one technique to enhance the performance of learning.
		Create probabilistic and unsupervised learning models for handling unknown pattern.
		Analyze the co-occurrence of data to find interesting frequent patterns and Preprocess the data before applying to any real-world problem and can evaluate its performance
IT-803	Parallel Computing	To develop an understanding of various basic concepts associated with parallel computing environments
		Understand, appreciate and apply parallel and distributed algorithms in problem solving
		Acquire skills to measure the performance of parallel and distributed programs
		Design parallel programs to enhance machine performance in parallel hardware environment
		Design and implement parallel programs in modern environments such as CUDA, OpenMP, etc
IT-804	Machine Learning Lab	Recognize the characteristics of machine learning strategies.
		Apply various supervised learning methods to appropriate problems.

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		Identify and integrate more than one technique to enhance the performance of learning.
		Create probabilistic and unsupervised learning models for handling unknown pattern.
		Analyze the co-occurrence of data to find interesting frequent patterns and Preprocess the data before applying to any real-world problem and can evaluate its performance
IT-805	Major Project-II	Learn about different software development process models and software engineering principles and develop an ability to apply them to software design of real life problems.
		Plan, analyze, design and implement a software project using programming languages like Java, ASP, PHP etc.
		Gain confidence at having conceptualized, designed and implemented a working major project with their team.
		Understand the fundamental principles of Software Project management & will also have a good knowledge of responsibilities of project manager and how to handle these.
		Be familiar with the different methods and techniques used for project management.

Department of Electronics and Communication Engineering

Vision of Electronics and Communication Engineering

To produce globally competent electronics & communication engineering students with knowledge of core as well as inter discipline domains.

Mission of Electronics and Communication Engineering

1. Educating the students in field of electronics and communication engineering to create competent professionals with moral values, social ethics and pursuing higher education.
2. Inculcating the understanding technical competence in the fields of electronics and communication engineering and implementation of theoretical concepts in practical multidiscipline scenarios.

Program Educational Objective (PEO's) of Electronics and Communication Engineering

PEO-1

To create the ability to demonstrate technical competence in the fields of electronics and communication engineering and to develop solutions to the problems in core as well as inter disciplinary areas.

PEO-2

To develop graduates with sound academic background and industrial exposure this gives them capability to make a productive contribution to society through lifelong learning.

PEO-3

To develop competent professionals with moral values, ethics to build an efficient team with soft skill capabilities

Program Specific Outcomes (PSO's) of Electronics and Communication Engineering

PSO1

The ability to analyze, design and implement application specific electronic system for complex engineering problems for analog, digital domain, communications and signal processing applications by applying the knowledge of basic sciences, engineering mathematics and engineering fundamentals.

PSO2

The ability to adapt for rapid changes in tools and technology with an understanding of societal and ecological issues relevant to professional engineering practice through life-long learning.

PSO3

Excellent adaptability to function in multi-disciplinary work environment, good interpersonal skills as a leader in a team in appreciation of professional ethics and societal responsibilities.

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Programme Outcomes (PO's) of Electronics and Communication Engineering

Upon successful completion of the programme, the students would have the following attributes.

1. Demonstrate knowledge of
    a. Differential and integral calculus, differential equations, linear algebra, vector calculus, complex variables, Laplace transforms, Fourier transforms, and probability and statistics,
    b. Basic physics including mechanics, electricity and magnetism, and optics,
    c. Basic chemistry and environmental science,
    d. Basic computing,
    e. Analog, digital circuit analysis and design techniques,
    f. Architecture and applications of Electronics, Communications Engineering systems.

2. Identify, formulate and solve complex problems in the domains of analog/digital design, signal processing and communication engineering, reaching substantiated conclusions using first principles of Mathematics and Engineering Sciences.

3. Design/develop
    a. Microprocessor/Microcontroller based systems
    b. Communication and Networking systems
    c. Algorithms for signal process
    d. VLSI circuit components to meet desired specifications with realistic constraints such as manufacturability and sustainability.

4. Design and conduct experiments in analog/digital systems, signal processing and communication and networking systems, analyze and interpret data, and synthesize information to provide valid conclusions using simulation techniques and/or numerical methods, graphics.

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5. Select and apply necessary modern electronic instruments like Digital Storage Oscilloscope, DSP and FPGA trainer kits, Microcontrollers and software tools such as Spice, MATLAB and HDL for Digital Signal Processing, Communication Engineering, Networking and VLSI engineering practices with an understanding of their limitations.

6. Apply reasoning informed by the contextual knowledge to assess societal, safety, legal and cultural issues, and the consequent responsibilities relevant to the professional engineering practice.

7. Demonstrate the knowledge of contemporary issues in the field of Electronics and Communication Engineering.

8. Commit to professional ethics and responsibilities and norms of engineering practice.

9. Work effectively as an individual, and also as a member or leader in multicultural and multidisciplinary teams.

10. Effectively communicate on their Electronics and Communication Engineering activities, with the Engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations.

11. Manage projects by applying gained knowledge on Engineering and Management principles.

12. Adapt themselves wholly to the demands of the Electronics and Communication related Engineering by life-long learning.

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Course Outcomes (CO's) of Electronics and Communication Engineering (UG)

Univ. Subject Code	Subject Name	CO Description
BT-201	Engineering Physics	The Coursework is designed to provide students the opportunity to learn key concepts of Wave nature of particles and the Schrodinger equation.
		Student will able to understand the knowledge of Wave optics i.e. interference and diffraction.
		To introduce the idea of solids like semiconductors (P type and N Type semiconductors), Diodes and Hall effect. Students will also be able to understand the basic concept of superconductivity.
		To develop the understanding of Lasers, fiber optics and their applications in field of engineering sciences.
		To provide you to basic understanding of Electrostatics in vacuum.
BT-102	Mathematics-I	To introduce the fallouts of Rolle's Theorem that is fundamental to application of analysis to Engineering problems.
		To introduce the idea of applying differential and integral calculus to notions of curvature and to improper integrals. Apart from some applications it gives a basic introduction on Beta and Gamma function
		To develop the tool of power series and Fourier series for learning advanced Engineering Mathematics.
		To familiarize the student with functions of several variables that is essential in most branches of engineering
		To develop the essential tool of matrices and linear algebra in a comprehensive manner.
BT-203	Basic Mechanical Engineering	Understand the properties of material, stress strain. Properties of alloys and cast iron.
		Understand the concept measurement and machine tools their operations and their applications.
		Understand the concept of fluid flow , properties of fluid, Bernoulli's equation, Pascal's law.
		To Understand the concept of heat and temperature, law of thermodynamics, boilers and their mountings and accessories, basic Refrigeration cycles and its applications.
		To Understand the working of different cycles and 4 strokes, 2 stroke engines and their applications.
BT-204	Basic Civil Engineering & Mechanics	Students will acquire the basic knowledge in different fields of civil engineering and materials used in construction.
		Gain the ability to use modern survey equipment to measure angles

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		and distances.
		Students will understand the basic of contour lines and map
		Students will have the ability to identify, formulate and solve engineering problems related to Engineering Mechanics: Statics
		Students will be able to analyse beam for shear force and bending moment.
BT-205	Basic Computer Engineering	Able to understand the basic applications of computers in various fields, describe operating system, its role and functionalities and to apply concepts of MS word, MS power point, MS Excel efficiently.
		Discuss and apply simple algorithms for arithmetic and logical problems.
		Translate the algorithms to programs applying object-oriented concepts in C++ programming language.
		Understand basics of computer networks, OSI layers and protocols, E commerce applications, impact of security threats and attacks on networking systems and also security measures
		Understand the different method for representing and processing data and to get awareness about the impact of cloud computing, its various type of services.
BT-206	Language Lab & Seminars	learners to develop good listening skills.
		Encourages learner to talk freely and lose their shyness when talking in front of the people
		To develop the overall personality of the students by the practical activities
		Helps in confidence building, motivation to be more presentable and help in removing the stage fright
		Develops speaking, writing, reading, listening and presentation skills.
BT-101	Engineering Chemistry	Differentiate hard and soft water; solve the related numerical problems on water purification and its significance in industry and daily life.
		Select the lubricant for various purposes based on the type of Machines.
		Equipped with basic knowledge of polymer , methods of polymerization and various industrial applications of polymers
		Draw the Phase diagrams of one & two component systems and causes, consequences and methods to minimize corrosion to improve industrial designs.
		Identify the structure of unknown/new compounds with the help of spectroscopy and understand periodic properties such as ionization potential, oxidation states and electro negativity
BT-202	Mathematics-II	To introduce effective mathematical tools for the solutions of ordinary and partial differential equations that model physical processes.

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		To introduce the tools of differentiation and integration of functions of complex variable those are used in various techniques dealing engineering problems.
		To acquaint the student with mathematical tools available in vector calculus needed various field of science and engineering.
BT-103	English for Communication	Effective use of verbal and non-verbal communication for enhanced soft skill beside enhanced reading comprehension as well
		Write the different kinds of letters, reports and technical writing.
		Apply basic rules of grammar in both written as well as oral communication.
BT-104	Basic Electrical & Electronics Engineering	To introduce the concept of Basics of DC electrical Network including network theorems.
		To introduce the concept of Basics of AC electrical Network(single phase & 3 phase)..
		To study of law of Electromagnetism, introduction of transformer.
		To study of various electrical Machines.
		To study Basic Concept Digital Electronics.
BT-105	Engineering Graphics	Draw various types of scales, and curves.
		Draw orthographic projections of points & lines
		Draw orthographic projections of Planes & Solids
		Draw sections and development of solids including cylinders, cones, prisms and pyramids.
		Draw isometric views of Planes and Solids, Drawing using AUTOCAD.
BT-106	Manufacturing Practices	Use hand and power tools for different manufacturing processes
		Operate machine tools while preparing any component
		Select the appropriate tools required for specific operation.
		Comprehend the safety measures required to be taken while using the tools.
		Prepare Foundry, Fitting, Carpentry, Welding and smithy Job.
BT-107	Internship-I (60 Hrs Duration) at the Institute level	Demonstrate the application of knowledge and skill sets acquired from the course and workplace in the assigned job function/s
		Solve real life challenges in the workplace by analysing work environment and conditions, and selecting appropriate skill sets acquired from the course
		Exhibit critical thinking and problem solving skills by analysing underlying issue/s to challenges
		Demonstrate appreciation and respect for diverse groups of professionals by engaging harmoniously with different company stakeholders
		Exhibit professional ethics by displaying positive disposition during

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		internship
BT-108	Swachh Bharat Summer Internship Unnat Bharat Abhiyan (100Hrs)/ Rural Outreach	This course is to sensitize students about the socio-cultural aspects of the rural areas parochial to their colleges.
		Students are expected to observe, investigate and learn about the following aspects of the rural region: i. Demographics, Literacy, Geographical parameters of the Village; ii. Schemes of government of India and State of Madhya Pradesh in operation in the villages.
		To enhance critical thinking by making them participate in social activities and imbibe human values among them.
		Rural Swachh Bharat Abhiyan is to promote cleanliness and develop healthy habits in people in villages.
		Unnat Bharat Abhiyan: To build an understanding of the development agenda within institutes of Higher Education and an institutional capacity and training relevant to national needs, especially those of rural India.
BT301	Mathematics-III	To determine the root finding techniques which can be used to solve practical engineering problems also demonstrate the use of interpolation methods to find intermediate values in given graphical and/or tabulated data.
		Apply the concept of numerical analysis to find the relative strengths and weaknesses of each computation method and know which are most applicable for given problem also will be able to approximate and analysis the errors obtained in the numerical solution of equations, ordinary, partial differential equations and simultaneous equations as well.
		To apply the analytical technique to express periodic function as a Fourier series and acquire the concepts of Laplace transformation & inverse Laplace Transform with its property to solve Partial Differential equation and Ordinary Differential Equation with given boundary conditions which is helpful in all engineering & research work.
		Apply the concept of a random variable, probability distribution and their application in diversified fields.
EC302	Electronic Measurement & Instrumentation	Students will able to understand the concept of Measurement and error.
		Students will able to analyze and design different types of bridges used for measurement of Resistance, Inductance and capacitance.
		Students will able to understand the operation of various instrumentation transducers.
		Students will able to understand the operation of various electronic instruments like CRO and Signal Generators.

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		Students will able to understand the working of the digital measurement and instruments used in Instrumentation world.
EC303	Digital Electronics	Design combinational circuit with the help of logic gates like adder subtractor and others.
		Design binary storage devices like flip-flops and other components.
		Design sequential circuits like Register &counters
		Design logic families and semiconductor memories and converters.
EC304	Electronic Devices	Students will able to understand the general insight about Semiconductor Material Properties, compound semiconductor materials.
		Students will able to understand the various type of different diodes such as: Tunnel diodes, Varactor diodes, Schottky diode, Photo diodes, Photodetector, LED, solar cell.
		Students will able to understand the Ideal and Practical diode, Clipper, Clamper.
		Students will able to understand the current components and equations, CB, CE and CC configuration, input and output characteristics.
		Students will able to understand amplifier and JFET construction.
EC305	Network Analysis	Graduates will be able to understand the basic circuit elements, circuit variables and Kirchhoff laws.
		Graduates will be able to solve problems using mesh and node analysis.
		Graduates will be able to analyses circuits in Laplace domain
		Graduates will be able to understand the concept of two port networks
		Graduates can understand tuned circuits & resonance.
EC306	EMI Lab	Students will able to understand the concept of Measurement and error.
		Students will able to analyze and design different types of bridges used for measurement of Resistance, Inductance and capacitance.
		Students will able to understand the operation of various instrumentation transducers.
		Students will able to understand the operation of various electronic instruments like CRO and Signal Generators.
		Students will able to understand the working of the digital measurement and instruments used in Instrumentation world.
BT107	Evaluation of Internship-I completed at I year level	Ability to be a multi-skilled engineer with good technical knowledge, management, leadership, social and environmental responsibility, and entrepreneurship skills.
		Understand the usage of modern technologies & tools in the field of Electronics & Communication Engineering

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ES401	Energy & Environmental Engineering	Get the knowledge of energy carriers, energy technologies, energy challenges and energy system integration and environment sustainability.
		Learn about the different types of ecosystems present in environment, ecological succession and energy flow in the ecosystem.
		Understand the value of biodiversity to human societies, threats to biodiversity, In-situ and Ex-situ conservation of biodiversity.
		Acquire knowledge of different types of environmental pollution, its effects on life and its remedies
		Aware about the social issue related to the environment, environment ethics, protection and conservation acts for the environment
EC402	Signals & Systems	Students will able to generate and characterize various continuous and discrete time signals.
		Students will able to develop input output relationship for linear shift invariant system and understand the convolution operator for continuous and discrete time system
		Students will able to analyze the spectral characteristics of signals using Fourier analysis.
		Students will able to analyze DT systems & their realization using Z-transforms.
		Students will able to evaluate and analyse the reconstruction of signals.
EC403	Analog Communication	Develop an understanding of the basic electronic communication process and use it for the solution of electronics and communication engineering with signals
		Derive the mathematical models for analog modulation schemes ie for AM
		Derive the mathematical models for analog modulation schemes ie for FM
		Analyze and design transmitters & receivers.
		Analyze the effects of noise in continuous wave modulation systems.
EC404	Control System	Students will able to develop an understanding of the basic control system and use it for the solution of electronics and communication engineering problems
		Students will able to derive the mathematical models for Time Response analysis and time-domain stability analysis.
		Students will able to derive the mathematical models for Frequency Response analysis and Frequency-domain stability analysis.
		Students will able to derive and analyze system design problems
		Students will able to analyze state space problem and controllability and observability
EC405	Analog Circuits	Students will able to understand the application of feedback and its types.

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		Students will able to understand the basics of ICs and VLSI flow.
		Students will able to understand the basic applications of OpAmp which are universally used.
		Students will able to understand the timer circuit and their IC configurations as multi-vibrators.
		Students will able to understand the various regulation ICs and their application and comparisons
EC406	Simulation Lab	Design and simulate Basic Electronic circuits (examples rectifiers, clippers, clampers, diode, transistor characteristics etc).
		Analyze Transient and steady state analysis of RL/ RC/ RLC circuits and realization of network theorems.
		Study of virtual instruments built in the software.
		Analyze circuit optimization
		Analyze fabricated PCB.
EC 501	Microprocessor & its Application	Students will be able to know about 8086 microprocessor addressing modes and pin description.
		Students will be able to know about 8086 microprocessor instruction set and their applications..
		Students will be able to know about 8155, 8255, Interfacings key boards, LEDs , ADC, DAC and memory Interfacing
		Students will be able to know about 8254 programmable interval timer, 8259A programmable interrupt controller & 8257 DMA controller.
		Students will be able to know about the microcontrollers (8051).
EC 502	Digital Communication	Students can able to differentiate various sampling methods and pulse modulation schemes.
		Students can able to understand mathematical model, spectrum, advantages, disadvantages and application various Analog to Digital conversion methods.
		Students can able to understand mathematical model, spectrum, advantages, disadvantages and application of various digital modulation schemes.
		Students can able to understand probability of error and signal space representation of various digital modulation Schemes.
		Students can able to understand Information theory, Source coding and channel coding.
EC 503	Departmental Elective (A) CNTI (B) Mobile Communication (C) Advanced	Students will able to analyze and design different type of Symmetrical And Asymmetrical Network
		Students will able to analyze and Design filter and Attenuators
		Students will able to analyze the line parameters and various losses in transmission lines.
		Students will able to apply smith chart for line parameter and

	Control system	impedance calculations
		Students will able to analyze and match Impedance
EC 504	Open Elective (A) EMT (Electro Magnetic (Theory) (B) Computer System Organisation (C) Process Control Instrumentation	Students will be able to apply vector calculus to understanding the Coloumbs law, Gauss law, electrostatic potential, and Laplace and Poisson equation boundary condition and be able to solve the electrostatic problem.
		Students will be able to apply vector calculus to understand the Biosavert law, Ampere circuital law, Lorentz force inductance and be able to solve the magneto static problem.
		Students will be able to analyze the Maxwell's equations for electromagnetic fields.
		Students will be able to derive Electromagnetic wave equation and apply the Poynting expression.
		Students will be able to Understand the behavior of electromagnetic wave in different medium.
EC 505	CNTL Lab	Students will able to analyze and design different type of Symmetrical And Asymmetrical Network
		Students will able to analyze and Design filter and Attenuators
		Students will able to analyze the line parameters and various losses in transmission lines.
		Students will able to apply smith chart for line parameter and impedance calculations
		Students will able to analyze and match Impedance
EC 506	Matlab Programming	Understand the different toolbox in the MATLAB like, communication toolbox, control system toolbox, math toolbox, etc and also Understanding the programming in MATLAB which is based on the mentioned toolbox.
EC 507	Evaluation of Internship-II	Ability to be a multi-skilled engineer with good technical knowledge, management, leadership, social and environmental responsibility, and entrepreneurship skills.
		Understand the usage of modern technologies & tools in the field of Electronics & Communication Engineering
EC 508	Minor Project 1	Identify and find solution to problems.
		Get awareness on design methodology using modern technologies, tools and systems and implementation real time.
		Apply communication, writing skills & Presentation skills
		Develop the team work and leadership skills with professional and ethical values.
EC-601	Digital Signal Processing	Students will able to understand the characteristics of continuous time and discrete-time signals and systems.
		Able to calculate Z-transforms for discrete time signals and system functions and also understand the relationship between poles, zeros,

		and stability.
		Analyze signals using the discrete Fourier series and discrete Fourier transform.
		The students will understand the basics of Fast Fourier Transform.
		Able to design Digital IIR/ FIR filters from Analog filters using various techniques.
EC-602	Antenna & Wave propagation	Student will be able to get detailed knowledge of antenna theory to form the field patterns.
		Student will be able to relate transmission and reception of antenna signal parameters.
		Student will be able to know the applications and various antenna types.
		Student will be able to understand the antenna arrays and synthesis of array pattern.
		Student will be able to work with models of Radio wave propagation affecting Communication Systems.
EC-603	Departmental Elective (A) Data Communication (B) CMOS Design (C) Satellite Communication	Students will able to understand all the terminologies related to Data Communication.
		Students will able to understand the Functions of each layer of OSI model and TCP/IP model.
		Students can understand the error correction and detection process at data link and transport layer. They can solve numerical based on this. Framing and accesses control methods are also known to them
		Students can understand the frame size protocol details and architecture of ATM, SONET, X.25, frame relay and many more
		Comparatively study on Repeaters, Bridges and Gateways.
EC-604	Open Elective (A) Microcontroller & Embedded system (B) Bio-medical Electronics (C) Power Electronics	Students will be able to know about 8051 interfacing.
		Students will be able to know about 8096 microcontroller..
		Students will be able to know about basics of embedded system.
		Students will be able to know about Embedded architecture.
		Students will be able to know about IO peripheral devices.
EC-605	Data Communication Lab	Multiplexing Techniques, Line Coding Techniques and Serial and parallel transmissions will be known to students.
		Various transmission media, their comparison and specifications will be known to students.
		NIC, RS-232 MODEM etc. networking hardware will be understood.
		Various topologies, LAN architectures and integrated services digital network will be known to students.

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EC-606	Microcontroller & Embedded System Lab	Students will be able to understand the communication between 8051 with PC.
		Students will be able to Study of various bit manipulation of 8051.
		Students will be able to do Programming of Timer and counter in 8051.
		Students will be able to understand the Programming in 8051 for sensor and actuator interfacing.
		Students will be able to understand the Programming implementation of 8051 with LCD interfacing
		Get awareness on design methodology using modern technologies, tools and systems and implementation real time.
		Apply communication, writing skills & Presentation skills
		Develop the team work and leadership skills with professional and ethical values.
EC-701	VLSI Design	Students will able to demonstrate a clear understanding of CMOS fabrication flow and technology scaling.
		Students will able to design MOSFET based logic circuit
		Students will able to draw layout of a given logic circuit
		Students will able to demonstrate an understanding of working principle of operation of different types of memories.
		Students will able to demonstrate an understanding of working principles of clocking, power reduction and Distribution.
EC-702	Departmental Elective (A) Microwave Engg. (B) Information Theory & Coding (C) Nano Electronics	Understand basic concepts and applications of microwave systems and Analyze different waveguide structures.
		Understand about Solid State Devices and Application of Various type of diodes, Transferred Electron Devices and Avalanche transit time devices.
		Understand microwave measurement.
		Identify of various types of Microwave electronic components.
		Solving complex RF & Microwave communication network design problems S.
EC-703	(A) Cellular Mobile Communication (B) Internet of Things (C) Probability Theory & Stochastic Processor	Understand in depth about Internet of things.
		Establish secure communication for his network for his devices connected in IOT.
		Store his data securely on cloud and access it when required
		Design web based application using various internet protocols and services
		Use sensor technology and RFID and wireless networking for maintaining privacy and security concern in smart city and housing environmental considerations.

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EC-704	Microwave Lab	Understand basic concepts and applications of microwave systems and Analyze different waveguide structures.
		Understand about Solid State Devices and Application of Various type of diodes, Transferred Electron Devices and Avalanche transit time devices.
		Understand microwave measurement.
		Identify of various types of Microwave electronic components.
		Solving complex RF & Microwave communication network design problems S.
EC-705	I.O.T. Lab	Students will be able to know about Arduino applications.
		Students will be able to know about connecting Arduino with ESP 8266.
		Students will be able to know about Sensor interfacing.
		Students will be able to know about connecting various protocols.
		Students will be able to get and post request through HTTP protocols
EC-706	Major Project-I	Identify the complex engineering problems relevant to the society and industry
		Apply modern technologies, tools and systems in the field of Electronics & Communication Engineering to analyze the identified problem
		Design and implement a viable solution to the problem.
		Apply communication, writing skills & Presentation skills
		Develop the team work and leadership skills with professional and ethical values.
EC-707	Evaluation of Internship -III	Ability to be a multi-skilled engineer with good technical knowledge, management, leadership, social and environmental responsibility, and entrepreneurship skills.
		Understand the usage of modern technologies & tools in the field of Electronics & Communication Engineering
EC 801	Optical Fibre Communication	Understand Optical Fiber Communication System and its parameters.
		Analyze transmission characteristics of optical fiber
		Understand the construction and operation of various optical sources and detectors.
		Performance analysis of optical receivers and study of fiber joints
		Brief introduction of optical fiber networks and amplifiers
EC 802	Departmental Elective (A) AI & Signal Processing (B) Wireless Communication	Students will able to develop a basic understanding of AI building blocks presented in intelligent agents.
		Students will able to choose an appropriate problem-solving method and knowledge representation technique.
		Students will able to analyze the strength and weaknesses of AI approaches to knowledge-intensive problem-solving.

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	(C) 5G Technology	Students will able to understand real time applications of Fourier transform.
		Students will able to describe discrete time systems in terms of difference equations.
EC 803	Open Elective (A) Wireless Network (B) Digital Image Processing (C) Speech Processing	Understand the basic elements of digital image processing
		Develop and analyze the algorithm for discrete Fourier transformations.
		Understand the concept of Image enhancement by analyzing different filtering techniques.
		Applying different models and techniques to understand the concept of image restoration
		Analyze and implement different image encoding methods
EC 804	Advanced Communication Engg. Lab	Understand the microwave signal measurement using VSWR and frequency meter and practical implementation of Microwave Communication Systems.
		Understand the design, application and practical implementation of various Digital Modulation techniques.
		Understand the various losses associated with OFC channel
		Understand the characteristics of various antenna and its coverage area
EC 805	Major Project-II	Identify the complex engineering problems relevant to the society and industry
		Apply modern technologies, tools and systems in the field of Electronics & Communication Engineering to analyze the identified problem
		Design and implement a viable solution to the problem.
		Apply communication, writing skills & Presentation skills
		Develop the team work and leadership skills with professional and ethical values.

Course Outcomes (CO's) of Electronics and Communication Engineering (PG)

MEDC 101	Advanced Mathematics
CO1	Students will able to demonstrate the understanding of fundamentals of partial differential equations by separation method, and finite difference methods.
CO2	Students will able to solve problems on probability distributions, Binomial, Normal, Sampling & Poisson's distribution, Estimate & apply all these concepts in communication Engineering.
CO3	Students will able to apply Markovian process and distinguish the utility of queuing models.

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CO4	Students will able to understand the operation of fuzzy set using mathematical concept of set theory.
CO5	Students will able to understand the reliability & estimate basic reliability functions from complete failure data.
MEDC 102	MICRO CONTROLLER SYSTEM DESIGN
CO1	Students will able to understand the basic concepts and building blocks for Embedded Systems.
CO2	Students will able to understand the single chip various microcontrollers.
CO3	Students will able to understand the software development modular approach and analysis of recursion and debugging.
CO4	Students will able to understand the design and application of microcontroller in data acquisition, embedded controller and process control.
CO5	Students will able to understand the architecture DSP processor for real time application.
MEDC 103	DSP APPLICATION
CO1	Students will able to understand the discrete time system and their representation in time and frequency domain.
CO2	Students will able to apply the principles of z-transforms to finite difference equations.
CO3	Students will able to apply the principles of Fourier transform analysis to describe the frequency characteristics of discrete-time signals and systems
CO4	Students will able to apply different design techniques for FIR and IIR filters.
CO5	Students will able to estimation of power spectral density of random process.
MEDC 104	VLSI DESIGN
CO1	Students will able to understand the fundamental concepts of VLSI design process and CMOS fabrication process.
CO2	Students will able to understand the CMOS circuits and logic design.
CO3	Students will able to understand the CMOS chip design, simulation and verification.
CO4	Students will able to understand the CMOS subsystem design, simulation and verification.
CO5	Students will able to understand CAD system and algorithm.
MEDC 105	DATA COMMUNICATION AND COMPUTER NETWORK
CO1	Students will able to understand various transmission mode and switching techniques.
CO2	Students will able to understand data flow control in different layers.
CO3	Students will able to build the various routing mechanisms as well as design new routing algorithm.
CO4	Students will able to identify the different types of network topologies and

	protocols.
CO5	Students will able to enumerate the layers of the OSI model and TCP/IP.
MEDC 106	Lab-I Part A
CO1	Students will able to understand the basic concepts and building blocks for Embedded Systems.
CO2	Students will able to understand the single chip various microcontrollers.
CO3	Students will able to understand the software development modular approach and analysis of recursion and debugging.
CO4	Students will able to understand the design and application of microcontroller in data acquisition, embedded controller and process control.
CO5	Students will able to understand the architecture DSP processor for real time application.
MEDC 106	Lab-I Part B
CO1	Students will able to understand the discrete time system and their representation in time and frequency domain.
CO2	Students will able to apply the principles of z-transforms to finite difference equations.
CO3	Students will able to apply the principles of Fourier transform analysis to describe the frequency characteristics of discrete-time signals and systems
CO4	Students will able to apply different design techniques for FIR and IIR filters.
CO5	Students will able to estimation of power spectral density of random process.
MEDC 107	Lab-II Part A
CO1	Students will able to understand the fundamental concepts of VLSI design process and CMOS fabrication process.
CO2	Students will able to understand the CMOS circuits and logic design.
CO3	Students will able to understand the CMOS chip design, simulation and verification.
CO4	Students will able to understand the CMOS subsystem design, simulation and verification.
CO5	Students will able to understand CAD system and algorithm.
MEDC 107	Lab-II Part B
CO1	Students will able to understand various transmission mode and switching techniques.
CO2	Students will able to understand data flow control in different layers.
CO3	Students will able to build the various routing mechanisms as well as design new routing algorithm.
CO4	Students will able to identify the different types of network topologies and protocols.

CO5	Students will able to enumerate the layers of the OSI model and TCP/IP.
MEDC 201	System Programming
CO1	Students will able to understand the fundamental of programming.
CO2	Students will able to understand the data types, array, pointer, stack, trees and its application
CO3	Students will able to perform the searching and sorting using various methods.
CO4	Students will able to understand the assembler, complier, editor and operating system.
MEDC 202	Modelling and Simulation of Computer
CO1	Students will able to understand the fundamental elements of discrete-event simulation including statistical models, random processes, random variables, and inputs to simulation
CO2	Students will able to understand practical models in simulation like discrete, continuous, passion and empirical distribution.
CO3	Students will able to understand Characteristics of Queuing systems and their utility.
CO4	Students will able to understand properties of random number and its generation.
CO5	Students will able to understand the validation process of simulation models.
MEDC 203	Network Design Technology
CO1	Students will able to understand the concepts of layering and layered models.
CO2	Students will able to understand the various types of Ethernet and IP's.
CO3	Students will able to understand various interior gateways protocols.
CO4	Students will able to understand the label switching and MPLS.
CO5	Students will able to understand the concept of ATM.
MEDC 204	Optical Network
CO1	Students will able to understand the importance of optical network, essential components and various parameters that governs their performance.
CO2	Students will able to understand the use of Optical components, transmission techniques and network management concepts.
CO3	Students will able to understand the first generation of optical networks and its application.
CO4	Students will able to design a network topology for a given application.
CO5	Students will able to demonstrate an understanding of working principles of wavelength routing networks and packet switching.
MEDC 205	Mobile & Satellite Communication
CO1	Students will able to understand the techniques of radio spectrum allocation in multi-user systems and their impact on networks capacity
CO2	Students will able to understand how the various signal processing and coding

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	techniques combat channel uncertainties.
CO3	Students will able to expose Adaptive Equalization techniques.
CO4	Students will able to understand various wireless systems and standards and their basic operation cases
CO5	Students will able to understand the Satellite system and mobile services provided
MEDC 206	Lab-III (201)
CO1	Students will able to understand the fundamental of programming.
CO2	Students will able to understand the data types, array, pointer, stack, trees and its application
CO3	Students will able to perform the searching and sorting using various methods.
CO4	Students will able to understand the assembler, complier, editor and operating system.
MEDC 207	Lab-IV (202)
CO1	Students will able to understand the fundamental elements of discrete-event simulation including statistical models, random processes, random variables, and inputs to simulation
CO2	Students will able to understand practical models in simulation like discrete, continuous, passion and empirical distribution.
CO3	Students will able to understand Characteristics of Queuing systems and their utility.
CO4	Students will able to understand properties of random number and its generation.
CO5	Students will able to understand the validation process of simulation models.
MEDC 301(A)	Students will able to understand the validation process of simulation models.
CO1	Students will be able to understand the concept of information and entropy
CO2	Students will be able to design a lossless transmission system on the basis of channel capacity and source coding theorem
CO3	Students will be able to analyze error correction and detection using linear block codes and systematic codes.
CO4	Students will be able to analyze error correction and detection using cyclic codes
CO5	Students will be able to implement encoding and decoding of BCH codes and convolution codes.
MEDC 302(A)	Advanced Digital Communication
CO1	Students will be able to analyze the properties of basic Modulation techniques and apply them to Digital system.
CO2	Students will be able to understand Probability of error in detection PAM signals.
CO3	Students will be able to understand inter symbol interference combat by various

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	equalization techniques.
CO4	Students will be able to describe and analyze the digital communication system with spread spectrum modulation.
CO5	Students will be able to familiarize different type of fading phenomena and overcome by diversity techniques.
MEDC 302(B)	Optical Instrumentation & Measurement
CO1	Students will be able to understand various optical instrument and its application
CO2	Students will be able to understand the use of active and passive optical components in optical fiber communication.
CO3	Students will be able to understand various optical sensors.
CO4	Students will be able to understand various optical parameter measurement techniques.
MEDC 303	Seminar
CO1	Develop and Analyze a thought process for presentation.
CO2	Enhance the language and communication Skill.
CO3	Conversant with the latest development in Digital Communication.
MEDC 304	Dissertation part I
CO1	Identify and formulate problem, and design required setup to carry out a research
CO2	Search appropriate literature for conceptual basis of research
CO3	Enlist the research methodology tools for data collection and analysis.
CO4	Communicate the research summery, research gaps and research objectives through an effective report
MEDC 401	Dissertation part II
CO1	Simulate the designs using modern tool sets and validate through experimental methods
CO2	Validate and Analyze the results using multiple case.
CO3	Deduce conclusions and draw inferences worthy of publication

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Department of Civil Engineering

Vision of Civil Engineering

To impart high technical competency amongst the students and strive for excellence towards addressing civil engineering challenges.

Mission of Civil Engineering

- To make the department as hub of excellence by offering good research oriented learning environment & producing Industry ready Engineers.
- To promote innovative logical thinking among the students to face new challenges and real time problems in Civil engineering
- To provide quality based consultancy services to the communities for the development of the region
- To encourage students to pursue higher education, excel in competitive exams and various career enhancement programs.

Program Educational Objective (PEO's) of Civil Engineering

- PEO 1: To prepare students by bridging the gaps between the curriculum and industries requirement.
- PEO 2: To prepare learners to use modern tools effectively to solve real life problems
- PEO 3: To encourage and motivate learners for Consultancy Services.
- PEO 4: To prepare learners for successful career in Indian and multinational organizations and to excel in post graduate studies.

Program Specific Outcomes (PSO's) of Civil Engineering

- **PSO1:** Students will be able to generate drawing of civil engineering projects.
- **PSO2:** Students will be able to perform analysis and design of civil engineering projects.
- **PSO3:** Students will be able to make abstract and estimates of civil engineering projects.

Programme Outcomes (PO's) of Civil Engineering

Upon successful completion of the program, the students would have the following attributes.

- **PO 1:** Ability to apply the basic knowledge of mathematics, science, mechanics to the solution of complex civil engineering problems in manner to develop engineering skills of students in various disciplines viz. structural analysis and design, water resources engineering and hydraulics, transportation engineering, environmental engineering, geotechnical engineering, construction technology and management, building planning & architecture etc.
- **PO 2**: Ability to identify, formulate and analyze complex problems related to civil engineering and construction management reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

- **PO 3:** An ability to design different components of civil engineering structures using different materials and methods that fulfill desired specifications and requirements for Foundation, public health engineering and sewerage structures, irrigation and water resources schemes, hydraulic structures, rigid and flexible pavements, buildings and bridge structures, special structures, etc.

- **PO 4:** Conducting reconnaissance survey and investigate geotechnical features of soil through exploration for civil engineering projects.

- **PO 5**: Create, select and apply appropriate technique, resources and modern engineering tools including prediction and modeling to complex civil engineering activities with an understanding of the limitations.

- **PO 6:** Apply reasoning informed by contextual knowledge to assess social health safety, legal and culture issues and consequent responsibilities relevant to professional civil engineering practices.

- **PO 7:** Broadly understand the impact of the civil engineering solutions in society and environmental contexts, and demonstrate awareness of contemporary issues and need for sustainable development.

- **PO 8:** Apply ethical principles committed to professional ethics, responsibilities and norms of engineering practices and regulatory Building Bye Laws.

- **PO 9:** Function effectively as an individual and as a member or leader in diverse teams and in multidisciplinary setting.

- **PO 10:** Communicate effectively on complex engineering activities with the civil engineering organizations and with society such as being able to write effective and

detailed report of the civil engineering project and make effective presentations on their project.

- **PO 11:** Demonstrate knowledge for understanding civil engineering and management principles to apply these to one's own civil engineering project work as a member and leader in a team to manage projects in multidisciplinary environments.

- **PO 12:** Ability to engage in independent and lifelong learning & adapt to rapid changes in civil engineering and its allied areas.

Course Outcomes (CO's) of Civil Engineering

Subject Code	Subject Name	CO Description
BT-201	Engineering Physics	The Coursework is designed to provide students the opportunity to learn key concepts of Wave nature of particles and the Schrodinger equation.
		Student will able to understand the knowledge of Wave optics i.e. interference and diffraction.
		To introduce the idea of solids like semiconductors (P type and N Type semiconductors), Diodes and Hall effect. Students will also be able to understand the basic concept of superconductivity.
		To develop the understanding of Lasers, fiber optics and their applications in field of engineering sciences.
		To provide you to basic understanding of Electrostatics in vacuum.
BT-102	Mathematics-I	To introduce the fallouts of Rolle's Theorem that is fundamental to application of analysis to Engineering problems.
		To introduce the idea of applying differential and integral calculus to notions of curvature and to improper integrals. Apart from some applications it gives a basic introduction on Beta and Gamma function
		To develop the tool of power series and Fourier series for learning advanced Engineering Mathematics.
		To familiarize the student with functions of several variables that is essential in most branches of engineering
		To develop the essential tool of matrices and linear algebra in a comprehensive manner.

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BT-203	Basic Mechanical Engineering	Understand the properties of material, stress strain. Properties of alloys and cast iron.
		Understand the concept measurement and machine tools their operations and their applications.
		Understand the concept of fluid flow , properties of fluid, Bernoulli's equation, Pascal's law.
		To Understand the concept of heat and temperature, law of thermodynamics, boilers and their mountings and accessories, basic Refrigeration cycles and its applications.
		To Understand the working of different cycles and 4 strokes, 2 stroke engines and their applications.
BT-204	Basic Civil Engineering & Mechanics	Students will acquire the basic knowledge in different fields of civil engineering and materials used in construction.
		Gain the ability to use modern survey equipment to measure angles and distances.
		Students will understand the basic of contour lines and map
		Students will have the ability to identify, formulate and solve engineering problems related to Engineering Mechanics: Statics
		Students will be able to analyse beam for shear force and bending moment.
BT-205	Basic Computer Engineering	Able to understand the basic applications of computers in various fields, describe operating system, its role and functionalities and to apply concepts of MS word, MS power point, MS Excelefficiently.
		Discuss and apply simple algorithms for arithmetic and logical problems.
		Translate the algorithms to programs applyingobject-oriented concepts in C++ programming language.
		Understand basics of computer networks, OSI layers and protocols, E commerce applications, impact of securitythreats and attacks on networking systems and also security measures
		Understand the different method for representing and processing data and to get awareness about the impact of cloud computing, its various type of services.
BT-206	Language Lab & Seminars	learners to develop good listening skills.
		Encourages learner to talk freely and lose their shyness when talking in front of the people
		To develop the overall personality of the students by the practical activities
		Helps in confidence building, motivation to be more presentable and help in removing the stage fright
		Develops speaking, writing, reading, listening and presentation skills.

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BT-101	Engineering Chemistry	Differentiate hard and soft water; solve the related numerical problems on water purification and its significance in industry and daily life.
		Select the lubricant for various purposes based on the type of Machines.
		Equipped with basic knowledge of polymer , methods of polymerization and various industrial applications of polymers
		Draw the Phase diagrams of one & two component systems and causes, consequences and methods to minimize corrosion to improve industrial designs.
		Identify the structure of unknown/new compounds with the help of spectroscopy and understand periodic properties such as ionization potential, oxidation states and electro negativity
BT-202	Mathematics-II	To introduce effective mathematical tools for the solutions of ordinary and partial differential equations that model physical processes.
		To introduce the tools of differentiation and integration of functions of complex variable those are used in various techniques dealing engineering problems.
		To acquaint the student with mathematical tools available in vector calculus needed various field of science and engineering.
BT-103	English for Communication	Effective use of verbal and non-verbal communication for enhanced soft skill beside enhanced reading comprehension as well
		Write the different kinds of letters, reports and technical writing.
		Apply basic rules of grammar in both written as well as oral communication.
BT-104	Basic Electrical & Electronics Engineering	To introduce the concept of Basics of DC electrical Network including network theorems.
		To introduce the concept of Basics of AC electrical Network(single phase & 3 phase)..
		To study of law of Electromagnetism, introduction of transformer.
		To study of various electrical Machines.
		To study Basic Concept Digital Electronics.
BT-105	Engineering Graphics	Draw various types of scales, and curves.
		Draw orthographic projections of points & lines
		Draw orthographic projections of Planes & Solids
		Draw sections and development of solids including cylinders, cones, prisms and pyramids.
		Draw isometric views of Planes and Solids, Drawing using AUTOCAD.

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BT-106	Manufacturing Practices	Use hand and power tools for different manufacturing processes
		Operate machine tools while preparing any component
		Select the appropriate tools required for specific operation.
		Comprehend the safety measures required to be taken while using the tools.
		Prepare Foundry, Fitting, Carpentry, Welding and smithy Job.
BT-107	Internship-I (60 Hrs Duration) at the Institute level	Demonstrate the application of knowledge and skill sets acquired from the course and workplace in the assigned job function/s
		Solve real life challenges in the workplace by analysing work environment and conditions, and selecting appropriate skill sets acquired from the course
		Exhibit critical thinking and problem solving skills by analysing underlying issue/s to challenges
		Demonstrate appreciation and respect for diverse groups of professionals by engaging harmoniously with different company stakeholders
		Exhibit professional ethics by displaying positive disposition during internship
BT-108	Swachh Bharat Summer Internship Unnat Bharat Abhiyan (100Hrs)/ Rural Outreach	This course is to sensitize students about the socio-cultural aspects of the rural areas parochial to their colleges.
		Students are expected to observe, investigate and learn about the following aspects of the rural region: i. Demographics, Literacy, Geographical parameters of the Village; ii. Schemes of government of India and State of Madhya Pradesh in operation in the villages.
		To enhance critical thinking by making them participate in social activities and imbibe human values among them.
		Rural Swachh Bharat Abhiyan is to promote cleanliness and develop healthy habits in people in villages.
		Unnat Bharat Abhiyan: To build an understanding of the development agenda within institutes of Higher Education and an institutional capacity and training relevant to national needs, especially those of rural India.
BT301	Mathematics-III	To determine the root finding techniques which can be used to solve practical engineering problems also demonstrate the use of interpolation methods to find intermediate values in given graphical and/or tabulated data.
		Apply the concept of numerical analysis to find the relative strengths and weaknesses of each computation method and know which are most applicable for given problem also will be able to approximate and analysis the errors obtained in the numerical solution of equations, ordinary, partial differential

		equations and simultaneous equations as well.
		To apply the analytical technique to express periodic function as a Fourier series and acquire the concepts of Laplace transformation & inverse Laplace Transform with its property to solve Partial Differential equation and Ordinary Differential Equation with given boundary conditions which is helpful in all engineering & research work.
		Apply the concept of a random variable, probability distribution and their application in diversified fields.
CE302	Construction Material	Understand the characteristics, occurrence, classification, uses of the various conventional building materials.
		Understand the characteristics, classification, uses and defects of the various other useful building materials.
		Understand basic knowledge of types of floors and roofs and also the basic flooring and roofing material. Get the knowledge about the types of pipes using in sanitary works.
		Understand basic concepts of different types of paints and varnishes including composition, application on the different type of surfaces and types.
		Understand the characteristics, occurrence, classification, uses of the Miscellaneous building materials.
CE303	Surveying	To introduce the principle of surveying and also impart awareness on the various fields of surveying and types of instruments.
		To understand the various methods of surveying and computations by using advanced surveying instruments this makes the surveying ease and rapid.
		To understand the determination of heights, distances, angels and elevations with the help of latest surveying instruments and different methods of surveying.
		To understand the different types of curves and setting out methods of surveying.
		To give the knowledge of the hydrographic survey and photographic survey.
CE304	Building Planning and Architecture	The students able to understand and to draw various building components.
		The students able to deals with the building planning, orientation and drawing.
		The students able to understand and deals with building services.
		The students able to deals with the architectural design aspects.

		The students able to Representation of a building on Paper.
CE305	Strength of Material	Understand the stress and strain calculation and its importance for different materials.
		Understand the analysis of bending moments and stresses generated on a beam subject to different load conditions.
		Understand the importance of slope and deflection in a beam and to analyze it for different scenarios.
		Analyze the behavior of columns and struts under different loading conditions.
		Understand the determination of torsion on shafts and able to analyze the problems based on combined bending and torsion and also able to analyze unsymmetrical bending in beams.
CE306	Study of Historical and Ancient Civil Engineering	Student will be able to understand study the various aspects of civil engineering practices in ancient structures.
		Student will be able to understand study with respect to civil engineering practices of historical structures.
BT107	Evaluation of Internship-I completed at I Year Level	Able to Integrate theory and practice
		Able to generate experience on various advance system and software.
		Able to do a different Engineering analysis
		Able to explain the analysis in front of audience
		Understand the importance of available tools and its lifelong learning process.
BT307	90 hrs. Internship based on using various software's – Internship -II	Demonstrate the application of knowledge and skill sets acquired from the course and workplace in the assigned job function/s
		Solve real life challenges in the workplace by analysing work environment and conditions, and selecting appropriate skill sets acquired from the course
		Exhibit critical thinking and problem solving skills by analysing underlying issue/s to challenges
		Demonstrate appreciation and respect for diverse groups of professionals by engaging harmoniously with different company stakeholders
		Exhibit professional ethics by displaying positive disposition during internship
ES401	Energy & Environmental Engineering	The student will be able to understand the concept of energy, energy sources, transformation, efficiency and storage.
		The student will be able to understand the concept of ecosystem, its structure and function.
		The students will able to understand the concept of biodiversity and its conservation.
		The students will able to understand the various types of environmental pollution, its effects and control measures.

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		The student will able to understand sustainable and unsustainable development.
CE402	Construction Technology	Student will be able to design features and construction methods of foundations.
		Students will be proficient in knowledge of pile foundations and design and construction features of different types of formworks and temporary structures.
		Student will be able to design and construction of all types of walls and masonry and other technologies associated with them.
		Students will know about materials and methods used for construction of floors and roofs.
		Students will gain knowledge about planning and construction of earthquake resistant buildings.
CE403	Structural Analysis-I	Student will be able to design features and construction methods of foundations.
		Understand the characteristics, classification, uses and defects of the various other useful building materials.
		Understand basic knowledge of types of floors and roofs and also the basic flooring and roofing material. Get the knowledge about the types of pipes using in sanitary works.
		Understand basic concepts of different types of paints and varnishes including composition, application on the different type of surfaces and types.
		Students will gain knowledge about planning and construction of earthquake resistant buildings.
CE404	Transportation Engineering-I	Understand the principles used in transportation and different transportation systems and their importance as well as understand different components of railways.
		Understand the analysis and design of stations, yards as well as signals used in railways.
		Understand the importance site selection criteria for bridge construction and will able to plan construction of bridges and their loading conditions.
		Will able to identify and choose foundations for different sites of bridges as well as analyze for their strength and testing under load conditions.
		Understand the types and methods of surveys and alignments for tunnels and their construction process in different materials.
CE405	Engineering Geology & Remote	Understand the Geology Concept in civil engineering.
		Students are able to understand the mineralogy and crystallography structure.
		Students are able to classify the various types of Rock and its formation method.

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		Understand the various terminology of structural geology and be able to understand the Geology report.
		Understand the role of geology in the design and construction Process of underground openings in rock and be able to understand the remote sensing application.
CE406	Software Lab	Students will be able to undersatnd CAD and Auto Cad
		Students will be able to draw the commands used in the software.
		Students will be able to draw the basic geometric shapes.
		Students will be able to understand 3-D Modelling with auto cad.
		Student will be able to Learn and practice Draw commands, Modify commands, Dimensioning, Annotating in AutoCAD and Drawing plan, section and elevation of 1 BHK house.
BT407	90 hrs Internship based on using various software Internship-II	Demonstrate the application of knowledge and skill sets acquired from the course and workplace in the assigned job function/s
		Solve real life challenges in the workplace by analysing work environment and conditions, and selecting appropriate skill sets acquired from the course
		Exhibit critical thinking and problem solving skills by analysing underlying issue/s to challenges
		Demonstrate appreciation and respect for diverse groups of professionals by engaging harmoniously with different company stakeholders
		Exhibit professional ethics by displaying positive disposition during internship
BT408	Cyber Security	Analyze and evaluate the cyber security needs of an organization.
		Determine and analyze software vulnerabilities and security solutions to reduce the risk of exploitation.
		Measure the performance and troubleshoot cyber security systems.
		Implement cyber security solutions and use of cyber security, information assurance, and cyber/computer forensics software/tools.
		Comprehend and execute risk management processes, risk treatment methods, and key risk and performance indicators
CE-501	Fluid Mechanics I	Understand the basics of fluid flow and pressure in fluids at rest and also Analyze the condition of stability of a body in a fluid based on relative positions of its center of buoyancy and Meta Centre.
		Analyze the behavior of fluid at rest and in motion with concepts of fluid statics, kinematics and dynamics.

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		Apply Bernoulli's equation to fluid flow problems involving venturimeter, orifice meter, pitot tube, orifices, mouthpieces, notches and weirs.
		Analyze the flow through pipes and the major and minor energy losses.
		Understand basic concepts of model study are also developed along with laws of similarity and similitude.
CE-502	Transportation Engineering II	Understand the basics of Highway alignment, able to find out the Stopping Sight distance, Overtaking Sight Distance and Extra Widening at curves.
		Understand the Seal Coat, Tack Coat, surface dressing. Also able to understand the flexible and rigid payment.
		Understand the Channelized and un-channelized intersection, rotary design elements and traffic lights design.
		Analyze the Runway Orientation, read the Wind Rose diagram, able to apply the runway length correction.
		Understand the threshold lighting, taxiway lighting, and traffic control equipment like ILS- Instrument Landing System, PAR- Precision Approach Radar..
CE -503	Departmental Elective - Quantitative Surveying and Costing	Students understood the purpose, importance and types of estimates.
		Students are able to analyze the rates of various items of work.
		Students learned to prepare the estimates of various types of construction works.
		Students gained the knowledge of all the terms, rules and regulations of estimating.
		Students understood the purpose, importance and methods of valuation.
CE -504	Open Elective- Urban Town and Planning	Students will be able to understand planning process of an urban area & surveys conducted for urban development and designing in relation with spatial organization, utility, demand of the area and supply considering future growth of an urban area.
		Students shall know about Urban Planning agencies and their functions. Also public participation in planning, development control regulations, sustainability, components of sustainable urban and regional development and emerging concepts for city.
		Students will gain complete knowledge about town and country planning act, building bye-laws, elements of city planning, landscaping and urban planning standards.
		Students shall know about traffic transportation systems and management for urban roads considering Legal issues in planning and professional practice for preparation of DPR.

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		Students will be able to understand types of development plans and Water Supply & sanitation for urban areas, planning agencies and their purpose.
CE -505	Quantity surveying & Costing Lab	Students are able to prepare detailed estimates of buildings.
		Students are able to prepare the detailed estimate for services of plumbing and water supply or Electrification work
		Students are able to prepare the detailed estimate for earth work for the road construction or arched culvert.
		Students are able to learn the analysis of rates of various items of work
		Students are able to learn preparation of DPR of Civil Engineering Project
CE -506	Material Testing Lab	Students able to apply and understand the significance of various type of Cement Test
		Students able to apply and understand the significance of various type of Aggregate Test
		Students able to apply and understand the significance of various type of workability Test of Concrete
		Students able to apply the Mix Design of Concrete
		Students able to apply and understand the significance of various type of Concrete Test
CE-507	Evaluation of Internship-II	Able to Integrate theory and practice of Civil Engineering
		Able to generate experience on various advance system and software of Civil Engineering
		Able to do a different Civil Engineering analysis
		Able to explain the analysis in front of audience
		Understand the importance of available tools and its lifelong learning process.
CE -508	Field Visit, Case Study and Seminar	Introspect & develop a planned approach towards his career & life in general.
		Have clarity on his career exploration process and to match his skills and interests with a chosen career path.
		Explain the use of functional and chronological resume.
		Develop thinking ability and polish his expression in group discussions.
		Be prepared for the personal interview through mock interviews while being aware of the various kinds of interviews
CE601	Structural Design and Drawing	Students understood the purpose, importance of design and Basic Principles of Structural Design.
		Students are understood that how to analyze and Design the Beams.
		Students understood that how to analyze and Design the slab.
		Students understood that how to analyze and Design the column and footing.

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		Students understood that how to Design the Staircases.
CE 602	Environmental Engineering I	Students will be able to understand Estimation of Water Quality and Population forecasting.
		Students shall know about design of Sewer for waste-water.
		Students will gain complete knowledge Quality of water and Wastewater and its analysis.
		Students shall know about Treatment methods and design of water treatment units
		Students will be able to understand Wastewater Treatment Technologies and waste water treatment units
CE 603	Departmental Elective-Water Resource Engineering	The student will be able to understand the concept of irrigation along with different types of irrigation schemes. The concepts of soil water plant relationship along with crop water requirement are also developed.
		The student will be able to understand the concept of ground water and well irrigation.
		The students will able to do assessment of available water and hydrologic analysis including precipitation analysis, rainfall Runoff process, and design flood estimation along with hydrograph analysis.
		The students will able to do detailed design of canal and other canal structures.
		The student will able to estimate the flood by various methods.
CE 604	Open Elective-Fluid Mechanics-II	Understand the basic concept of turbulent flow, could be able to design pipe network and analyze the problems based on pipe flow
		Analyze the behavior of fluid in open channel during Uniform flow and also able to design open channel for such condition
		Analyze the behavior of fluid in open channel during Non - Uniform flow and also able to design open channel for such condition.
		Analyze the various immersed bodies.
		Understand basic concepts of Fluid machines and design, characteristics of turbines and pumps.
CE 605	Advance surveying lab	Students able to understand the various Advance Surveying Tools
		Students able to analyse leveling work
		Students able to survey a field by Traversing
		Students understand the significance of surveying
		Students able to work on a surveying instrument on construction site
CE 606	Non Destructive	Student will be able to examine the Soundness and Strength of Structural components by study of Rebound Hammer Test.

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	Testing Lab	Student will be able to examine the Compactness, homogeneity and air voids of an existing structure by study of UPV Test.
CE 607	Internship-III	Able to Integrate theory and practice of Civil Engineering
		Able to generate experience on various advance system and software of Civil Engineering
		Able to do a different Civil Engineering analysis
		Able to explain the analysis in front of audience
		Understand the importance of available tools and its lifelong learning process.
CE 608	Minor Project II	Introspect & develop a planned approach towards his career & life in Civil Engineering.
		Have clarity on his career exploration process and to match his skills and interests with a chosen career path.
		Explain the use of functional and chronological resumes.
		Develop thinking ability and polish his expression in group discussions.
		Be prepared for the personal interview through mock interviews while being aware of Civil Engineering
CE -701	Geotechnical Engineering	Understand the soil formation, terminologies of soil properties and there relation. Able to classify the type of soil.
		Able to determine the coefficient of permeability and permeability of layered soil. Understand the application of flow net, quick condition and Laplace equation for two dimensional flow
		Understand the Boussinesqs and Westergards theory, Newmarks influence chart for irregular areas. Understand the factors affecting the compaction of soil
		Understand the type of Consolidation of soil, Terzaghi's One Dimensional Consolidation theory and method of finding coefficient of consolidation
		Understand the type of Shear Stress test i.e., Direct Shear test, Triaxial test and Vane Shear test. Able to understand the mohr colomb shear strength envelope and failure envelope. Understand the soil stabilization
CE -702	Departmental Elective-Environmental Engineering-II	Students will be able to understand theory and design of preliminary treatment units of waste-water treatment.
		Students shall know about methods, theory and design of Biological Treatment of waste-water treatment.
		Students will gain complete knowledge about Advanced Waste-water treatment methods.
		Students shall know about Air pollution its classification and characterization and effects.
		Students will be able to understand meteorological aspects of Air pollution chemistry.

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CE -703	Open Elective-Project Management	Understand project characteristics and various stages of a project.
		Understand the conceptual clarity about project organization and feasibility analyses – Market, Technical, Financial and Economic.
		Analyze the learning and understand techniques for Project planning, scheduling and Execution Control
		Understand the contract management, Project Procurement and productivity.
		Understand the Documentation and Control are practiced in the industry.
CE -704	Prestressed Concrete Structures Lab	Students able to fabricate caste and test prestressed concrete beam and slab for strength and deflection behaviour.
		Students able to fabricate caste and test prestressed concrete beam and slab with different layout of cable for strength and deflection behaviour.
		students are able to fabricate the different prestressed structure
CE 705	IoT Lab	Explain what Internet of Things is.
		Describe key technologies in Internet of Things and RFID.
		Understand Principles for Web Connectivity and Communication Protocols
		Explain Wireless Sensor Network Technology and Sensor data Communication Protocols.
		Understand smart city streetlights control & monitoring and Business models for the Internet of Things
CE -706	Major Project-I	Introspect & develop a planned approach towards his career & life in Civil Engineering.
		Have clarity on his career exploration process and to match his skills and interests with a chosen career path.
		Explain the use of functional and chronological resumes.
		Develop thinking ability and polish his expression in group discussions.
		Be prepared for the personal interview through mock interviews while being aware of Civil Engineering
CE -707	Evaluation of Internship -III	Able to Integrate theory and practice of Civil Engineering
		Able to generate experience on various advance system and software of Civil Engineering
		Able to do a different Civil Engineering analysis
		Able to explain the analysis in front of audience
		Understand the importance of available tools and its lifelong learning process.
CE-801	Design of Steel Structures	Student are able to understand the Structural Design and Connection Design
		Students are able to design Compression and Tension member

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		Students are able to design Flexural member
		Students are able to design Column and Column Bases
		Students are able to Design Industrial Buildings
CE -802	Departmental Elective-Foundation Engineering	Students will be able to understand Selection of foundation and Sub-soil exploration/investigation
		Students shall know about design and analysis of Shallow Foundation.
		Students will gain complete knowledge for design and analysis of Pile foundations.
		Students shall know about Foundations on problematic soil & Introduction to Geo-synthetics methods and technique.
		Students will be able to understand various earth pressure theories.
CE -803	Open Elective-Artificial Intelligence	Be familiar with terminology used in this area
		Explain what constitutes "Artificial" Intelligence and how to identify systems with Artificial Intelligence
		Know how to build simple knowledge-based systems
		Have ability to apply knowledge representation, reasoning, and machine learning techniques to realworld problems
CE -804	Earthquake Resistant Structures	The students will be able to evaluate seismic forces for various structures as per relevant Indian standards
		The students will be able to design and ductile detailing of structures for seismic resistance as per Indian standards
		The students will be able to apply concepts of repair and rehabilitation of earthquake affected structures
CE 805	Major Project-II	Introspect & develop a planned approach towards his career & life in Civil Engineering.
		Have clarity on his career exploration process and to match his skills and interests with a chosen career path.
		Explain the use of functional and chronological resumes.
		Develop thinking ability and polish his expression in group discussions.
		Be prepared for the personal interview through mock interviews while being aware of Civil Engineering

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Department of Chemical Engineering

Vision of Chemical Engineering

To be one of the outstanding departments for its **education** and **research** in the field of Chemical Engineering and strive for **holistic development** of the students.

Mission of Chemical Engineering

- Strive for academic excellence in Chemical Engineering through well designed course curriculum, effective classroom pedagogy, in-depth knowledge of laboratory work and computing technologies.

- Incubate, apply and spread innovative ideas by collaborating with relevant industries through focused research groups and transforming the Chemical Engineering Department as a leader in imparting Quality Education and Research.

- Transform undergraduate engineering students into technically competent, socially responsible and ethical professionals through continuous team work by a group of committed faculty members.

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Program Educational Objective (PEO's) of Chemical Engineering

- Impart broad **technical knowledge in chemical engineering discipline** with research attitude, problem solving techniques and hands on skill.

- Provide a successful career **with professional ethics and responsibilities** as a leading or participating role in chemical engineering, R & D organization, academia, and other fields orto pursue higher studies.

- Identify and solve engineering problems using a **scientific research approach** with their sound engineering base (Engineering Basics) and with the knowledge of contemporary global issues.

Program Specific Outcomes (PSO's) of Chemical Engineering

A graduate of the Chemical Engineering Program will demonstrate:

PSO1

Ability to analyze different physical, chemical and biological systems/processes by applying the knowledge of unit operations and unit processes.

PSO2

Ability to automate and control processes/systems by designing an environment friendly system for effective reaction, separation and purification and other operations in various processes with proper safety measures using modern engineering tools and simulators

PSO3

Ability to acquire high end industry centric skills in the field of Chemical Engineering with professional ethics for the benefit of society.

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Programme Outcomes (PO's) of Chemical Engineering

- **PO 1: Engineering Knowledge:** An ability to understand and solve real chemical engineering problems by establishing the relationship between mathematics, basic sciences , engineering sciences and aptitude.

- **PO 2: Problem Analysis:** An Ability to identify, analyze and resolve chemical engineering problem by deep knowledge of laboratory work, latest software tools & computing technologies, self-study, participation and professional development courses.

- **PO 3: Design/ Development of Solution:** An ability to identify and resolve the problems relevant with design of various component of industrial production process.

- **PO 4: Conduct Investigation of problem:** An ability to use research based knowledge and by reviewing research literature reaching substantial conclusion by applying principle of mathematics, natural sciences and chemical engineering science.

- **PO 5: Modern Tool Usage:** An Ability to select and apply appropriate method, resource, modern technique and engineering tools to complex chemical engineering activities.

- **PO 6: The Engineer and Society:** An understanding of the ethical, societal, health, safety, legal and cultural issues and consequent responsibilities relevant to Chemical Engineering Technology practice.

- **PO 7: Environment and Sustainability:** An Ability to take societal, environmental and economical considerations into account in professional activities.

- **PO 8: Ethics:** An Ability to apply ethical principles, professional ethics and responsibilities of the chemical engineering practice.

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- **PO 9: Individual and team work:** An Ability to conduct team work (within the discipline, inter-disciplinary, multidisciplinary)

- **PO 10: Communication:** An ability to communicate verbally, in writing and audio-visually in industrial activities performance.

- **PO 11: Project Management and Finance:** An Ability to conduct experiment, management task and do engineering design for multidisciplinary project.

- **PO 12: Life Long Learning:** An ability to engage in independent and life-long learning in specialized technologies and contemporary issues.

Course Outcomes (CO's) of Chemical Engineering

Univ. Subject Code	Subject Name	CO Description
BT-201	Engineering Physics	The Coursework is designed to provide students the opportunity to learn key concepts of Wave nature of particles and the Schrodinger equation.
		Student will able to understand the knowledge of Wave optics i.e. interference and diffraction.
		To introduce the idea of solids like semiconductors (P type and N Type semiconductors), Diodes and Hall effect. Students will also be able to understand the basic concept of superconductivity.
		To develop the understanding of Lasers, fiber optics and their applications in field of engineering sciences.
		To provide you to basic understanding of Electrostatics in vacuum.
BT-102	Mathematics-I	To introduce the fallouts of Rolle's Theorem that is fundamental to application of analysis to Engineering problems.
		To introduce the idea of applying differential and integral calculus to notions of curvature and to improper integrals. Apart from some applications it gives a basic introduction on Beta and Gamma function
		To develop the tool of power series and Fourier series for learning advanced Engineering Mathematics.

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		To familiarize the student with functions of several variables that is essential in most branches of engineering
		To develop the essential tool of matrices and linear algebra in a comprehensive manner.
BT-203	Basic Mechanical Engineering	Understand the properties of material, stress strain. Properties of alloys and cast iron.
		Understand the concept measurement and machine tools their operations and their applications.
		Understand the concept of fluid flow , properties of fluid, Bernoulli's equation, Pascal's law.
		To Understand the concept of heat and temperature, law of thermodynamics, boilers and their mountings and accessories, basic Refrigeration cycles and its applications.
		To Understand the working of different cycles and 4 strokes, 2 stroke engines and their applications.
BT-204	Basic Civil Engineering & Mechanics	Students will acquire the basic knowledge in different fields of civil engineering and materials used in construction.
		Gain the ability to use modern survey equipment to measure angles and distances.
		Students will understand the basic of contour lines and map
		Students will have the ability to identify, formulate and solve engineering problems related to Engineering Mechanics: Statics
		Students will be able to analyse beam for shear force and bending moment.
BT-205	Basic Computer Engineering	Able to understand the basic applications of computers in various fields, describe operating system, its role and functionalities and to apply concepts of MS word, MS power point, MS Excelefficiently.
		Discuss and apply simple algorithms for arithmetic and logical problems.
		Translate the algorithms to programs applyingobject-oriented concepts in C++ programming language.
		Understand basics of computer networks, OSI layers and protocols, E commerce applications, impact of securitythreats and attacks on networking systems and also security measures
		Understand the different method for representing and processing data and to get awareness about the impact of cloud computing, its various type of services.
BT-206	Language Lab & Seminars	learners to develop good listening skills.
		Encourages learner to talk freely and lose their shyness when talking in front of the people

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		To develop the overall personality of the students by the practical activities
		Helps in confidence building, motivation to be more presentable and help in removing the stage fright
		Develops speaking, writing, reading, listening and presentation skills.
BT-101	Engineering Chemistry	Differentiate hard and soft water; solve the related numerical problems on water purification and its significance in industry and daily life.
		Select the lubricant for various purposes based on the type of Machines.
		Equipped with basic knowledge of polymer , methods of polymerization and various industrial applications of polymers
		Draw the Phase diagrams of one & two component systems and causes, consequences and methods to minimize corrosion to improve industrial designs.
		Identify the structure of unknown/new compounds with the help of spectroscopy and understand periodic properties such as ionization potential, oxidation states and electro negativity
BT-202	Mathematics-II	To introduce effective mathematical tools for the solutions of ordinary and partial differential equations that model physical processes.
		To introduce the tools of differentiation and integration of functions of complex variable those are used in various techniques dealing engineering problems.
		To acquaint the student with mathematical tools available in vector calculus needed various field of science and engineering.
BT-103	English for Communication	Effective use of verbal and non-verbal communication for enhanced soft skill beside enhanced reading comprehension as well
		Write the different kinds of letters, reports and technical writing.
		Apply basic rules of grammar in both written as well as oral communication.
BT-104	Basic Electrical & Electronics Engineering	To introduce the concept of Basics of DC electrical Network including network theorems.
		To introduce the concept of Basics of AC electrical Network(single phase & 3 phase)..
		To study of law of Electromagnetism, introduction of transformer.
		To study of various electrical Machines.
		To study Basic Concept Digital Electronics.
BT-105	Engineering Graphics	Draw various types of scales, and curves.
		Draw orthographic projections of points & lines

		Draw orthographic projections of Planes & Solids
		Draw sections and development of solids including cylinders, cones, prisms and pyramids.
		Draw isometric views of Planes and Solids, Drawing using AUTOCAD.
BT-106	Manufacturing Practices	Use hand and power tools for different manufacturing processes
		Operate machine tools while preparing any component
		Select the appropriate tools required for specific operation.
		Comprehend the safety measures required to be taken while using the tools.
		Prepare Foundry, Fitting, Carpentry, Welding and smithy Job.
BT-107	Internship-I (60 Hrs Duration) at the Institute level	Demonstrate the application of knowledge and skill sets acquired from the course and workplace in the assigned job function/s
		Solve real life challenges in the workplace by analysing work environment and conditions, and selecting appropriate skill sets acquired from the course
		Exhibit critical thinking and problem solving skills by analysing underlying issue/s to challenges
		Demonstrate appreciation and respect for diverse groups of professionals by engaging harmoniously with different company stakeholders
		Exhibit professional ethics by displaying positive disposition during internship
BT-108	Swachh Bharat Summer Internship Unnat Bharat Abhiyan (100Hrs)/ Rural Outreach	This course is to sensitize students about the socio-cultural aspects of the rural areas parochial to their colleges.
		Students are expected to observe, investigate and learn about the following aspects of the rural region: i. Demographics, Literacy, Geographical parameters of the Village; ii. Schemes of government of India and State of Madhya Pradesh in operation in the villages.
		To enhance critical thinking by making them participate in social activities and imbibe human values among them.
		Rural Swachh Bharat Abhiyan is to promote cleanliness and develop healthy habits in people in villages.
		Unnat Bharat Abhiyan: To build an understanding of the development agenda within institutes of Higher Education and an institutional capacity and training relevant to national needs, especially those of rural India.
BT-301	Mathematics- III	To determine the root finding techniques which can be used to solve practical engineering problems also demonstrate the use of interpolation methods to find intermediate values in given graphical and/or tabulated data.

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		Apply the concept of numerical analysis to find the relative strengths and weaknesses of each computation method and know which are most applicable for given problem also will be able to approximate and analysis the errors obtained in the numerical solution of equations, ordinary, partial differential equations and simultaneous equations as well.
		To apply the analytical technique to express periodic function as a Fourier series and acquire the concepts of Laplace transformation ; inverse Laplace Transform with its property to solve Partial Differential equation and Ordinary Differential Equation with given boundary conditions which is helpful in all engineering ; research work.
		Apply the concept of a random variable, probability distribution and their application in diversified fields.
CM-302	Chemical Engineering Thermodynamics	To understand simple steady and unsteady states, extended with combination of open, closed and isolated systems.
		To acquire knowledge about PVT behaviour of fluids and using laws to determine process variables.
		To understand Carnot cycle, efficiency of closed loop process and calculation of entropy.
		To apply third law in determining feasibility of reaction and energy correlation with types of reaction/process.
		To calculate output in single and multi-stage process in physical process using fluids..
CM-303	Advance Engineering Chemistry	Ability to familiarize with ceramics and its processing
		Ability to understand concept of general manufacturing techniques of refractory
		Ability to understand concept of processing of glass and its casting
		Ability to understand the processing of oils and fats.
		Ability to understand the reaction rate mechanism
CM-304	Material & Energy Balance	Ability to familiarize with different unit systems and dimensional analysis.
		Ability to understand concept of ideal gas, real gas, vapor pressure and humidity.
		Ability to solve material balance problems involving recycle, bypass and purge, without chemical reaction.
		Ability to solve material balance problems involving recycle, bypass and purge, with chemical reaction.
		Ability to calculate energy balance using enthalpy changes and solve energy balance involving chemical reactions

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CM-305	Chemical Instrumentation	1.Students can understand the use of instrumentations, general characteristics of instruments and types of errors and their remedies.
		2. Students able to understand characteristics and working principle of different instruments used to measure temperature and humidity.
		3. Students able to understand characteristics and working principle of instruments used for pressure measurement and control.
		4. Students able to analyze different types of flow meters and instruments for the measurement of density and viscosity.
		5. Students able to design process and instrumentation diagrams (P&ID) for process equipments such as distillation column, heat exchanger and storage tanks.
CM-306	Computer Programming-I (JAVA)	Understand and Experiment with Java Database Connectivity (JDBC)
		Illustrate and Create dynamic web pages, using Servlets and JSP
		Develop reusable Java Bean
		Interpret and Dissect the Remote Method Invocation (RMI) to invoke the remote methods in a variety of applications.
		Demonstrate the multi-tier architecture of Enterprise JavaBeans (EJB) and Struts Framework to Build web-based enterprise applications
BT-107	Evaluation of Internship-I completed at I year level	Demonstrate the application of knowledge and skill sets acquired from the course and workplace in the assigned job function/s
		Solve real life challenges in the workplace by analysing work environment and conditions, and selecting appropriate skill sets acquired from the course
		Exhibit critical thinking and problem solving skills by analysing underlying issue/s to challenges
		Demonstrate appreciation and respect for diverse groups of professionals by engaging harmoniously with different company stakeholders
		Exhibit professional ethics by displaying positive disposition during internship
BT-307	90 hrs Internship based on using various softwares – Internship -II	Exposure to Organizational skills and professional practices.
		Efficiently completing tasks, fostering good relationship with seniors and subordinates
		Improved Communication & interpersonal skills.
		Exposure to latest technology applications to the specific discipline.
		Identification of relevant problems in the industry and innovative solutions.

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ES-401	Energy & Environmental Engineering	Get the knowledge of energy carriers, energy technologies, energy challenges and energy system integration and environment sustainability.
		Learn about the different types of ecosystems present in environment, ecological succession and energy flow in the ecosystem.
		Understand the value of biodiversity to human societies, threats to biodiversity, In-situ and Ex-situ conservation of biodiversity.
		Acquire knowledge of different types of environmental pollution, its effects on life and its remedies
		Aware about the social issue related to the environment, environment ethics, protection and conservation acts for the environment
CM-402	Fluid Particle Mechanics	Ability to evaluate size, surface and population of particles, & screen analysis of solids.
		Ability to understand principle of size reduction, crushing, grinding, pulverizing and ultrafining.
		Ability to design mixing equipment and calculate power requirements.
		Ability to understand principle of separation techniques for system involving solids, liquid sand gases, sedimentation and filtration.
		Ability to understand particulate and aggregative fluidization, pressure drop through fluidized bed.
CM-403	Fluid Mechanics	Ability to understand basic concept of fluid static, viscosity, pressure & vapor pressure and dimensional analysis
		Ability to understand different types of flow, streamlines & continuity equation.
		Ability to understand Euler's equation of motion, Bernoulli's equation, linear momentum equation, velocity
		Ability to understand working of pump, fan blowers, compressor and vacuum pumps
		Ability to understand concept of Reynolds number and friction factor
CM-404	Inorganic Process Technology	1. Ability to familiarize process flow diagram of salts and sodium compounds, soda ash, caustic soda.
		2. Understand the process flow diagram of hydrochloric acid, sulphur and sulphuric acid, phosphoric acid and phosphate.
		3. Comprehend the process flow diagram of nitrogenous industries, ammonia and nitric acid, nitrogenous fertilizer.
		4. Ability to interpret process flow diagram of cement industries and industrial gases.

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		5. Able to understand the process flow diagram of bromine, iodine, Fluorine, soaps and detergents, glass, ceramic and inorganic pigments.
CM-405	Fuel Technology	Ability to give the overview of coal Classifications and Washing of coal, mechanism of low and high temperature carbonization.
		Ability to enhance the knowledge of petroleum processing like cracking, reforming, distillation and isomerization.
		Ability to familiar with properties and testing of petroleum products.
		Ability to know composition and properties of gaseous fuels and fuel cells.
		Ability to understand renewable energy sources.
CM-406	Computer Programming-II (Excel)	To perform basic operations using functions/commands of excel.
		Ability to analyze and solve complex problems
		To solve chemical engineering based problems using excel
BT-407	90 hrs Internship based on using various software's – Internship -II	Exposure to Organizational skills and professional practices.
		Efficiently completing tasks, fostering good relationship with seniors and subordinates
		Improved Communication & interpersonal skills.
		Exposure to latest technology applications to the specific discipline.
		Identification of relevant problems in the industry and innovative solutions.
BT-408	Cyber Security	Analyze and evaluate the cyber security needs of an organization.
		Determine and analyze software vulnerabilities and security solutions to reduce the risk of exploitation.
		Measure the performance and troubleshoot cyber security systems.
		Implement cyber security solutions and use of cyber security, information assurance, and cyber/computer forensics software/tools.
		Comprehend and execute risk management processes, risk treatment methods, and key risk and performance indicators
CM-501	Mass Transfer-I	To understand the knowledge of mass transfer by applying principles of diffusion, interphase mass transfer and different theories.
		To understand the concept and operation of various types of gas liquid contact equipment and to determine and analyse mass transfer coefficient.
		Ability to understand the concept of vapour liquid equilibrium, relative volatility and distillation.
		Able to design distillation column.

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		To understand the concept and determine NTU , HTU, HETP and height of packed bed used for absorption
CM-502	Heat Transfer	Understands the mechanisms of conduction in heat transfer.
		Understands the mechanisms of convection, overall and individual heat transfer coefficient.
		Understands the mechanisms of radiation.
		Understands the mechanisms of radiation.
		Ability to understand the reaction rate mechanism. CO5 Analyzes the performance of heat exchange equipments.
CM-503	Computation Methods in Chemical Engineering	Ability to understand, examine and solve the engineering data by using various methods.
		Ability to calculate errors occurred in engineering data.
		Ability to solve differential equations for the conservation of mass in chemical engineering problems
		Ability to solve ODE by numerical methods for prediction of data at any instant in chemical engineering problems.
		To solve finite difference, linear & non-linear difference method and optimization in chemical engineering related problems
CM-504	**A. Organic Process Technology** B. Fuel Cell Technology C. Energy Management	1. Ability to familiarize process flow diagram of pulp and paper manufacturing process.
		2. Understand the process flow diagram of sugar and alcohol derivatives like acetic acid, acetic anhydride, vinyl acetate and ethylene glycol.
		3. Comprehend the process flow diagram of Intermediates for petrochemical like phenol, methanol, propylene, benzene, toluene etc.
		4. Ability to interpret process flow diagram of dyes, insecticides, pesticides, and nitrating agents.
		5. Able to understand the process flow diagram of manmade fibers.
CM-505	Chemical Process Plant Simulation Lab-I	Understanding uses and initializing Matlab.
		Ability to perform simple mathematical calculation.
		Ability to solve and analyse advance mathematics based problems.
CM-506	Organic Process Technology Lab	1. Ability to determine the iodine value of the given sample of oil and chloride in a given H2O sample by argentrometric method.
		2. Ability to prepare of urea formaldehyde resin and oxalic acid from cane sugar.
		3. Ability to determine the concentration of sugar by using polarimeter.
		4. Ability to draw process flow diagrams PFD on AutoCAD P&ID.

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CM-507	Evaluation of Internship-II	Demonstrate the application of knowledge and skill sets acquired from the course and workplace in the assigned job function/s
		Solve real life challenges in the workplace by analysing work environment and conditions, and selecting appropriate skill sets acquired from the course
		Exhibit critical thinking and problem solving skills by analysing underlying issue/s to challenges
		Demonstrate appreciation and respect for diverse groups of professionals by engaging harmoniously with different company stakeholders
		Exhibit professional ethics by displaying positive disposition during internship
CM-508	Minor Project- I	Identify problem in area of Chemical Engineering which requires further investigation.
		Identify the methods and materials required for the project work.
		Manage the work with team members.
		Formulate and implement innovative ideas for social and environmental benefits.
		Analyze the results to come out with solutions related to the project work.
CM-601	Mass Transfer -II	The concept of Equilibrium in adsorption separation operations should be clear.
		To study the concept Humidification and Dehumidification operations.
		To introduce the concept of drying and drying equipment's.
		To study the principal of leaching and crystallization.
		To introduce liquid-liquid extraction.
CM-602	Chemical Reaction Engineering	To understand the reaction kinetics and method of analysis.
		To analyze and design chemical reacting system.
		To understand heterogeneous reacting system and non-ideal reactor analysis.
		To study different catalytic reactor.
		To study different Models and Regime for reacting system.
CM-603	**A. Process Equipment Design I** B. Polymer Technology C. Nano Technology	To understand the concept of stress and strain analysis and able to design different vessel roof.
		To design pressers vessel under different different operating conditions.
		To understand the design concept of tall vessel and their supporting structure.
		To design different types of flanges and understand different types of equipment testing methods

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CM-604	**A. Chemical Process Control** B. Process Optimization Techniques C. Fertilizer Technology	To understand the knowledge of controlling processes and controllers.
		To investigate control and instrumentation of chemical engineering equipment's
		Ability to solve complex equation using laplace tan formations.
		To understand interacting and noninteracting process and their responses
		To know about stability concept and techniques to solve problems on it..
CM-605	Chemical Process Plant Simulation Lab-II	Student will able to simulate of process in "DWSIM"
		Student will able to simulate Shortcut Distillation, Rigorous Distillation on DWSIM
		Student will able to simulate double pipe Heat Exchanger in DWSIM
		Student will able to simulate CSTR in DWSIM
CM-606	Chemical Process Control Lab	To understand the knowledge of thermocouple and Dead weight Pressure Gauge.
		To understand Characteristics of Control valve and PID Controller.
		Ability to measurement of liquid level by Air purge method.
		To understand interacting and non-interacting process and their responses.
CM-607	Internship-III	Exposure to Organizational skills and professional practices.
		Efficiently completing tasks, fostering good relationship with seniors and subordinates
		Improved Communication & interpersonal skills.
		Exposure to latest technology applications to the specific discipline.
		Identification of relevant problems in the industry and innovative solutions.
CM-608	Minor Project II	Identify problem in area of Chemical Engineering which requires further investigation.
		Identify the methods and materials required for the project work.
		Manage the work with team members.
		Formulate and implement innovative ideas for social and environmental benefits.
		Analyze the results to come out with solutions related to the project work.
CM-701	Process Equipment Design-II	Ability to design different types of heat exchangers like double pipe heat exchanger, shell and tube heat exchanger used in chemical industries and to understand the role of heat transfer coefficient and pressure drop in design
		Ability to design multiple effect evaporators with boiling point rise and without boiling point rise condition

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		Ability to design mass exchange equipment like plate and packed column for distillation and absorption column used in chemical refineries
		Ability to design Flash drum, Kettle reboiler, condenser, cooling tower, rotary drier and tray drier
CM-702	A Transport Phenomena B Bio Process Technology **C Petroleum Refining Engineering**	Ability to understand origin, composition & classification of petroleum.
		Ability to understand crude oil distillation process & to understand the concept of catalytic cracking and reforming processes.
		Ability to discuss alkylation, isomerization, polymerization processes.
		Ability to understand the manufacture of lubricating oil & to know sweetening and desulphurization processes.
		Ability to enhance the knowledge of petroleum products, their properties and characterization and discuss about LPG and hydrogen recovery.
CM-703	**A. Environmental Engineering** B. Process Intensification C. Non-conventional energy Sources	Ability to understand characteristics & effect of pollution on living and non-living things and to know various policies for pollution control.
		Ability to understand the effect of climate changes, atmospheric dispersion of air pollutants, and operating principles.
		Ability to understand effect of water pollution and working principles of particulate control devices.
		Analyze the hazardous and nonhazardous solid wastes and select the treatment and disposal methods.
		To analyse the pollution caused by different Chemical Process (case studies)
CM-704	Energy Lab	1. Student will able to identify various forms of renewable energy
		2. Student will able to understand biogas plant, gasifier and production of Biogas
		3. Student will able to understand production process of biodiesel, bio-fuels
		4. Student will able to understand solar drying system, solar distillation and solar Pond
		5. Student will able to determine of exhaust gas analysis by using Orsat apparatus.
CM-705	Environmental Engineering Lab	Student able to determine oxygen demand required to decompose organics in polluted water
		Student able to determine pH, acidity and alkalinity present in polluted water
		Student able to determine hardness and turbidity of given water

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		sample
		Student able to determine Total Dissolved Solids in water.
CM-706	Major Project-I	Identify problem in area of Chemical Engineering which requires further investigation.
		Identify the methods and materials required for the project work.
		Manage the work with team members.
		Formulate and implement innovative ideas for social and environmental benefits.
		Analyze the results to come out with solutions related to the project work.
CM-607	Evaluation of Internship -III	Demonstrate the application of knowledge and skill sets acquired from the course and workplace in the assigned job function/s
		Solve real life challenges in the workplace by analysing work environment and conditions, and selecting appropriate skill sets acquired from the course
		Exhibit critical thinking and problem solving skills by analysing underlying issue/s to challenges
		Demonstrate appreciation and respect for diverse groups of professionals by engaging harmoniously with different company stakeholders
		Exhibit professional ethics by displaying positive disposition during internship
CM-801	Chemical Process Modeling & Simulation	1. Gaining the knowledge of basics of modeling and simulation.
		2. Ability to model the different static and dynamic models.
		3. Understanding the concept of the treatment of experimental data.
		4. Understanding of dynamic modeling of simple processes.
		5. Understanding of computer programming of various iterative convergence methods such as Newton- Raphson, false position etc.
CM-802	**A. Process Piping Design** B. Process safety & Hazards Management C. Fertilizer Technology	Able to select piping system components.
		Understand the rheological and time dependent behavior of fluid
		To be able to calculate power losses for Compressible and Incompressible fluids in vertical flow
		To be able to calculate power losses for Compressible and Incompressible fluids in horizontal flow
		Understand the importance of software and piping system in Chemical Industry
CM-803	**A Process Plant Economics & Management**	1. To study the concepts of chemical process plant design
		2. To understand the economics of plant establishment.
		3. To understand the cost analysis of products

	B Petrochemical Technology C IPR (Intellectual Property Right)	4. To study the process to check the financial feasibility of plant.
		5. To study the overall network design of process plant.
CM-804	Petrochemical Technology Lab	Ability to understand origin, composition & classification of petroleum.
		Ability to understand crude oil distillation process & to understand the concept of catalytic cracking and reforming processes.
		Ability to discuss alkylation, isomerization, polymerization processes.
		Ability to understand the manufacture of lubricating oil & to know sweetening and desulphurization processes.
		Ability to enhance the knowledge of petroleum products, their properties and characterization and discuss about LPG and hydrogen recovery.
CM-805	Major Project-II	Identify the complex engineering problems relevant to the society and industry
		Apply modern technologies, tools and systems in the field of Chemical Engineering to analyze the identified problem
		Design and implement a viable solution to the problem.
		Apply communication, writing skills & Presentation skills
		Develop the team work and leadership skills with professional and ethical values.

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Department of Mechanical Engineering

Vision of Mechanical Engineering

To be nationally recognized department for imparting mechanical engineering education, leading to competent engineers, capable of contributing to society through innovation, entrepreneurial and leadership.

Mission of Mechanical Engineering

- Imparting quality education to the students and enhancing their skills to make them globally competitive mechanical engineers.
- Ability to work as a member of interdisciplinary teams, capable of adapting to changing environments of engineering, technology and society with ethical and moral values.
- Inculcate critical thinking abilities among students and develop entrepreneurial skills, leadership qualities and innovative ideas.

Program Educational Objective (PEO's) of Mechanical Engineering

- The graduating students from Mechanical Engineering should have a comprehensive background of physical sciences, mathematics and foundations of Mechanical

Engineering to be able to solve application level problems related to core Mechanical Engineering and interdisciplinary areas.

- The graduating students from Mechanical Engineering needs to develop expertise and acumen in core areas like Mechanical design, thermal engineering, materials and manufacturing science to a satisfaction of employers.

- The program orients its graduating students towards contemporary areas of socio-technological issues like energy crisis, pollution, formal practices of human resources and industrial relations in order to achieve the professional development of the student.

Program Specific Outcomes (PSO's) of Mechanical Engineering

PSO1: Apply the fundamentals of mathematics, science and engineering knowledge to identify, formulate, design, investigate and solve complex engineering problems of machines & mechanisms, kinematics and dynamics, mechanical components & systems to manufacturing facilities having computer-based design, analysis, simulation and fabrication with best quality practices.

PSO2: Design mechanical systems in various fields such as machine elements, thermal, manufacturing, industrial and inter-disciplinary fields by using various engineering/technological tools to meet the mercurial needs of the industry and society at large.

PSO3: The ability to grasp the latest development, methodologies of mechanical engineering and possess competent knowledge of design process, practical proficiency, skills and knowledge of programme and developing ideas towards innovation & research.

Programme Outcomes (PO's) of Mechanical Engineering

Upon successful completion of the program, the students would have the following attributes.

- Apply the fundamental knowledge of mathematics, science and engineering in the solution of complex Mechanical engineering problems.

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- Identify, formulate, analyze and solve complex mechanical engineering problems

- Design solutions for complex mechanical engineering problems and design system components or processes that meet the specified needs with appropriate consideration for public health and safety, and cultural, societal, and environmental considerations.

- Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- Create, select, and apply appropriate techniques, resources, and modern engineering tools, including prediction and modelling to complex engineering activities, with an understanding of the limitations.

- The contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

- Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

- Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

- Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

- Communicate effectively on complex engineering activities with the engineering community and with the society at large, such as, being able to comprehend and write

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effective reports and design documentation, make effective presentations, and give and receive clear instructions.

- Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

- Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Course Outcomes (CO's) of Mechanical Engineering (UG)

Univ. Subject Code	Subject Name	CO Description
BT-201	Engineering physics	The Coursework is designed to provide students the opportunity to learn key concepts of Wave nature of particles and the Schrodinger equation.
		Student will able to understand the knowledge of Wave optics i.e. interference and diffraction.
		To introduce the idea of solids like semiconductors (P type and N Type semiconductors), Diodes and Hall effect. STudents will also be able to understand the basic concept of superconductivity.
		To develop the understanding of Lasers, fiber optics and their applications in field of engineering sciences.
		To provide you to basic understanding of Electrostatics in vacuum.
BT-102	Mathematics-I	To introduce the fallouts of Rolle's Theorem that is fundamental to application of analysis to Engineering problems.
		To introduce the idea of applying differential and integral calculus to notions of curvature and to improper integrals. Apart from some applications it gives a basic introduction on Beta and Gamma function
		To develop the tool of power series and Fourier series for learning advanced Engineering Mathematics.
		To familiarize the student with functions of several variables that is essential in most branches of engineering
		To develop the essential tool of matrices and linear algebra in a comprehensive manner.

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BT-203	Basic mechanical engineering	Understand the properties of material, stress strain. Properties of alloys and cast iron.
		Understand the concept measurement and machine tools their operations and their applications.
		Understand the concept of fluid flow , properties of fluid, Bernoulli's equation, Pascal's law.
		To Understand the concept of heat and temperature, law of thermodynamics, boilers and their mountings and accessories, basic Refrigeration cycles and its applications.
		To Understand the working of different cycles and 4 strokes, 2 stroke engines and their applications.
BT-204	Basic civil engineering & mechanics	Students will acquire the basic knowledge in different fields of civil engineering and materials used in construction.
		Gain the ability to use modern survey equipment to measure angles and distances.
		Students will understand the basic of contour lines and map
		Students will have the ability to identify, formulate and solve engineering problems related to Engineering Mechanics: Statics
		Students will be able to analyse beam for shear force and bending moment.
BT-205	Basic computer engineering	Able to understand the basic applications of computers in various fields, describe operating system, its role and functionalities and to apply concepts of MS word, MS power point, MS Excelefficiently.
		Discuss and apply simple algorithms for arithmetic and logical problems.
		Translate the algorithms to programs applyingobject-oriented concepts in C++ programming language.
		Understand basics of computer networks, OSI layers and protocols, E commerce applications, impact of securitythreats and attacks on networking systems and also security measures
		Understand the different method for representing and processing data and to get awareness about the impact of cloud computing, its various type of services.
BT-206	Language lab & seminars	learners to develop good listening skills.
		Encourages learner to talk freely and lose their shyness when talking in front of the people
		To develop the overall personality of the students by the practical activities
		Helps in confidence building, motivation to be more presentable and help in removing the stage fright
		Develops speaking, writing, reading, listening and presentation skills.

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BT-101	Engineering chemistry	Differentiate hard and soft water; solve the related numerical problems on water purification and its significance in industry and daily life.
		Select the lubricant for various purposes based on the type of Machines.
		Equipped with basic knowledge of polymer , methods of polymerization and various industrial applications of polymers
		Draw the Phase diagrams of one & two component systems and causes, consequences and methods to minimize corrosion to improve industrial designs.
		Identify the structure of unknown/new compounds with the help of spectroscopy and understand periodic properties such as ionization potential, oxidation states and electro negativity
BT-202	Mathematics-II	To introduce effective mathematical tools for the solutions of ordinary and partial differential equations that model physical processes.
		To introduce the tools of differentiation and integration of functions of complex variable those are used in various techniques dealing engineering problems.
		To acquaint the student with mathematical tools available in vector calculus needed various field of science and engineering.
BT-103	English for Communicatio n	Effective use of verbal and non-verbal communication for enhanced soft skill beside enhanced reading comprehension as well
		Write the different kinds of letters, reports and technical writing.
		Apply basic rules of grammar in both written as well as oral communication.
BT-104	Basic electrical & electronics engineering	To introduce the concept of Basics of DC electrical Network including network theorems.
		To introduce the concept of Basics of AC electrical Network(single phase & 3 phase)..
		To study of law of Electromagnetism, introduction of transformer.
		To study of various electrical Machines.
		To study Basic Concept Digital Electronics.
BT-105	Engineering graphics	Draw various types of scales, and curves.
		Draw orthographic projections of points & lines
		Draw orthographic projections of Planes & Solids
		Draw sections and development of solids including cylinders, cones, prisms and pyramids.
		Draw isometric views of Planes and Solids, Drawing using AUTOCAD.
BT-106	Manufacturing	Use hand and power tools for different manufacturing processes

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	practices	Operate machine tools while preparing any component
		Select the appropriate tools required for specific operation.
		Comprehend the safety measures required to be taken while using the tools.
		Prepare Foundry, Fitting, Carpentry, Welding and smithy Job.
BT-107	Internship-I (60 Hrs Duration) at the Institute level	Demonstrate the application of knowledge and skill sets acquired from the course and workplace in the assigned job function/s
		Solve real life challenges in the workplace by analysing work environment and conditions, and selecting appropriate skill sets acquired from the course
		Exhibit critical thinking and problem solving skills by analysing underlying issue/s to challenges
		Demonstrate appreciation and respect for diverse groups of professionals by engaging harmoniously with different company stakeholders
		Exhibit professional ethics by displaying positive disposition during internship
BT-108	Swachh bharat summer internship unnat bharat abhiyan (100hrs)/ rural outreach	This course is to sensitize students about the socio-cultural aspects of the rural areas parochial to their colleges.
		Students are expected to observe, investigate and learn about the following aspects of the rural region: i. Demographics, Literacy, Geographical parameters of the Village; ii. Schemes of government of India and State of Madhya Pradesh in operation in the villages.
		To enhance critical thinking by making them participate in social activities and imbibe human values among them.
		Rural Swachh Bharat Abhiyan is to promote cleanliness and develop healthy habits in people in villages.
		Unnat Bharat Abhiyan: To build an understanding of the development agenda within institutes of Higher Education and an institutional capacity and training relevant to national needs, especially those of rural India.
BT 301	Mathematics-III	To determine the root finding techniques which can be used to solve practical engineering problems also demonstrate the use of interpolation methods to find intermediate values in given graphical and/or tabulated data.
		Apply the concept of numerical analysis to find the relative strengths and weaknesses of each computation method and know which are most applicable for given problem also will be able to approximate and analysis the errors obtained in the numerical solution of equations, ordinary, partial differential equations and simultaneous equations as well.

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		To apply the analytical technique to express periodic function as a Fourier series and acquire the concepts of Laplace transformation & inverse Laplace Transform with its property
		To solve Partial Differential equation and Ordinary Differential Equation with given boundary conditions which is helpful in all engineering & research work.
		Apply the concept of a random variable, probability distribution and their application in diversified fields.
ME302	Thermodynamics	Apply conservation principles (mass and energy) to evaluate the performance of simple engineering systems and cycles
		Evaluate thermodynamic properties of simple homogeneous substances
		Analyze processes and cycles using the second law of thermodynamics to determine maximum efficiency and performance
		Discuss the physical relevance of the numerical values for the solutions to specific engineering problems
		Critically evaluate the validity of the numerical solutions for specific engineering problems
ME303	Materials technology	Understand the crystal structure and classification of materials.
		Understand methods of determining mechanical properties and their suitability for applications.
		Understand Mechanical behavior of metals and alloys, Tensile & compressive stress-strain
		Understand Iron carbon diagram, time temperature transformation etc.
		Understand Non destructive testing, alloty study with heat treatment process.
ME304	Strength of Material	To define direct normal stress and direct shear stress and compute their values.
		able to calculate shear stress distribution in solid and hollow round members under Torsional loading conditions.
		Able to calculate bending stress and shear stress at any location along the beam. Calculate maximum bending stress and maximum shear stress.
		Able to use different theories of failure in different loading condition
		able to develop an understanding of analytic methods used in connection with the structural design of columns, long mechanical members under compression.
ME305	Manufacturing process	Students will be able to understand concepts of casting Technology.
		Students will be able to understand mechanical working of metals.

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		Students will be able to understand concepts of welding process
		Students will be able to understand concept of forging methods
		Students will be able to understand press working .
ME306	Thermal engg lab	To study the working of different types of high pressure boilers.
		To calculate different performance parameters of boilers.
		To determine volumetric and isothermal efficiencies of a reciprocating air compressor.
		To study the working of different types of steam condensors.
		To analyse the exhaust gas using ORSAT apparatus.
BT107	Evaluation of Internship-I Completed at First Year Level	Demonstrate the application of knowledge and skill sets acquired from the course and workplace in the assigned job function/s
		Solve real life challenges in the workplace by analysing work environment and conditions, and selecting appropriate skill sets acquired from the course
		Exhibit critical thinking and problem solving skills by analysing underlying issue/s to challenges
		Demonstrate appreciation and respect for diverse groups of professionals by engaging harmoniously with different company stakeholders
		Exhibit professional ethics by displaying positive disposition during internship
ES401	Energy & environmental engineering	To learn about various types of energy resources.
		To learn about Ecosystem.
		To learn about Biodiversity and its conservation.
		To learn about Causes, Effects and Control of Environmental Pollution.
		To learn about various social issues w.r.t. environment.
ME402	Instrumentation & control	To learn about different types of Instrument Systems & Measurement Techniques.
		To know about various characteristics of measuring instrument.
		To learn about measurement of different physical quantities like Temperature, Flow, Velocity & Pressure
		To learn about different mechanical measurement devices.
		To know about different types of control systems.
ME403	Theory of machines	To introduce the approaches used in kinematic and dynamic analysis of machinery.
		To understand the various four bar mechanisms and applications.
		To understand various types of gear and gear trains.
		To understand Cam & folloers working.
		To give basic knowledge on mechanical vibrations.

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ME404	Fluid mechanics	To understand the Newton's law of viscosity and able to explain the mechanics of fluids at rest and in motion by observing the fluid phenomena.
		Compute force of buoyancy on a partially or fully submerged body and able to analyze the stability of a floating body.
		To understand Euler's Equation of motion and Deduce Bernoulli's equation.
		To find energy losses in pipe transitions and to draw energy gradient lines.
		Evaluate pressure drop in pipe flow using Hagen-Poiseuille's equation for laminar flow in a pipe and distinguish the types of flows and Determine sonic velocity in a fluid.
ME405	Manufacturing technology	Upon completion of this course, the students will be able to understand and compare the functions and applications of different metal cutting tools
		Understand the basic concepts of gear machining
		Understand the basic concepts of plastics and molding method
		Understand the basic concepts of NTM
		The student will be able to write the programming to control and operate NC machines
ME406	Software lab	To introduce different drawing softwares to students.
		To learn about Surface modelling its design & implemntation in engineering applications.
		To know about current developments in CAD.
		To learn about Solid modeling & its applications.
		To know about strategic plan of CAD system design.
ME407	90 hrs Internship based on using various software's – Internship -II	Exposure to Organizational skills and professional practices.
		Efficiently completing tasks, fostering good relationship with seniors and subordinates
		Improved Communication & interpersonal skills.
		Exposure to latest technology applications to the specific discipline.
		Identification of relevant problems in the industry and innovative solutions.
ME 501	Internal combustion engines	To understand different types, parts and working of IC Engines.
		To learn in details the combustion process in Petrol Engines.
		To learn in details the combustion process in DieselEngines.
		To learn about different types of fuels and their properties used in IC Engines.
		To know about the concepts of Supercarging & Turbocharging of IC Engines

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ME502	Mechanical vibrations	Understand the causes and effects of vibration in mechanical systems.
		Develop schematic models for physical systems and formulate governing equations of motion.
		Understand the role of damping, stiffness and inertia in mechanical systems
		Analyze rotating and reciprocating systems and compute critical speeds.
		Analyze and design machine supporting structures, vibration isolators and absorbers.
ME503(B)	Dynamics of Machines	To design and analyze the fundamental knowledge of dynamics of machines so that student can appreciate solve problems of dynamic force balance and transmissibility of forces.
		To calculate the balancing mass with analytical and graphical methods for rotary and reciprocating masses.
		To develop understanding of governor mechanism and its significance on engineering design.
		To develop understanding of dynamic balancing, flywheel analysis, gyroscopic forces and moments.
		To Draw Turning moment diagram for different internal combustion engine and able to design
ME504 (A)	Industrial engineering & ergonomics	Able to use the Charts to record the activities of the people, materials and equipment to find alternative methods which minimize waste and to implement the best method.
		Able to apply the knowledge to eliminate unproductive activities under the control of the management, supervisor, worker and the design of products and processes
		Able to implement &use the various job evaluation and incentive scheme for the smooth working of the workforce in industry.
		To Apply ergonomic concept to improve working conditions in various industrial environments.
		To estimate information associated with control display systems using information processing theory. Students will be able to evaluate audio, visual and tactile displays.
ME505	FEM / CFD	Understand the concepts behind formulation methods in FEM.
		Identify the application and characteristics of FEA elements
		To develop an understanding for the major theories, approaches and methodologies used in CFD
		Develop element characteristic equation and generation of global equation.

		Able to apply suitable boundary conditions to a global equation for bars, trusses, beams, circular shafts, heat transfer, fluid flow, axi symmetric and dynamic problems and solve them displacements, stress and strains induced.
ME506	Python	Basic understanding of python and installation
		understand the concept of control statement
		Understanding of searching algorithm
		Underatading of sorting algorithm
		Underatading of file handling
ME507	Evaluation of Internship II	Demonstrate the application of knowledge and skill sets acquired from the course and workplace in the assigned job function/s
		Solve real life challenges in the workplace by analysing work environment and conditions, and selecting appropriate skill sets acquired from the course
		Exhibit critical thinking and problem solving skills by analysing underlying issue/s to challenges
		Demonstrate appreciation and respect for diverse groups of professionals by engaging harmoniously with different company stakeholders
		Exhibit professional ethics by displaying positive disposition during internship
ME508	Minor project	Identify a topic in advanced areas of Mechanical Engineering.
		Review literature to identify gaps and define objectives & scope of the work.
		Generate and implement innovative ideas for social benefit.
		Develop a prototypes/models, experimental set-up and software systems necessary to meet the objectives.
		Analyze the ruslts and evaluate the performance.
ME601	Thermal engineering and gas dynamics	To understand the working of high pressure boiler.
		To understand the vapour power cycles applied on thermal power plant.
		To understand the concepts of gas dynamics.
		To understand the working of reciprocating air compressor.
		Analyze the flow through varing area ducts with friction and heat transfer.
ME602	Machine component design	Able to explain the theory behind the different phases of design process.
		Apply knowledge to design basic elements shaft, keys and couplings.
		Apply knowledge to design springs and power screws.

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		Design clutches and brakes depending on need.
		Design and analyze rolling contact or journal bearing.
ME603(A)	Department elective (turbo-machinery)	Apply thermodynamic concepts to analyze turbo machines
		Analyze impulse and reaction steam turbo machines for energy transfer.
		Analyze hydro turbo machines for energy transfer.
		Analyze different types of fans, blowers and compressors for energy transfer.
		General theory and working of different power transmitting turbo machines.
ME604(C)	Open elective (renewable energy technology)	To explain in detail about solar energy & its utilization.
		To explain in detail about wind energy & its utilization.
		To learn about production and application of Biomass.
		To understand different types, parts and working of Hydro Power Systems.
		To explain in detail about geo thermal energy & its utilization.
ME605	CAD lab	Understand geometric transformation techniques in CAD.
		Develop models to represent curves and surfaces.
		Develop programs to manufacture industrial components
		Devlopment of 3d part nd part
		Simulation study
ME606	RDBMS	To learn about normalization and its different forms.
		To learn about query processing & optimization technique.
		To understand the usage of backup recovery feature of database.
		Study and usage of object or object oriented relational database management software (Oracle).
		Creating and use web database in PHP
ME607	Internship iii	Exposure to Organizational skills and professional practices.
		Efficiently completing tasks, fostering good relationship with seniors and subordinates
		Improved Communication & interpersonal skills.
		Exposure to latest technology applications to the specific discipline.
		Identification of relevant problems in the industry and innovative solutions.
ME608	Minor project II	Identify problem in area of Mechanical Engineering which requires further investigation.
		Identify the methods and materials required for the project work.
		Manage the work with team members.
		Formulate and implement innovative ideas for social and

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		environmental benefits.
		Analyze the results to come out with solutions related to the project work.
ME701	Heat and Mass Transfer	Know about the basic concept of heat transfer and its modes. Mechanism of Steady State Conduction.
		Learn about the Transient Heat Conduction and its applications.
		Learn about Convective Heat Transfer.
		Understand the working principle and types of heat exchangers. And learn about Boiling & Condensation.
		Understand the concept of Radiative Heat Transfer, mass transfer.
ME702 D	Departmental elective advance machine design	Understand the concept of belt, chain and rope drive and their design process
		Able to design spur and helical gears.
		Able to design of bevel gears.
		Able to design I C engine components such as pystion, cylinder and connecting rod
		Able to design componets like joints, couplings, pressure vessels and power screw.
ME703A	Open Elective Operation Research and Supply Chain	Formulate and solve linear programming problems
		Determine optimum solution to transportation problem
		Determine average queue length and waiting times of queuing models.
		Determine optimum inventory and cost in inventory models.
		Understand the decision phases and apply competitive & supply chain strategies
ME704	CAD / CAM / CIM	Students will be able to produce CAD drawings which communicate the appropriate manufacturing details, standards, and specifications
		Students will be able to generate NC code using G-codes & M-codes to machine parts to specifications.
		Students will be able to set-up, program, and operate CNC milling and turning equipment
		Students will be able to Design Flexible manufacturing cell after carrying out Group technology study and finally creating FMS.
		Students will be able to apply knowledge about Computer Aided Quality control and Process Planning Control.
ME705	MATLAB and R Programming	To introduce MATLAB & R.
		Download & Installation of MATLAB & R.
		In detail explanation of various MATLAB commands and functions.
		In detail explanation of various R commands and functions.

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		Examples & Case Studies on MATLAB & R Programming.
ME706	Major project-I	Identify problem in area of Mechanical Engineering which requires further investigation.
		Identify the methods and materials required for the project work.
		Manage the work with team members.
		Formulate and implement innovative ideas for social and environmental benefits.
		Analyze the results to come out with solutions related to the project work.
ME607	Evaluation of Internship -III	Demonstrate the application of knowledge and skill sets acquired from the course and workplace in the assigned job function/s
		Solve real life challenges in the workplace by analysing work environment and conditions, and selecting appropriate skill sets acquired from the course
		Exhibit critical thinking and problem solving skills by analysing underlying issue/s to challenges
		Demonstrate appreciation and respect for diverse groups of professionals by engaging harmoniously with different company stakeholders
		Exhibit professional ethics by displaying positive disposition during internship
ME801	Refrigeration and air conditioning	Illustrate the fundamental principles and applications of refrigeration and air conditioning system
		Obtain cooling capacity and coefficient of performance by conducting test on vapour compression refrigeration systems and ice plant
		Present the properties, applications and environmental issues of different refrigerants
		Calculate cooling load for air conditioning systems used for various conditions
		Operate and analyze the refrigeration and air conditioning systems.
ME802A	Departmental elective (automobile engineering)	Explain in detail about Chassis systems of an Automobile.
		Explain in detail about steeringsystems of an Automobile.
		Explain in detail about transmission systems of an Automobile.
		Explain in detail about suspension systems of an Automobile.
		Explain in detail about Electrical, control systems and emission standards of an Automobile.
ME803C	Open elective (entrepreneurs hip & management	To learn about different system concepts.
		To learn about different management concepts.
		To learn about different marketing concepts.
		To know about basics of productivity & operations.

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	concepts)	To explain in detail Entrepreneurship.
ME804	Simulation & modeling lab	To understand the concepts of modelling.
		To understand the concepts of simulation.
		To model mechanical components using CATIA.
		To model mechanical components using ANSYS.
		To analyze modelled component using ANSYS.
ME805	Major project II	Identify methods and materials to carry out experiments/develop code.
		Reorganize the procedures with a concern for society, environment and ethics.
		Analyze and discuss the results to draw valid conclusions.
		Prepare a report as per recommended format and defend the work.
		Explore the possibility of publishing papers in peer reviewed journals/conference proceedings.

Course Outcomes (CO's) of Mechanical Engineering (PG)

SUBJECT CODE	SUBJECT NAME	CO DETAILS
MMMD101	Advance mathematics	Apply advanced algebraic techniques applied to diverse situations in physics, engineering and other mathematics.
		Apply a range of techniques to solve first & second order partial differential equations
		Apply the basic concepts of probability, probability distribution of random variables and identify central tendency.
		Able to solve problems associated with continuous joint probability distribution, Markov chain using transition probability matrix and explain the concept of queuing theory.
		Able to apply mathematical Techniques used in FEM analysis and solve the structural and thermal problems associated with mechanical systems.
MMMD102	Theory of Elasticity & Plasticity	Apply advanced algebraic techniques applied to diverse situations in physics, engineering and other mathematics.
		Apply a range of techniques to solve first & second order partial differential equations
		Apply the basic concepts of probability, probability distribution of random variables and identify central tendency.
		Able to solve problems associated with continuous joint probability distribution, Markov chain using transition probability matrix and explain the concept of queuing theory.

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		Able to apply mathematical Techniques used in FEM analysis and solve the structural and thermal problems associated with mechanical systems.
MMMD103	Material Science	Apply advanced algebraic techniques applied to diverse situations in physics, engineering and other mathematics.
		Apply a range of techniques to solve first & second order partial differential equations
		Apply the basic concepts of probability, probability distribution of random variables and identify central tendency.
		Able to solve problems associated with continuous joint probability distribution, Markov chain using transition probability matrix and explain the concept of queuing theory.
		Able to apply mathematical Techniques used in FEM analysis and solve the structural and thermal problems associated with mechanical systems.
MMMD104	Theory of Vibration	Apply advanced algebraic techniques applied to diverse situations in physics, engineering and other mathematics.
		Apply a range of techniques to solve first & second order partial differential equations
		Apply the basic concepts of probability, probability distribution of random variables and identify central tendency.
		Able to solve problems associated with continuous joint probability distribution, Markov chain using transition probability matrix and explain the concept of queuing theory.
		Able to apply mathematical Techniques used in FEM analysis and solve the structural and thermal problems associated with mechanical systems.
MMMD105	Computer Aided Design & Drafting	Apply advanced algebraic techniques applied to diverse situations in physics, engineering and other mathematics.
		Apply a range of techniques to solve first & second order partial differential equations
		Apply the basic concepts of probability, probability distribution of random variables and identify central tendency.
		Able to solve problems associated with continuous joint probability distribution, Markov chain using transition probability matrix and explain the concept of queuing theory.
		Able to apply mathematical Techniques used in FEM analysis and solve the structural and thermal problems associated with mechanical systems.

MMMD201	Adv. Machine Design	Apply advanced algebraic techniques applied to diverse situations in physics, engineering and other mathematics.
		Apply a range of techniques to solve first & second order partial differential equations
		Apply the basic concepts of probability, probability distribution of random variables and identify central tendency.
		Able to solve problems associated with continuous joint probability distribution, Markov chain using transition probability matrix and explain the concept of queuing theory.
		Able to apply mathematical Techniques used in FEM analysis and solve the structural and thermal problems associated with mechanical systems.
MMMD202	FINITE ELEMENT METHOD	Apply advanced algebraic techniques applied to diverse situations in physics, engineering and other mathematics.
		Apply a range of techniques to solve first & second order partial differential equations
		Apply the basic concepts of probability, probability distribution of random variables and identify central tendency.
		Able to solve problems associated with continuous joint probability distribution, Markov chain using transition probability matrix and explain the concept of queuing theory.
		Able to apply mathematical Techniques used in FEM analysis and solve the structural and thermal problems associated with mechanical systems.
MMMD203	Robotics	Apply advanced algebraic techniques applied to diverse situations in physics, engineering and other mathematics.
		Apply a range of techniques to solve first & second order partial differential equations
		Apply the basic concepts of probability, probability distribution of random variables and identify central tendency.
		Able to solve problems associated with continuous joint probability distribution, Markov chain using transition probability matrix and explain the concept of queuing theory.
		Able to apply mathematical Techniques used in FEM analysis and solve the structural and thermal problems associated with mechanical systems.
MMMD204	Industrial Tribology	Apply advanced algebraic techniques applied to diverse situations in physics, engineering and other mathematics.
		Apply a range of techniques to solve first & second order partial differential equations

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		Apply the basic concepts of probability, probability distribution of random variables and identify central tendency.
		Able to solve problems associated with continuous joint probability distribution, Markov chain using transition probability matrix and explain the concept of queuing theory.
		Able to apply mathematical Techniques used in FEM analysis and solve the structural and thermal problems associated with mechanical systems.
MMMD205	Vibration & Noise Control	Apply advanced algebraic techniques applied to diverse situations in physics, engineering and other mathematics.
		Apply a range of techniques to solve first & second order partial differential equations
		Apply the basic concepts of probability, probability distribution of random variables and identify central tendency.
		Able to solve problems associated with continuous joint probability distribution, Markov chain using transition probability matrix and explain the concept of queuing theory.
		Able to apply mathematical Techniques used in FEM analysis and solve the structural and thermal problems associated with mechanical systems.
MMMD301(B)	Experimental Stress Analysis	Apply advanced algebraic techniques applied to diverse situations in physics, engineering and other mathematics.
		Apply a range of techniques to solve first & second order partial differential equations
		Apply the basic concepts of probability, probability distribution of random variables and identify central tendency.
		Able to solve problems associated with continuous joint probability distribution, Markov chain using transition probability matrix and explain the concept of queuing theory.
		Able to apply mathematical Techniques used in FEM analysis and solve the structural and thermal problems associated with mechanical systems.
MMMD302(B)	Fluid Film Lubrication	Apply advanced algebraic techniques applied to diverse situations in physics, engineering and other mathematics.
		Apply a range of techniques to solve first & second order partial differential equations
		Apply the basic concepts of probability, probability distribution of random variables and identify central tendency.

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		Able to solve problems associated with continuous joint probability distribution, Markov chain using transition probability matrix and explain the concept of queuing theory.
		Able to apply mathematical Techniques used in FEM analysis and solve the structural and thermal problems associated with mechanical systems.

Department of Artificial Intelligence and Machine Learning

Vision of Artificial Intelligence and machine learning

To achieve excellent standards of quality-education by using the latest tools, nurturing collaborative culture and disseminating customer oriented innovations to relevant areas of academia and industry towards serving the greater cause of society.

Mission of Artificial Intelligence and machine learning

- To develop professionals who are skilled in the area of Artificial Intelligence and Machine Learning.
- To impart quality and value based education and contribute towards the innovation of computing, expert system, Data Science to raise satisfaction level of all stakeholders.
- Our effort is to apply new advancements in high performance computing hardware and software.

Program Educational Objective (PEO's) of Artificial Intelligence and machine learning

The Program Educational Objectives of the Artificial Intelligence and Machine Learning Undergraduate program are designed to produce knowledgeable Machine Learning engineers who are ready to contribute effectively to the advancement of Intelligent Computing systems. The graduates shall:

- **PEO1:** Apply analysis, predictions, optimization, decision making and develop skills in order to formulate and solve complex intelligent computing and multidisciplinary problems.

- **PEO2:** Take up higher studies, research & development and other creative efforts in the area of Machine Learning.

- **PEO3:** Use their skills in an ethical & professional manner to raise the satisfaction level of stakeholders.

Program Specific Outcomes (PSO's) of Artificial Intelligence and machine learning

- **PSO1:** Apply the skills in the areas of Health Care, Education, Agriculture, Intelligent Transport, Environment, Smart Systems & in the multi-disciplinary area of Artificial Intelligence and Machine Learning.

- **PSO2:** Demonstrate engineering practice learned through industry internship to solve live problems in various domains. Software applications for problem solving.

- **PSO 3: Professional Skills:** The ability to apply the fundamentals of computer science in competitive research and to develop innovative products to meet the societal needs thereby evolving as an eminent researcher and entrepreneur.

Programme Outcomes (PO's) of Artificial Intelligence and machine learning

- PO1: Engineering knowledge: Apply the knowledge of mathematics, science and engineering fundamentals for the solution of AIML problems.

- PO2: Problem analysis: Ability to identify, formulate and analyze complex engineering problems.

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- PO3: Design/development of solutions: Ability to design and develop AIML based systems to meet desired needs within realistic constraints such as public health and safety, environmental, agriculture, economic and societal considerations.

- PO4: Conduct investigations of complex problems: Ability to demonstrate excellent programming, analytical, logical and problem-solving skills.

- PO5: Modern tool usage: Ability to use the emerging technologies, skills, and modern software tools to design, develop, test and debug the programs or software.

- PO6: The engineer and society: Ability to include and solve the social, cultural, ethical issues with AIML solutions.

- PO7: Environment and sustainability: Ability to design and develop web based solutions with effective graphical user interface for the need of sustainable development.

- PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the AIML practices.

- PO9: Individual and team work: Ability to work individually and as a member or leader in diverse teams to accomplish a common goal.

- PO10: Communication: Ability to communicate effectively in both verbal and written forms with the engineering community and society.

- PO11: Project management and finance: Knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team to manage the software and AIML based projects in multidisciplinary environments.

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- PO12: Life-long learning: Appreciation of technological change and the need for independent life-long learning.

Course Outcomes (CO's) of Artificial Intelligence and machine learning

Univ. Subject Code	Subject Name	CO Description
BT-201	Engineering Physics	The Coursework is designed to provide students the opportunity to learn key concepts of Wave nature of particles and the Schrodinger equation.
		Student will able to understand the knowledge of Wave optics i.e. interference and diffraction.
		To introduce the idea of solids like semiconductors (P type and N Type semiconductors), Diodes and Hall effect. STudents will also be able to understand the basic concept of superconductivity.
		To develop the understanding of Lasers, fiber optics and their applications in field of engineering sciences.
		To provide you to basic understanding of Electrostatics in vacuum.
BT-102	Mathematics-I	To introduce the fallouts of Rolle's Theorem that is fundamental to application of analysis to Engineering problems.
		To introduce the idea of applying differential and integral calculus to notions of curvature and to improper integrals. Apart from some applications it gives a basic introduction on Beta and Gamma function
		To develop the tool of power series and Fourier series for learning advanced Engineering Mathematics.
		To familiarize the student with functions of several variables that is essential in most branches of engineering
		To develop the essential tool of matrices and linear algebra in a comprehensive manner.
BT-203	Basic Mechanical Engineering	Understand the properties of material, stress strain. Properties of alloys and cast iron.
		Understand the concept measurement and machine tools their operations and their applications.
		Understand the concept of fluid flow , properties of fluid, Bernoulli's equation, Pascal's law.
		To Understand the concept of heat and temperature, law of thermodynamics, boilers and their mountings and accessories, basic Refrigeration cycles and its applications.
		To Understand the working of different cycles and 4 strokes, 2 stroke engines and their applications.

BT-204	Basic Civil Engineering & Mechanics	Students will acquire the basic knowledge in different fields of civil engineering and materials used in construction.
		Gain the ability to use modern survey equipment to measure angles and distances.
		Students will understand the basic of contour lines and map
		Students will have the ability to identify, formulate and solve engineering problems related to Engineering Mechanics: Statics
		Students will be able to analyse beam for shear force and bending moment.
BT-205	Basic Computer Engineering	Able to understand the basic applications of computers in various fields, describe operating system, its role and functionalities and to apply concepts of MS word, MS power point, MS Excelefficiently.
		Discuss and apply simple algorithms for arithmetic and logical problems.
		Translate the algorithms to programs applyingobject-oriented concepts in C++ programming language.
		Understand basics of computer networks, OSI layers and protocols, E commerce applications, impact of securitythreats and attacks on networking systems and also security measures
		Understand the different method for representing and processing data and to get awareness about the impact of cloud computing, its various type of services.
BT-206	Language Lab & Seminars	learners to develop good listening skills.
		Encourages learner to talk freely and lose their shyness when talking in front of the people
		To develop the overall personality of the students by the practical activities
		Helps in confidence building, motivation to be more presentable and help in removing the stage fright
		Develops speaking, writing, reading, listening and presentation skills.
BT-101	Engineering Chemistry	Differentiate hard and soft water; solve the related numerical problems on water purification and its significance in industry and daily life.
		Select the lubricant for various purposes based on the type of Machines.
		Equipped with basic knowledge of polymer , methods of polymerization and various industrial applications of polymers
		Draw the Phase diagrams of one & two component systems and causes, consequences and methods to minimize corrosion to improve industrial designs.

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		Identify the structure of unknown/new compounds with the help of spectroscopy and understand periodic properties such as ionization potential, oxidation states and electro negativity
BT-202	Mathematics-II	To introduce effective mathematical tools for the solutions of ordinary and partial differential equations that model physical processes.
		To introduce the tools of differentiation and integration of functions of complex variable those are used in various techniques dealing engineering problems.
		To acquaint the student with mathematical tools available in vector calculus needed various field of science and engineering.
BT-103	English for Communication	Effective use of verbal and non-verbal communication for enhanced soft skill beside enhanced reading comprehension as well
		Write the different kinds of letters, reports and technical writing.
		Apply basic rules of grammar in both written as well as oral communication.
BT-104	Basic Electrical & Electronics Engineering	To introduce the concept of Basics of DC electrical Network including network theorems.
		To introduce the concept of Basics of AC electrical Network(single phase & 3 phase)..
		To study of law of Electromagnetism, introduction of transformer.
		To study of various electrical Machines.
		To study Basic Concept Digital Electronics.
BT-105	Engineering Graphics	Draw various types of scales, and curves.
		Draw orthographic projections of points & lines
		Draw orthographic projections of Planes & Solids
		Draw sections and development of solids including cylinders, cones, prisms and pyramids.
		Draw isometric views of Planes and Solids, Drawing using AUTOCAD.
BT-106	Manufacturing Practices	Use hand and power tools for different manufacturing processes
		Operate machine tools while preparing any component
		Select the appropriate tools required for specific operation.
		Comprehend the safety measures required to be taken while using the tools.
		Prepare Foundry, Fitting, Carpentry, Welding and smithy Job.
BT-107	Internship-I (60 Hrs Duration) at the Institute level	Demonstrate the application of knowledge and skill sets acquired from the course and workplace in the assigned job function/s
		Solve real life challenges in the workplace by analysing work environment and conditions, and selecting appropriate skill sets acquired from the course

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		Exhibit critical thinking and problem solving skills by analysing underlying issue/s to challenges
		Demonstrate appreciation and respect for diverse groups of professionals by engaging harmoniously with different company stakeholders
		Exhibit professional ethics by displaying positive disposition during internship
BT-108	Swachh Bharat Summer Internship Unnat Bharat Abhiyan (100Hrs)/ Rural Outreach	This course is to sensitize students about the socio-cultural aspects of the rural areas parochial to their colleges.
		Students are expected to observe, investigate and learn about the following aspects of the rural region: i. Demographics, Literacy, Geographical parameters of the Village; ii. Schemes of government of India and State of Madhya Pradesh in operation in the villages.
		To enhance critical thinking by making them participate in social activities and imbibe human values among them.
		Rural Swachh Bharat Abhiyan is to promote cleanliness and develop healthy habits in people in villages.
		Unnat Bharat Abhiyan: To build an understanding of the development agenda within institutes of Higher Education and an institutional capacity and training relevant to national needs, especially those of rural India.
AI301	AI 301 Technical Communication	Acquisition of technical communication's generic aspects like Reading Technical Material, Technical Writing, Listening, Thinking and using technical phrases in spoken, Knowing the parts of a technical documents like screenshots, graphs, tabular data, data analysis, pictorial depiction.
		Getting adapted with the technical generic formats/templates of technical writing of memos, technical report writing, technical presentations, technical proposal writing, minutes of meeting and the notes taking techniques.
		Accessing the reading material and developing the writing technical material with the use of technical concepts and tools like Vacaroo, Miscrosoft Visio, Notepad ++, Kinemaster, Powtoon, Split Page Technique, Diagram Technique.
		Learning the skill of proofreading and copy editing, paraphrasing and spinning using technical tools and manually using the knowledge of advance technical grammar.
		Learning the technical phrases and writing styles like descriptive, argumentative etc for developing good technical documents for presentations or disseminating technical documents.

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AI 302	AI 302 (Probability and Statistics)	**Upon completion of the course, the student will be able to:** Apply the basic counting techniques (multiplication rule, combinations, permutations) to compute probability and work with discrete random variables and demonstrate understanding what expectation, variance, covariance and correlation mean and be able to compute and interpret them.
		Understand the properties and applications of some standard bivariate and continuous probability distributions for both discrete and continuous random variables.
		Explain the concept of order statistics and solving problems related to it also will be using Binomial, Poisson, and Normal distributions to solve statistical problems.
		Use scatter plots to visualize the relationship between two variables and apply the least square errors method numerically and algebraically to find the curve of best fit also will be having Knowledge about formulating and testing a hypothesis, using critical values to draw conclusions and determining probability of making errors in hypothesis tests.
		Get an idea of order statistics with its applications. Also about small sample tests based on Chi-square, t and F distributions to understand and analyze various methods of Non-parametric tests
AI 303	AI 303 Data Structure	To understand the concept of linear, non-linear data structures, the operations performed on them and the applications of various data structures.
		Understand the arrays, searching and sorting algorithms.
		Implement stacks, queues and its applications.
		Implement linked list and its variations.
		Solve problem involving graphs, trees and heaps.
AI 304	AI 304 AI	Demonstrate fundamental understanding of the history of artificial intelligence (AI) and its foundations
		Apply basic principles of AI in solutions that require problem solving, inference, perception, knowledge representation, and learning
		Demonstrate an ability to share in discussions of AI, its current scope and limitations, and societal implications of applications like NLP
		Demonstrate profciency in applying method for forward and backward reasoning.
		Demonstrate awareness and a fundamental understanding of various applications of AI techniques in intelligent agents, expert systems, artificial neural networks and other machine learning models
AI 305	AI 305 OOPM	Describe the procedural and object oriented paradigm with concepts of streams, classes, functions, data and objects.

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		Understand dynamic memory management techniques using pointers, constructors, destructors etc.
		Describe the concept of function overloading, operator overloading, virtual functions and polymorphism.
		Understand how to apply the major object-oriented concepts to implement object oriented programs in C++, encapsulation, inheritance and polymorphism.
		Classify inheritance with the understanding of early and late binding, usage of exception handling, generic programming.

Department of Computer Science and Engineering (Internet of Things and Cyber Security Including Blockchain Technology)

Vision of CSE (Internet of Things and Cyber Security Including Blockchain Technology)

To Achieve excellent standards of quality-education by using the latest tools, nurturing collaborative culture and disseminating customer-oriented innovations to relevant areas of academia and industry towards serving the greater cause of society.

Mission of CSE (Internet of Things and Cyber Security Including Blockchain Technology)

- To develop professionals who are skilled in IOT, Cybersecurity and Blockchain.
- To impart quality and value-based education and contribute towards the innovation of computing, networks, security to raise the satisfaction level of all stakeholders.
- Our effort is to apply new advancements in high performance computing hardware and software.

Program Educational Objective (PEO's) of CSE (Internet of Things and Cyber Security Including Blockchain Technology)

The Program Educational Objectives of the CSE – IOT and blockchain using cyber security Undergraduate program are designed to produce knowledgeable IOT and block chain engineers

who are ready to contribute effectively to the advancement of IoT and Cybersecurity systems. The graduates shall:

- **PEO1:** Apply analysis, predictions, security, optimization, decision making and develop skills to formulate and solve complex Intelligent computing and multidisciplinary problems.

- **PEO2:** Take up higher studies, research & development, and other creative efforts in the area of IOT and Blockchain.

- **PEO3:** Use their skills in an ethical & professional manner to raise the satisfaction level of stakeholders.

Program Specific Outcomes (PSO's) of CSE (Internet of Things and Cyber Security Including Blockchain Technology)

- Understand engineering knowledge in the areas of IOT, blockchain, cyber security, artificial intelligence, full stack, web development, gaming, virtual reality, and augmented reality.
- Design and integrate hardware and software systems in the areas of IOT, Blockchain and Cloud Computing with strong emphasis on lifelong learning to create feasible engineering solutions for the advancement of society.

Programme Outcomes (PO's) of CSE (Internet of Things and Cyber Security Including Blockchain Technology)

- PO1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.

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- PO2: Problem analysis: Identify, formulate, review literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural science and engineering sciences.

- PO3: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for public health and safety and cultural, societal, and environmental considerations.

- PO4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

- PO5: Modern tool usage: Create, Select, and apply appropriate techniques, resources and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

- PO6: The engineer and society: Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues, and the consequent responsibilities relevant to the professional engineering practice.

- PO7: Environment and sustainability: Understand the impact of professional engineering solutions in societal and environmental context and demonstrate the knowledge of and need for sustainable development.

- PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice.
-
- PO9: Individual and teamwork: Function effectively as an individual and as a member or leader in diverse teams and in multidisciplinary settings.

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- PO10: Communication: Communicate effectively with the engineering community and with society at large. Be able to comprehend and write effective reports documentation. Make effective presentations and give and receive clear instructions.

- PO11: Project management and finance: Demonstrate knowledge and understanding of engineering and management principles and apply these to one's own work, as a member and leader in a team. Manage projects in multidisciplinary environments.

- PO12: Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Course Outcomes (CO's) of CSE (Internet of Things and Cyber Security Including Blockchain Technology)

Subject Code	Subject Name	CO Description
BT-101	Engineering Chemistry	Differentiate hard and soft water; solve the related numerical problems on water purification and its significance in industry and daily life.
		Select the lubricant for various purposes based on the type of Machines.
		Equipped with basic knowledge of polymer , methods of polymerization and various industrial applications of polymers
		Draw the Phase diagrams of one & two component systems and causes, consequences and methods to minimize corrosion to improve industrial designs.
		Identify the structure of unknown/new compounds with the help of spectroscopy and understand periodic properties such as ionization potential, oxidation states and electro negativity
BT-102	Mathematics-I	To introduce the fallouts of Rolle's Theorem that is fundamental to application of analysis to Engineering problems.
		To introduce the idea of applying differential and integral calculus to notions of curvature and to improper integrals. Apart from some applications it gives a basic introduction on Beta and Gamma function

		To develop the tool of power series and Fourier series for learning advanced Engineering Mathematics.
		To familiarize the student with functions of several variables that is essential in most branches of engineering
		To develop the essential tool of matrices and linear algebra in a comprehensive manner.
BT-103	English for Communication	Effective use of verbal and non-verbal communication for enhanced soft skill beside enhanced reading comprehension as well
		Write the different kinds of letters, reports and technical writing.
		Apply basic rules of grammar in both written as well as oral communication.
BT-104	Basic Electrical & Electronics Engineering	To introduce the concept of Basics of DC electrical Network including network theorems.
		To introduce the concept of Basics of AC electrical Network(single phase & 3 phase)..
		To study of law of Electromagnetism, introduction of transformer.
		To study of various electrical Machines.
		To study Basic Concept Digital Electronics.
BT-105	Engineering Graphics	Draw various types of scales, and curves.
		Draw orthographic projections of points & lines
		Draw orthographic projections of Planes & Solids
		Draw sections and development of solids including cylinders, cones, prisms and pyramids.
		Draw isometric views of Planes and Solids, Drawing using AUTOCAD.
BT-106	Manufacturing Practices	Use hand and power tools for different manufacturing processes
		Operate machine tools while preparing any component
		Select the appropriate tools required for specific operation.
		Comprehend the safety measures required to be taken while using the tools.
		Prepare Foundry, Fitting, Carpentry, Welding and smithy Job.
BT-107	Internship-I (60 Hrs Duration) at the Institute level	Demonstrate the application of knowledge and skill sets acquired from the course and workplace in the assigned job function/s
		Solve real life challenges in the workplace by analysing work environment and conditions, and selecting appropriate skill sets acquired from the course
		Exhibit critical thinking and problem solving skills by analysing underlying issue/s to challenges
		Demonstrate appreciation and respect for diverse groups of professionals by engaging harmoniously with different company stakeholders

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		Exhibit professional ethics by displaying positive disposition during internship
BT-108	Swachh Bharat Summer Internship Unnat Bharat Abhiyan (100Hrs)/ Rural Outreach	This course is to sensitize students about the socio-cultural aspects of the rural areas parochial to their colleges.
		Students are expected to observe, investigate and learn about the following aspects of the rural region: i. Demographics, Literacy, Geographical parameters of the Village; ii. Schemes of government of India and State of Madhya Pradesh in operation in the villages.
		To enhance critical thinking by making them participate in social activities and imbibe human values among them.
		Rural Swachh Bharat Abhiyan is to promote cleanliness and develop healthy habits in people in villages.
		Unnat Bharat Abhiyan: To build an understanding of the development agenda within institutes of Higher Education and an institutional capacity and training relevant to national needs, especially those of rural India.
BT-201	Engineering Physics	The Coursework is designed to provide students the opportunity to learn key concepts of Wave nature of particles and the Schrodinger equation.
		Student will able to understand the knowledge of Wave optics i.e. interference and diffraction.
		To introduce the idea of solids like semiconductors (P type and N Type semiconductors), Diodes and Hall effect. STudents will also be able to understand the basic concept of superconductivity.
		To develop the understanding of Lasers, fiber optics and their applications in field of engineering sciences.
		To provide you to basic understanding of Electrostatics in vacuum.
BT-202	Mathematics-II	To introduce effective mathematical tools for the solutions of ordinary and partial differential equations that model physical processes.
		To introduce the tools of differentiation and integration of functions of complex variable those are used in various techniques dealing engineering problems.
		To acquaint the student with mathematical tools available in vector calculus needed various field of science and engineering.
BT-203	Basic Mechanical Engineering	Understand the properties of material, stress strain. Properties of alloys and cast iron.
		Understand the concept measurement and machine tools their operations and their applications.
		Understand the concept of fluid flow , properties of fluid, Bernoulli's equation, Pascal's law.
		To Understand the concept of heat and temperature, law of thermodynamics, boilers and their mountings and accessories, basic

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		Refrigeration cycles and its applications.
		To Understand the working of different cycles and 4 strokes, 2 stroke engines and their applications.
BT-204	Basic Civil Engineering & Mechanics	Students will acquire the basic knowledge in different fields of civil engineering and materials used in construction.
		Gain the ability to use modern survey equipment to measure angles and distances.
		Students will understand the basic of contour lines and map
		Students will have the ability to identify, formulate and solve engineering problems related to Engineering Mechanics: Statics
		Students will be able to analyse beam for shear force and bending moment.
BT-205	Basic Computer Engineering	Able to understand the basic applications of computers in various fields, describe operating system, its role and functionalities and to apply concepts of MS word, MS power point, MS Excelefficiently.
		Discuss and apply simple algorithms for arithmetic and logical problems.
		Translate the algorithms to programs applyingobject-oriented concepts in C++ programming language.
		Understand basics of computer networks, OSI layers and protocols, E commerce applications, impact of securitythreats and attacks on networking systems and also security measures
		Understand the different method for representing and processing data and to get awareness about the impact of cloud computing, its various type of services.
BT-206	Language Lab & Seminars	learners to develop good listening skills.
		Encourages learner to talk freely and lose their shyness when talking in front of the people
		To develop the overall personality of the students by the practical activities
		Helps in confidence building, motivation to be more presentable and help in removing the stage fright
		Develops speaking, writing, reading, listening and presentation skills.

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Proof of published and disseminated - Vision, Mission, PEO's, PSO's, PO's and CO's

The Mission, Vision, PEO's, PSO's, PO's and CO's are published at

1. College website http://indoreinstitute.com/iist/
2. Notice boards of Department
3. Faculty rooms
4. Various promote location in the Institute
5. Head of the Department's Office
6. Library
7. Lab Manual and Notice board of Lab
8. Availability in departmental level documents.
9. Institute Prospectus

Apart from the above, these are also disseminated to all the stakeholders of the programs through faculty meetings, during student's workshops / seminar, student induction programs, and parent-teacher meetings etc.

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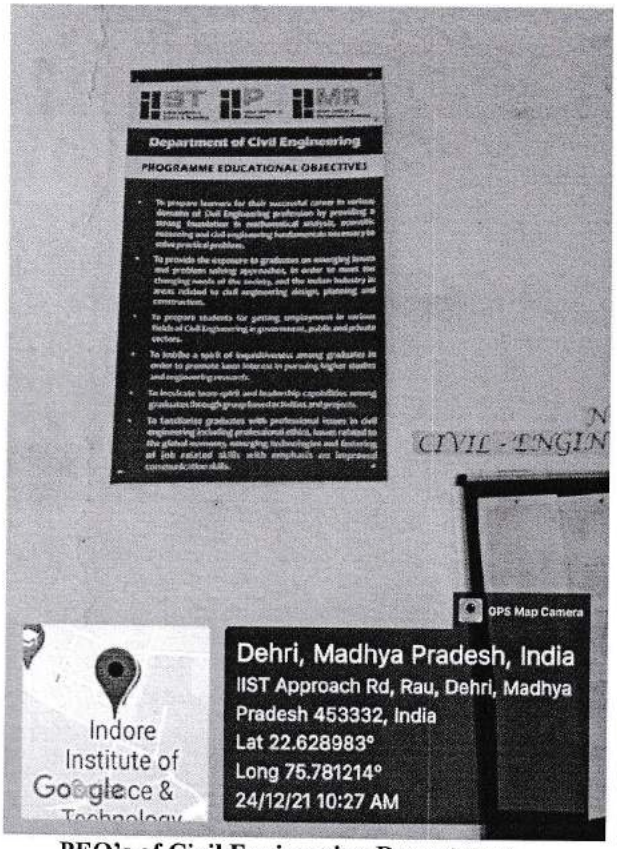
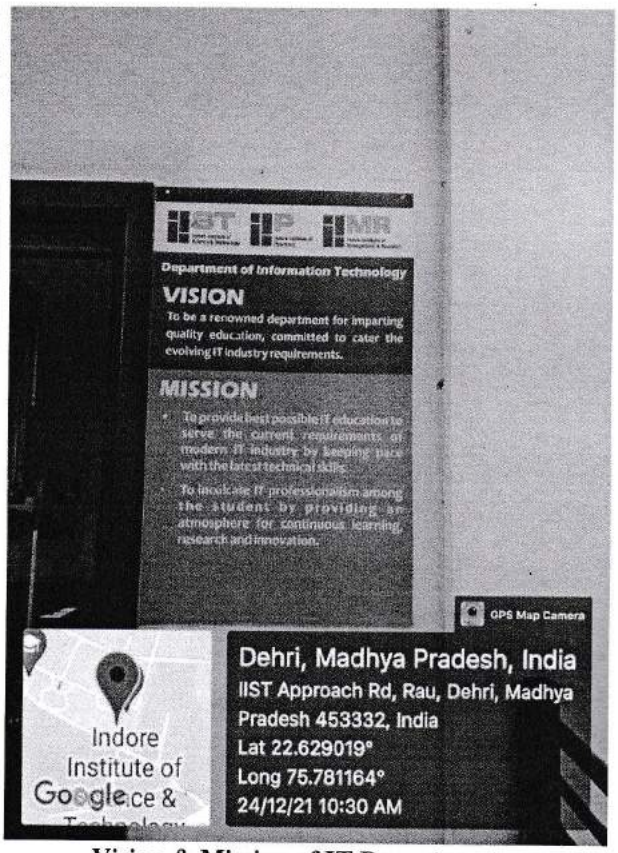
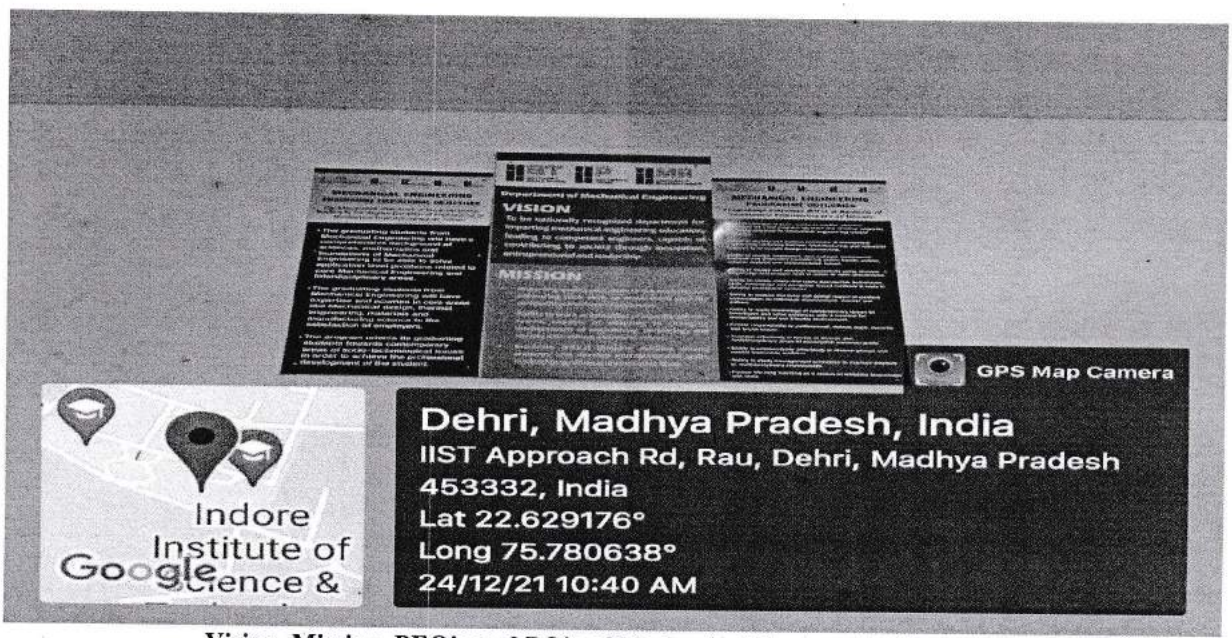


PEO's of Civil Engineering Department



Vision & Mission of IT Department



Vision, Mission, PEO's and PO's of Mechanical Engineering Department

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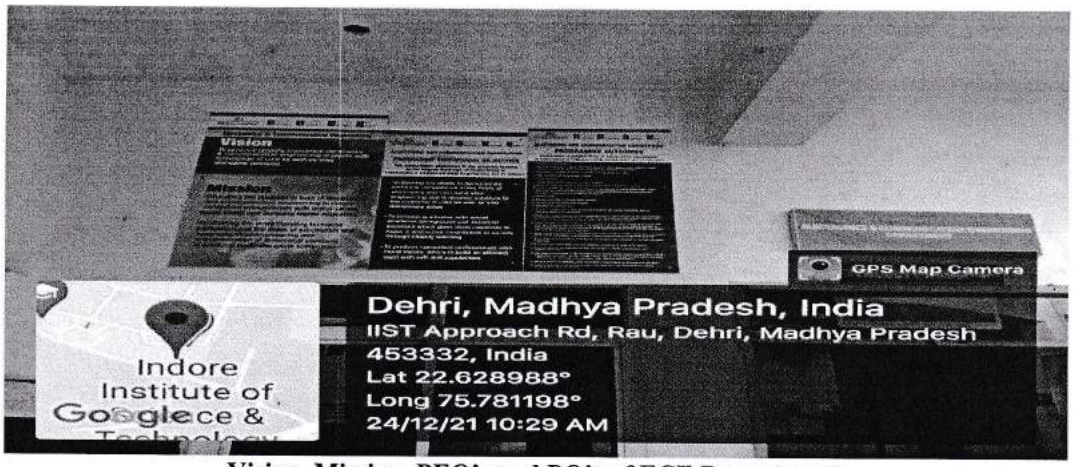
PO's of IT Department

PO's of CSE Department



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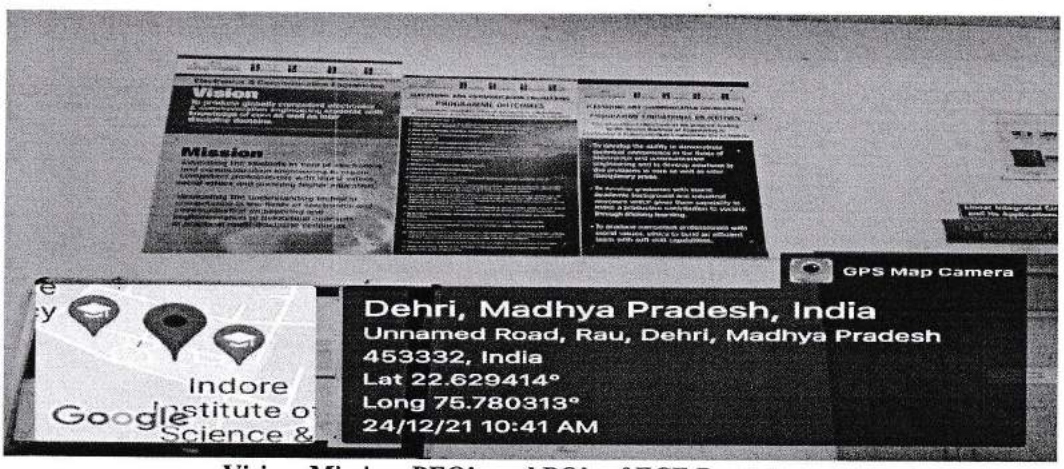

Vision, Mission, PEO's and PO's of ECE Department

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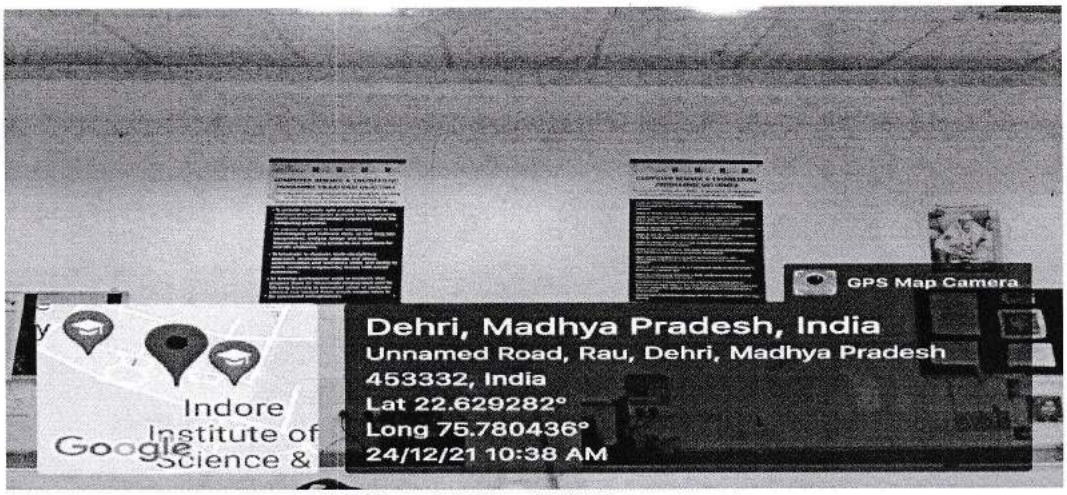
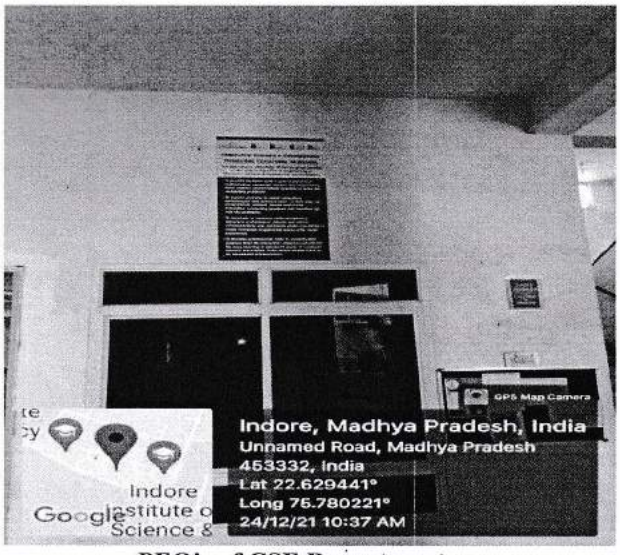


PEO's and PO's of CSE Department



PEO's of CSE Department

Vision and Mission of Chemical Department

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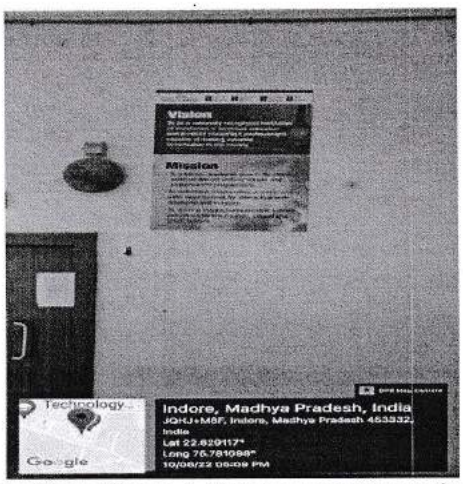
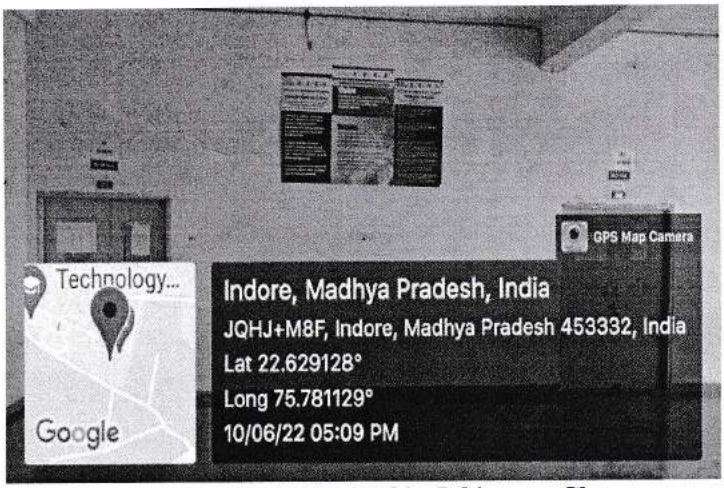
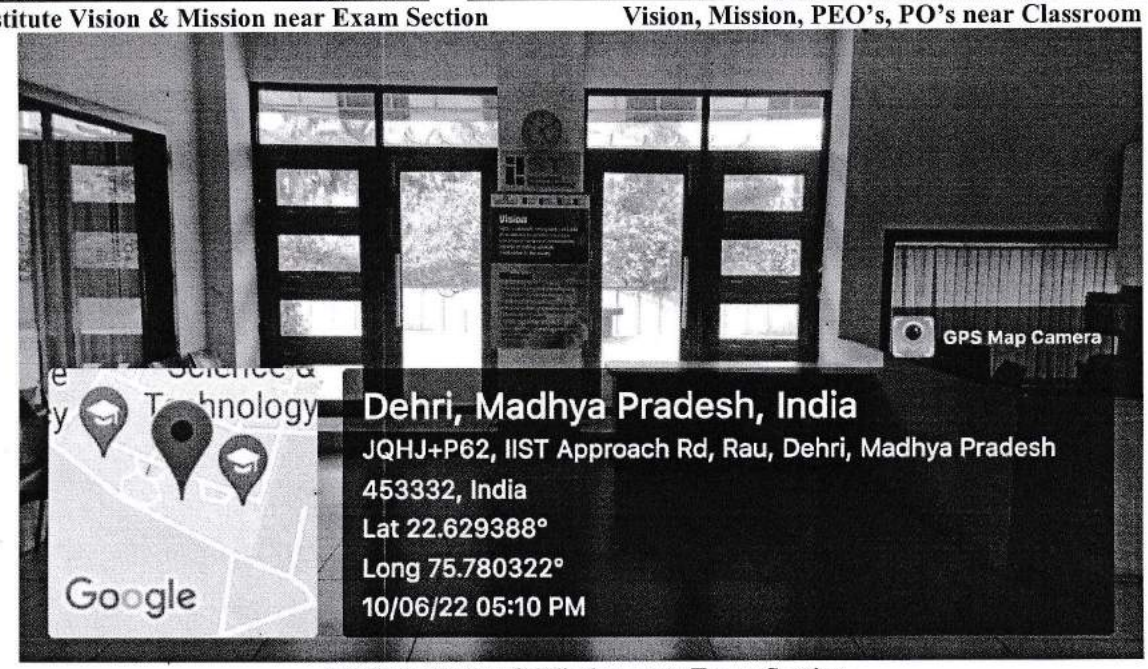


Institute Vision & Mission near Exam Section



Vision, Mission, PEO's, PO's near Classroom



Institute Vision & Mission near Exam Section

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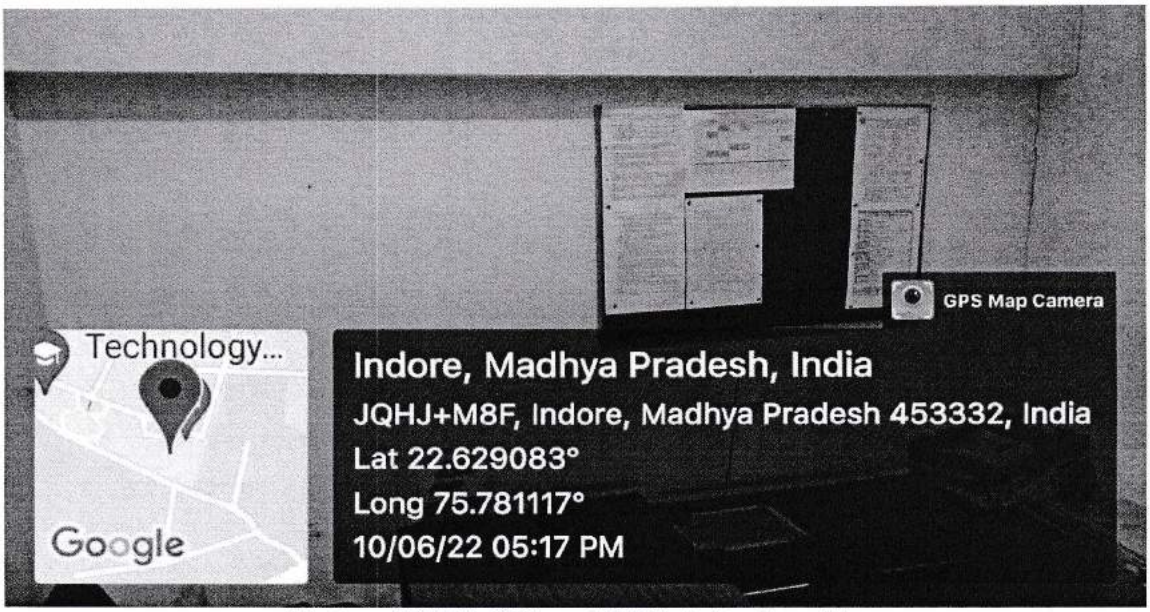
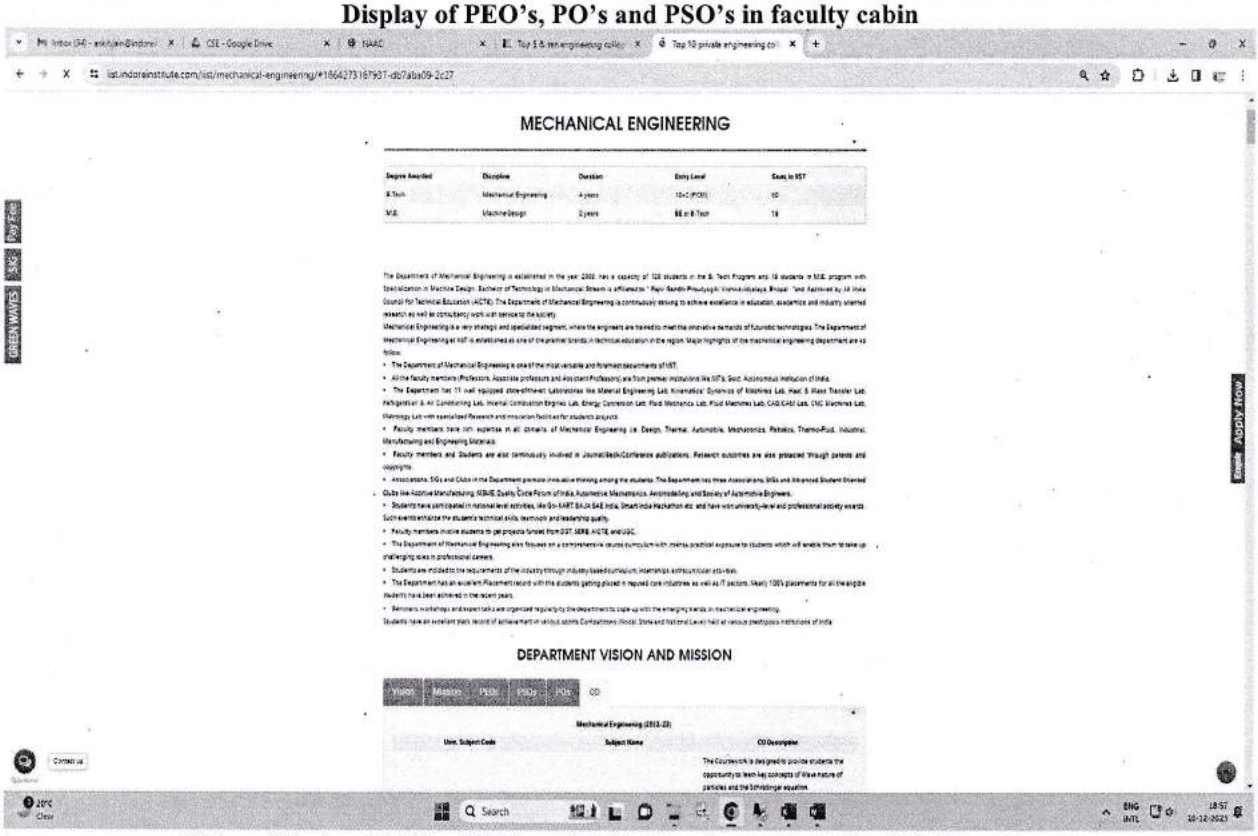
Institute of Science & Technology Indore * INDORE *



Display of PEO's, PO's and PSO's in faculty cabin



Vision, Mission, PEO's, PSO's and PO's Proof on website for ME Department

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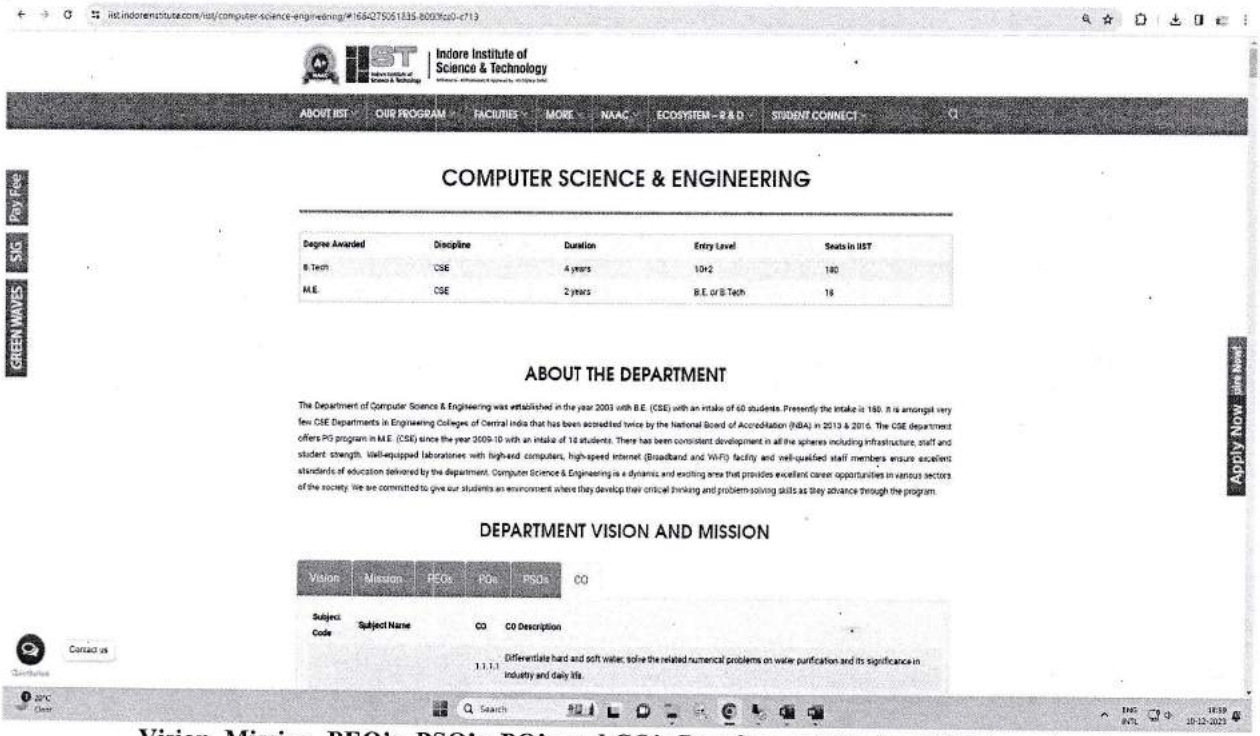
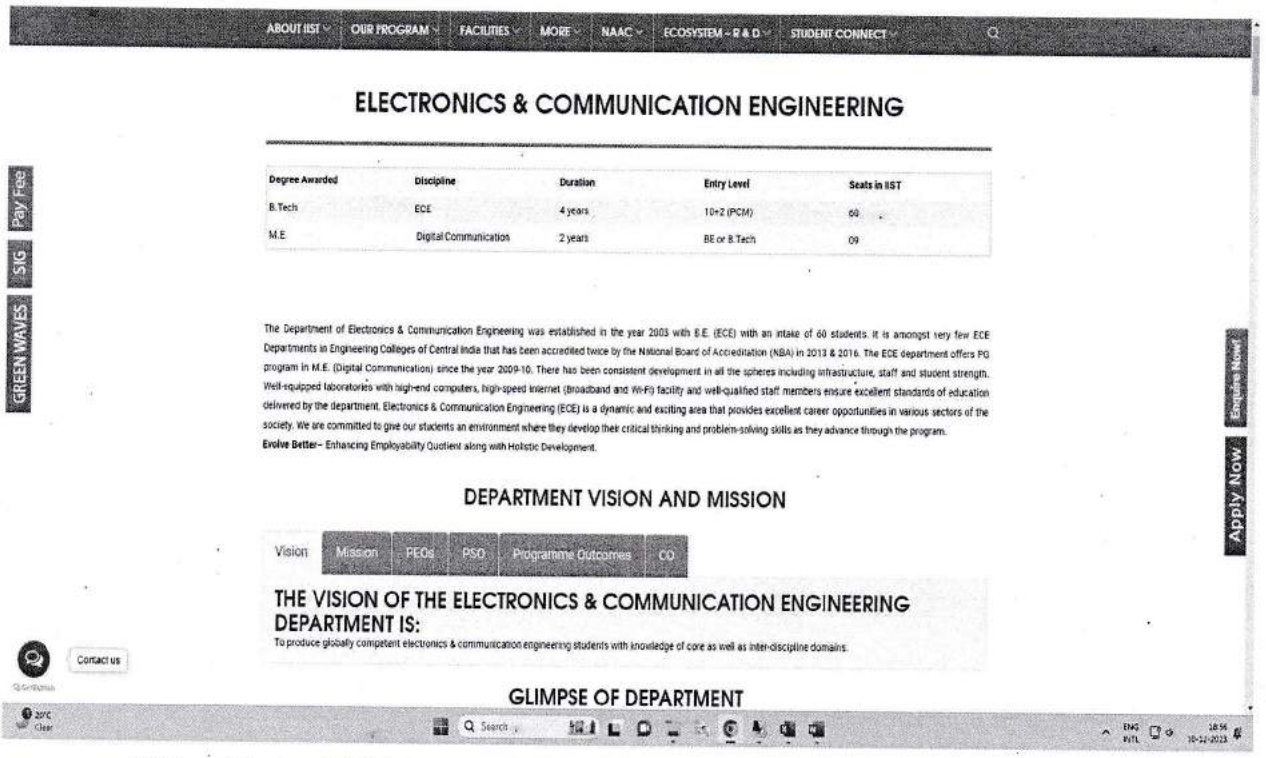


Vision, Mission, PEO's, PSO's, PO's and CO's Proof on website for CSE Department



Vision, Mission, PEO's, PSO's, PO's and CO's Proof on website for ECE Department

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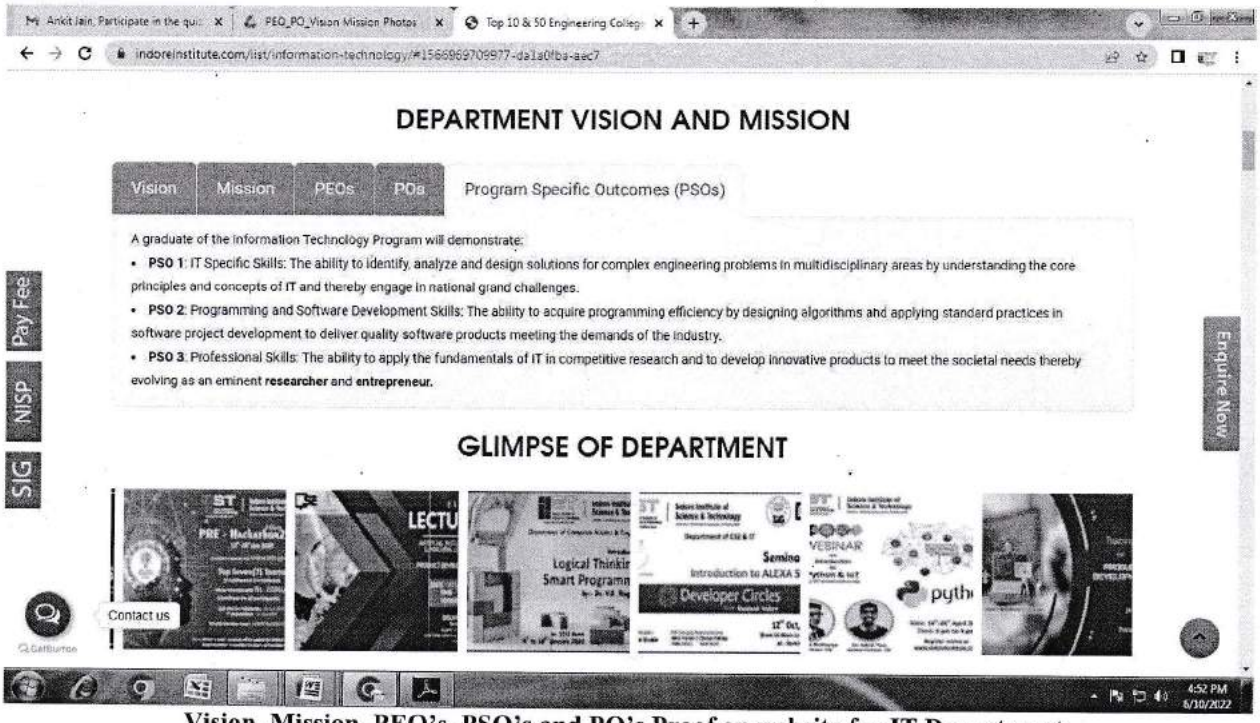
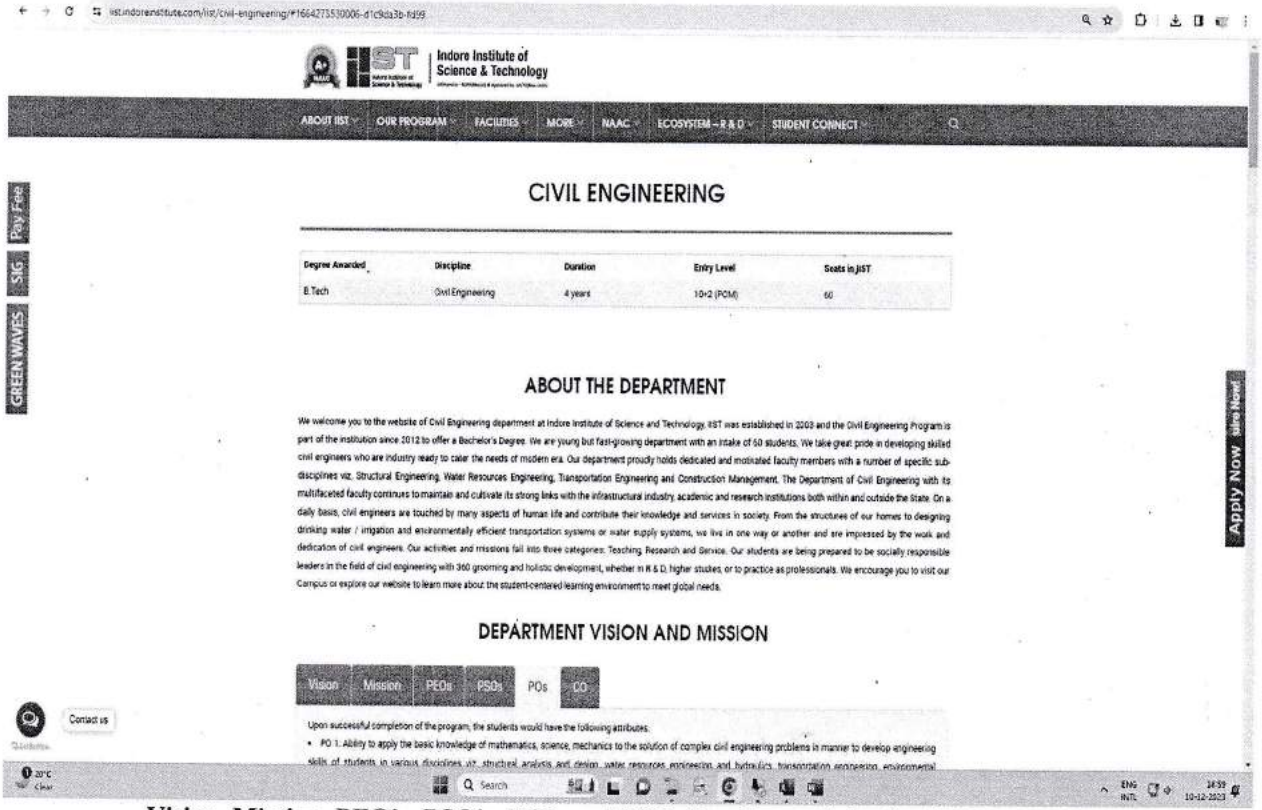


Vision, Mission, PEO's, PSO's and PO's Proof on website for IT Department



Vision, Mission, PEO's, PSO's, PO's and CO's Proof on website for CE Department

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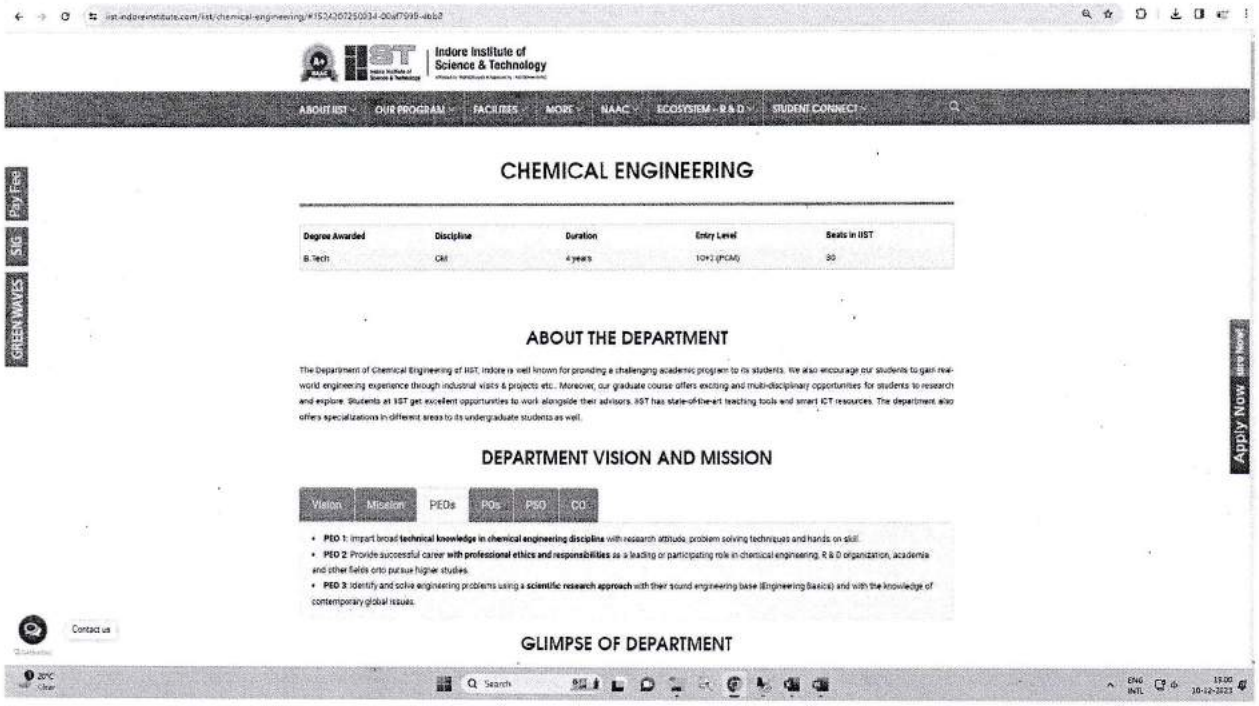
Approved by AICTE, New Delhi, Affiliated to RGPV, Bhopal, Recognized by UGC under Section 2(f)



Vision, Mission, PEO's, PSO's, PO's and CO's Proof on website for CM Department

Vision, Mission, PEO's, PSO's, PO's and CO's Proof on website for CSE(IOTCSBT) Department

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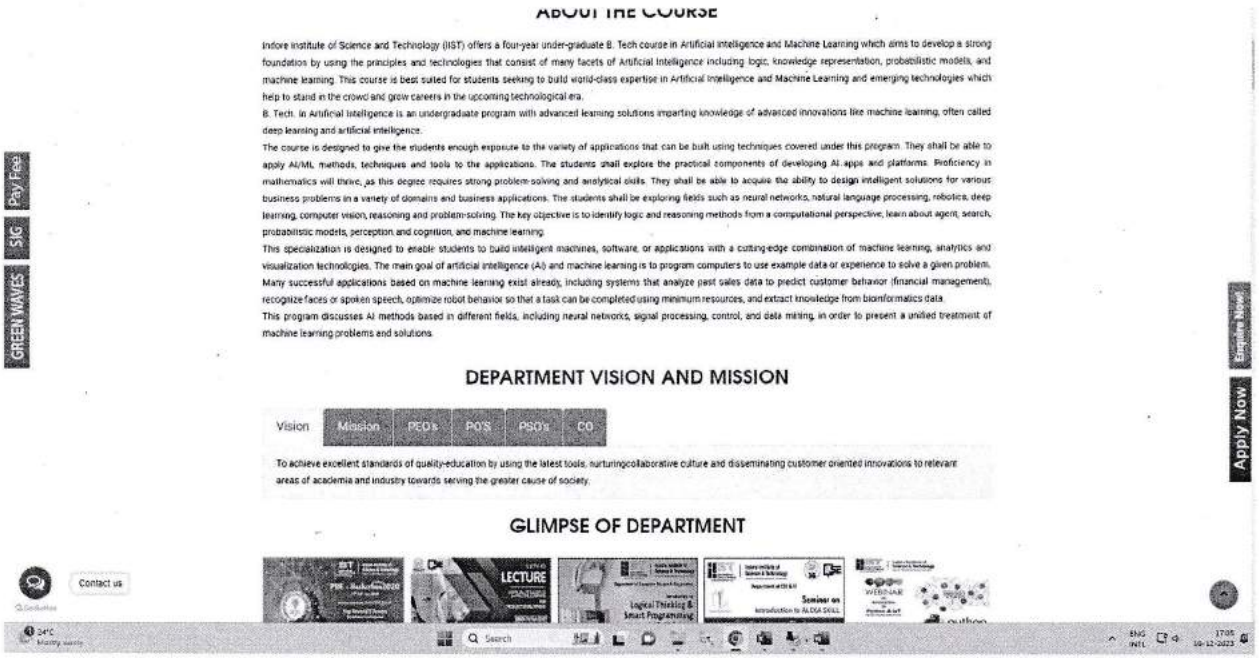
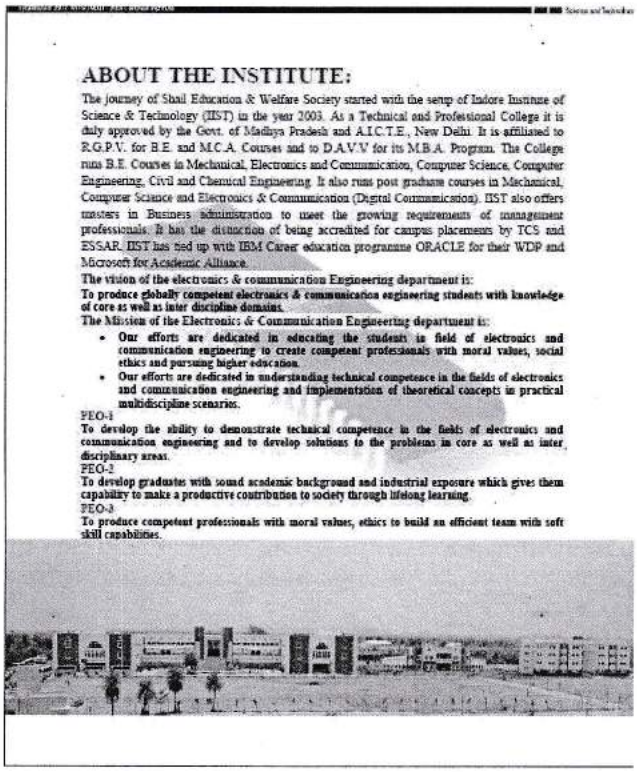


Vision, Mission, PEO's, PSO's, PO's and CO's Proof on website for AIML Department



ABOUT THE INSTITUTE:

The journey of Shail Education & Welfare Society started with the setup of Indore Institute of Science & Technology (IIST) in the year 2003. As a Technical and Professional College it is duly approved by the Govt. of Madhya Pradesh and A.I.C.T.E., New Delhi. It is affiliated to R.G.P.V. for B.E. and M.C.A. Courses and to D.A.V.V for its M.B.A. Program. The College runs B.E. Courses in Mechanical, Electronics and Communication, Computer Science, Computer Engineering, Civil and Chemical Engineering. It also runs post graduate courses in Mechanical, Computer Science and Electronics & Communication (Digital Communication). IIST also offers masters in Business administration to meet the growing requirements of management professionals. It has the distinction of being accredited for campus placements by TCS and ESSAR. IIST has tied up with IBM Career education programme ORACLE for their WDP and Microsoft for Academic Alliance.

The vision of the electronics & communication Engineering department is:

To produce globally competent electronics & communication engineering students with knowledge of core as well as inter discipline domains.

The Mission of the Electronics & Communication Engineering department is:

- **Our efforts are dedicated in educating the students in field of electronics and communication engineering to create competent professionals with moral values, social ethics and pursuing higher education.**
- **Our efforts are dedicated in understanding technical competence in the fields of electronics and communication engineering and implementation of theoretical concepts in practical multidiscipline scenarios.**

PEO-1
To develop the ability to demonstrate technical competence in the fields of electronics and communication engineering and to develop solutions to the problems in core as well as inter disciplinary areas.
PEO-2
To develop graduates with sound academic background and industrial exposure which gives them capability to make a productive contribution to society through lifelong learning.
PEO-3
To produce competent professionals with moral values, ethics to build an efficient team with soft skill capabilities.

FDP on Robotics under e-Yantra IIT Bombay Leaflet

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Indore Institute of Science & Technology

	COURSE PLAN	2020-2021
		Branch EC Year 2nd Sem 4 Section 1

The vision of the Institute is:
To be a nationally recognized institution of excellence in technical education and produce competent professionals capable of making valuable contribution to the society

The Mission of the Institute is:

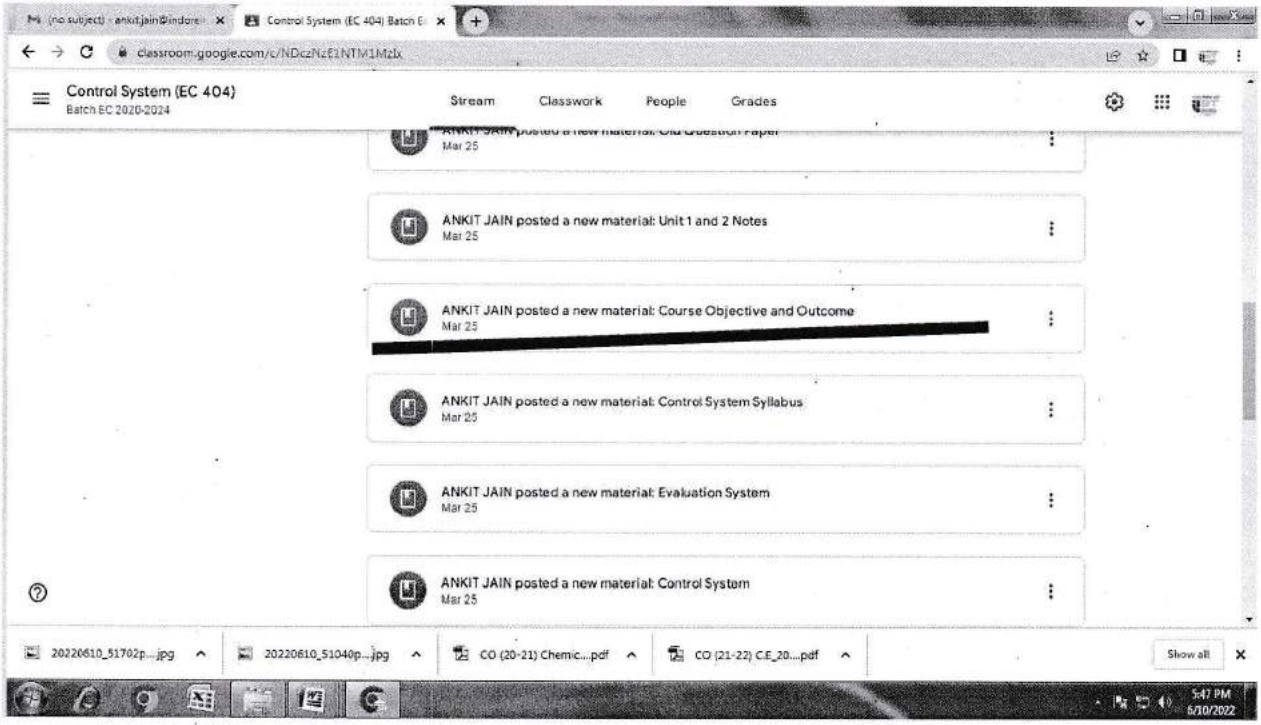
- To promote academic growth by offering state-of-the-art undergraduate and postgraduate programmes.
- To undertake collaborative projects which offer opportunities for interaction with academia and industry.
- To develop intellectually capable human potential who are creative, ethical and gifted leaders.

The vision of the Electronics & Communication Engineering department is:
To produce globally competent electronics & communication engineering students with knowledge of core as well as inter discipline domains.

The Mission of the Electronics & Communication Engineering department is:

1. Educating the students in field of electronics and communication engineering to create competent professionals with moral values, social ethics and pursuing higher education.
2. Inculcating the understanding technical competence in the fields of electronics and communication engineering and implementation of theoretical concepts in practical multidiscipline scenarios.

Vision, Mission, PEO's, PO's, PSO's and CO's in Course file



Course Outcome Shared through Google Classroom to the students

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