श्रीचन्द्रशेखरेन्द्रसरस्वतीविश्वमहाविद्यालयः
(विश्वविद्यालयानुदानयोगस्य १९५६ विधे: तृतीयविधिमनुसृत्य मानितविश्वविद्यालयत्वेन प्रकटीकृतः)

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(Deemed to be University u/s 3 of the UGC Act 1956)
(Accredited with 'A' Grade by NAAC)
Enathur, Kanchipuram - 631 561.

Programme Name: **Computer Science Engineering**

Programme Code: **BE**

PSOs (Programme Specific Outcome)

Name of the Programme	PSO Statement
Computer Science Engineering	PSO 1.Model Computational Problems by applying mathematical concepts and design solutions using suitable data structures and algorithmic techniques
	PSO 2.Design and develop solutions by following standard software engineering principles and implement by using suitable programming language and platforms
	PSO 3.Develop system solutions involving both hardware and software modules

PEOs (Programme Educational Objectives)

Name of the Programme	PEO Statement
Computer Science Engineering	PEO. 1: Provide engineering insight to problem solving to succeed in Technical Profession through precise education and to prepare students to excel in postgraduate programs.
	PEO. 2: To provide students with fundamental knowledge and ability to expertise in Computer Science and Engineering.
	PEO. 3: Prepare students with good scientific and engineering breadth so as to analyze, design and create products, solutions to problems in the area of Computer Science and Engineering.
	PEO. 4: To inculcate in students professional, effective communication skills, team work, multidisciplinary approach and an ability to relate engineering issues to broader social context.

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		PEO. 5: Prepare students to be aware of excellence, leadership, written ethical codes and guidelines and lifelong learning needed for successful professional career by providing them with an excellent academic environment.	

COs (Course Outcomes)

S.No	Course Code	Course Name	Course Outcome
1	CESCS18T40	Programming for Problem Solving	[1] Makes students gain a broad perspective about the uses of computers in the engineering industry [2] Develops a basic understanding of computers, the conept of algorithm and algorithmic thinking [3] Develops the ability to analyze a problem, develop an algorithm to solve it [4] Develops the use of the C programming language to implement various algorithms and develop the basic concepts and terminology of programming in general [5] Introduces the features of data structures in this C programming language
2	BCSF183T20	Digital Electronics	[1] Understand the basic number system and Boolean Algebra [2] Understand the basics of combinational and sequential circuits [3] Understand the concepts of VHDL programming for designing Digital circuits
3	BCSF183T30	Data Structures and Algorithms	[1] Able to analyze the algorithms to determine the time and computation complexity and justify the correctness [2] Implement search problems, problem of stacks, queue and linked list. [3] Student will able to write an algorithm Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort and compare their performance in term of Spaceand Time complexity [4] Student will able to implement Graph search and traversal algorithms and determine the time and computation complexity.
4	BCSF183T40	Object Oriented Programming using C++	[1] Articulate the principles of object-oriented simple abstract data types, control flow and design implementations, using abstraction functions to

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				document them.
			[2]	Outline the essential features of object-oriented programming such as encapsulation, polymorphism, inheritance, and composition of systems based on object identity using class and object.
			[3]	Apply the object using constructors and destructors and using the concept ofpolymorphism to implement compile time polymorphism in programs by usingoverloading methods and operators.
			[4]	Use the concept of inheritance to reduce the length of code and evaluate the usefulness.
			[5]	Apply the concept of run time polymorphism by using virtual functions, overriding functions and abstract class in programs.
			[6]	Use I/O operations and file streams in programs and by applying the concepts of class and objects using Generic types , error handling and STL
			[7]	Analyze problems and implement simple C++ applications using an object-orientedprogramming approach.
			[8]	Name and apply some common object-oriented design patterns and give examples of their use.
5	CBSMA18T10	Discrete Mathematics	[1]	Express a given logical sentence in terms ofpredicates, quantifiers, and logical connectives.
			[2]	Derive the solution for a given a problem using deductive logic and prove the solution based onlogical inference and classify its algebraic structure.
			[3]	Evaluate Boolean functions, simplify expressionsusing the properties of Boolean algebra
			[4]	Develop the given problem as graph networks andsolve with techniques of graph theory
6	BCSF184T20	Computer Organization and Architecture	[1]	An ability to design the arithmetic and logical unit.
			[2]	An ability to implement different types of control and the concept of I/O andpipelining Techniques.
			[3]	An ability to select appropriate computer systems for given application domains forfuture design of computer architecture.
			[4]	Understand and develop processor for future computing hardwires to solves theproblems of highend computing applications.
			[5]	Imparting training to the students to able to design new computer architecture oftheir own so that it could be solve the computer stakeholder problems in

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				future.
			[6]	An ability to understand and design the various parallel processor model andarchitecture for design of futures processor models
7	BCSF184T30	Microprocessor and Microcontroller	[1]	Understand block diagram, interrupt structure of 8086 and other processor configurations
			[2]	Interface ICs like 8255 PPI, 8279 Display and Keyboard Interface, ProgrammableInterrupt controller and DAM Controller
			[3]	Develop simple programs with Basic Arithmetic Functions, String functions and Array
			[4]	Understand block diagram of 8051, Memory organization, counters and interrupt structure in 8051
			[5]	Develop simple programs in Arithmetic Function, Interfacing with motor and display devices
			[6]	Understand the block diagram and fundamentals of ARM processor, Thumb Instruction set.
8	BCSF184T40	Design and Analysis of Algorithms	[1]	For a given algorithms analyze worst-case running times of algorithms based on asymptotic analysis and justify the correctness of algorithms.
			[2]	Describe the greedy paradigm and explain when an algorithmic design situation calls for it. For a given problem develop the greedy algorithms.
			[3]	Describe the divide-and-conquer paradigm and explain when an algorithmicdesign situation calls forit. Synthesize divide-and-conquer algorithms.Derive and solve recurrence relation.
			[4]	Describe the dynamic-programming paradigm and explain when analgorithmic design situation calls for it. For a given problems of dynamicprogramming and develop the dynamic programming algorithms, and analyze it to determine its computational complexity.
			[5]	For a given model engineering problem model it using graph and write thecorresponding algorithm to solve the problems.
			[6]	Explain the ways to analyze randomized algorithms (expected running time,probability of error).
			[7]	Explain what an approximation algorithm is. Compute the approximation factor of an approximation algorithm (PTAS and FPTAS).
9	BCSF185T0	Automata Theory	[1]	Design of digital circuits.
			[2]	Design of Lexical analyzer

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			[3]	Designing software for identifying the words, phrases and other patterns in largebodies of text.
			[4]	To write software for processing the natural language.
			[5]	To apply in Artificial Intelligence and knowledge engineering, in game theory andgames, computer graphics, linguistics etc.,
10	BCSF185T20	Operating Systems	[1]	Describe and explain the fundamental components of a computer operating system.
			[2]	Define, restate, discuss, and explain the policies for scheduling, deadlocks,memory management, synchronization, system calls, and file systems.
			[3]	Describe and extrapolate the interactions among the various components ofcomputing systems.
			[4]	Design and construct the following OS components: System calls, Schedulers,Memory management systems, Virtual Memory and Paging systems.
11	BCSF185T30	Programming in JAVA	[1]	Use an appropriate concepts OOP as well as the purpose and usage principles ofInheritance, polymorphism, encapsulation and method overloading for developingand Implementing required software to satisfy the customer's needs
			[2]	Apply the concept of class, Objects, Collections classes for creating and using theappropriate software to meet the customers demand
			[3]	Design and Implement the concept of package for API reusability to reduce thesoftware development time and increase the efficiency of delivering software's ontime to the customers.
			[4]	Use the file reading and writing concepts to implements various softwareapplications
			[5]	Implement the applications by using java API concepts and testing and debuggingtools to automatically discover errors of Java programs as well as use versioningtools for collaborative programming/editing
			[6]	Design and Implementation of Connecting java with Databases to provide thesolutions to the customers in N-Tier business software models to maintain theorganizational information's effectively
			[7]	Design and implements the concept of GUI based software applications usingappropriate GUI API
12	BCSF185T40	Database Management	[1]	Understand database concepts, E R model and relational model

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		Systems	[2]	Understand the structures of SQL and query language, processing. Apply the SQL and PL/SQL programming with SQL table, views and Embedded SQL
			[3]	Understand Functional Dependency, apply various normalization techniques.Perform SQL queries related to Transaction Processing & Locking using conceptof Concurrency control and recovery.
			[4]	Understand the principles of storage structure and understand advanced storagemechanism.
			[5]	Understand how to secure the designed database and to know the variousdatabase
13	BCSF186T10	Compiler Design	[1]	Explain the concepts and different phases of compilation with compile time errorhandling and represent language tokens using Regular expressions.
			[2]	Context free grammar and finite automata and design lexical analyzer for a language.Compare top down with bottom up parsers, and develop appropriate parser toproduce parse tree representation of the input.
			[3]	Design syntax directed translation schemes for a given context free grammar.Generate intermediate code for statements in high level language.
			[4]	Apply optimization techniques to intermediate code
			[5]	Generate machine code for high level language program.
14	BCSF186T20	Computer Networks	[1]	Explain the functions of the different layer of the OSI Protocol.
			[2]	Draw the functional block diagram of wide-area networks (WANs), local areanetworks (LANs) and Wireless LANs (WLANs) describe the function of each block.
			[3]	For a given requirement (small scale) of wide-area networks (WANs), local areanetworks (LANs) and Wireless LANs (WLANs) design it based on the marketavailable component
			[4]	For a given problem related TCP/IP protocol developed the network programming.
			[5]	Configure DNS DDNS, TELNET, EMAIL, File Transfer Protocol (FTP), WWW,HTTP,SNMP, Bluetooth, Firewalls using open-source available software and tools.
15	BCSF186T30	Object Oriented Analysis and Design	[1]	Use a rational rose framework and explore its capabilities

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			[2]	Apply appropriate method of diagrammatic techniques.
			[3]	Design and implement innovative features in a development process.
			[4]	Design and implement a recommender system.
			[5]	Examine the performance of UML with various diagrammatic presentations.
16	BCSF187T40	Computational Biology	[1]	knowledge and awareness of the basic principles and concepts of biology, computer science and mathematics
			[2]	Problem-solving skills, including the ability to develop new algorithms and analysismethods.
			[3]	An understanding of the intersection of life and information sciences, the core ofshared concepts, language and skills the ability to speak the language of structurefunction relationships, information theory and database queries
17	BCSF185EA0	Software Engineering	[1]	Basic knowledge and understanding of the analysis and design of complex systems.
			[2]	Ability to apply software engineering principles and techniques.
			[3]	Design and implement innovative features in a development process.
18	BCSF185EB0	Internet of Things	[1]	Understand the concepts of Internet of Things
			[2]	Analyze basic protocols in wireless sensor network
			[3]	Design IoT applications in different domain and be able to analyze theirperformance
			[4]	Implement basic IoT applications on embedded platform
19	BCSF185EC0	Machine Learning	[1]	Apply the apt machine learning strategy for any given problem
			[2]	Suggest supervised, unsupervised or semi-supervised learning algorithms for anygiven problem
			[3]	Design systems that use the appropriate Trees in Probabilities Models of machinelearning
			[4]	Modify existing machine learning algorithms to improve classification efficiency
			[5]	Design systems that use the appropriate graph models of machine learning
20	BCSF185ED0	Information Theory and Coding	[1]	Design the channel performance using Information theory
			[2]	Understand and Comprehend various error control code properties

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			[3]	Apply linear block codes for error detection and correction
			[4]	Apply convolution codes for performance analysis & cyclic codes for error detectionand correction
			[5]	Design and understand about compression techniques with various Channelperformance techniques
21	BCSF185EF0	Cloud Infrastructure and Services	[1]	To explain the core concepts of the cloud computing paradigm: how and why this paradigm shift came about, the characteristics, advantages and challenges brought about by the various models and services in cloud computing.
			[2]	To apply the fundamental concepts in datacenters to understand the tradeoffs inpower, efficiency and cost by Load balancing approach.
			[3]	To discuss system virtualization and outline its role in enabling the cloud computingsystem model.
			[4]	To analyze various cloud programming models and apply them to solve problems onthe cloud.
			[5]	To analyze the billing of resources and other paradigm: how to deal with disasters.
			[6]	To deploy applications over commercial cloud computing infrastructures such asAmazon
22	BCSF186EI0	Cryptography and Network Security	[1]	1. Understand the knowledge about network security services and mechanisms.
			[2]	Analyse about Symmetrical and Asymmetrical cryptography.
			[3]	Analyse and Understand about the concept of Data integrity, Authentication, DigitalSignatures.
			[4]	Analyze about Various network security applications, IPSec, Firewall, IDS, Web security, Email security, and Malicious software etc.
			[5]	Understand the security issues involved with different Network operating systems
23	BCSF186EG0	Dataware housing and Mining	[1]	Design a Data warehouse system and perform business analysis with OLAP tools.
			[2]	Apply suitable pre-processing and visualization techniques for data analysis
			[3]	Create simple data mining applications using various functionalities of data mining
			[4]	Apply frequent pattern and association rule mining techniques for data analysis
			[5]	Apply appropriate classification and clustering

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					techniques for data analysis.
24	BCSF187EK0	Advanced Computer Architecture	[1]	Apply the concept of Parallel processor architecture in designing a moderncomputer for the future customers needs	
			[2]	Apply the parallel and Multicore architecture in higher education for designing amodern computer architecture	
			[3]	Apply and Develop a software for the appropriate modern computer architecturethrough understanding parallel and multicore computer architecture	
			[4]	Use the various parallelism architecture techniques and apply for their research area in future perspectives	
25	BCSF187EL0	Big Data Analytics	[1]	Big Data Analytics will give ability to a student to communicate computer scienceconcepts, designs, and solutions effectively and professionally among the researchgroups.	
			[2]	This course is aimed to offer training which prepare students to embark on Big DataAnalytics careers which is one of the fastest growing technologies. They are alsoprovided a very good foundation for further research analysis work.	
			[3]	Analyze InfosphereBigInsights Big Data Recommendations and access with processdata on Distributed File System	
			[4]	Prepare and equip students for opportunities in ever changing technology withhands-on industrial training.	
			[5]	The Syllabus also develops requisite professional skills and problem-solving abilitiesfor pursuing a career in Software Industry.	
26	BCSF187EO0	Artificial Intelligence	[1]	Exhibit strong familiarity with a number of important AI techniques, including inparticular search, knowledge representation, and planning and constraintmanagement.	
			[2]	Interpret the modern view of AI as the study of agents that receive percepts from theenvironment and perform actions.	
			[3]	Build awareness of AI facing major challenges and the complexity of typicalproblems within the field.	
			[4]	Assess critically the techniques presented and apply them to real world problems.	
			[5]	Develop self-learning and research skills to tackle a topic of interest on his/her ownor as part of a team.	

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27	BCSF187EM0	Blockchain Technology	[1] Familiarize the functional/operational aspects of cryptocurrency ECOSYSTEM. [2] Understand emerging abstract models for Blockchain Technology. [3] Identify major research challenges and technical gaps existing between theory andpractice in cryptocurrency domain.
28	BCSF187EN0	Robotic Process Automation	[1] Learn the basic concepts of Robotic Process Automation [2] Understand processes which can be automated, associated business documentation basics, RPA journey of an organization [3] Develop familiarity and deep understanding of UiPath tools [4] Develop ability to independently design and create robots for business processes [5] Design basic and simple chat bots
29	BCSF188EQ0	Advanced Operating Systems	[1] Discuss the various synchronization, scheduling and memory management issues. [2] Demonstrate the Mutual exclusion, Deadlock detection and agreement protocols of distributed operating system. [3] Discuss the various resource management techniques for distributed systems [4] Identify the different features of real time and mobile operating systems [5] Install and use available open-source kernel [6] Modify existing open-source kernels in terms of functionality or features used.
30	BCSF188ET0	Parallel and Distributed Algorithms	[1] To demonstrate the power and purpose of parallelism and To understand different types of parallel architecture, performance of parallel programs [2] To demonstrate concepts of data and task parallelism, independent parallelism, Introduction to Java multithreading, Fork-join parallelism. And Analyze fork and join parallelism, parallel prefix, parallel pack. [3] To understand the concepts of Mutual exclusion, Deadlocks and ParallelComputational Models and Simulating CRCW, CREW and EREW, PRAM algorithms [4] To demonstrate the concepts of Brent's Theorem, Simple parallel programs in MPIenvironments and

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				construct the task dependency graph for Quick sort algorithm.
			[5]	To demonstrate the general concepts on Distributed systems model, messagepassing and peer-to-peer systems.
31	BCSF188ES0	Soft Computing	[1]	Understand the concepts of fuzzy sets, knowledge representation using fuzzy rules, approximate reasoning
			[2]	Reveal different applications of these models to solve engineering and otherproblems fuzzy inference systems, and fuzzy logic.
			[3]	Understand the fundamental theory and concepts of neural networks, Identifydifferent neural network architectures, algorithms, applications and theirlimitations.
			[4]	Evaluate various techniques of soft computing to defend the best working solutions.
			[5]	Design hybrid system to revise the principles of soft computing in variousapplications

Programme Name: **Electronics and Communication Engineering**

Programme Code: **BE**

PSOs (Programme Specific Outcome)

Name of the Programme	PSO Statement

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BE Electronics and Communication Engineering	PSO 1.
	PSO 2.
	PSO 3.

PEOs (Programme Educational Objectives)

Name of the Programme	PEO Statement
Electronics and Communication Engineering	PEO. 1
	PEO. 2
	PEO. 3
	PEO. 4
	PEO. 5

COs (Course Outcomes)

S.No	Course Code	Course Name	Course Outcome
1		Electronic Devices	[1] Design circuits with transistor biasing. [2] Design simple amplifier circuits. [3] Analyze the small signal equivalent circuits of transistors and Design and analyze large signal amplifiers.
2		Digital System Design	[1] Analyze different methods used for simplification of Boolean expressions. [2] Design and implement Combinational circuits.

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			[3]	Design and implement synchronous andasynchronous sequential circuits.
			[4]	Execute simple HDL codes for the circuits
3		Signals and Systems	[1]	Understand the properties and representation of continuous and discrete time signals
			[2]	Analyze the discrete time systems using z-transforms
4		Network Theory	[1]	Analyse the behavior of different circuits and their response using various circuit analysistools and theorems
			[2]	Apply and analyse the circuits in time domain and frequency domain.
			[3]	Understand basic concepts regarding the system definition mathematically and associatenetwork function.
			[4]	Interpret the concept of Network synthesis
5		Analog Electronics	[1]	Determine the configuration and apply the characteristics of diodes and transistors.
			[2]	Design and analyze various Rectifier and Amplifier circuits.
			[3]	Design sinusoidal and non-sinusoidal oscillators
			[4]	Characterize the functioning of OP-AMP and design OP-AMP based circuits
			[5]	Design ADC and DAC circuits.
6		Analog and Digital Communication	[1]	Compare different analog modulation schemes for their efficiency and bandwidth.
			[2]	Analyze the behaviour of communication systems in the presence of noise
			[3]	Investigate pulse modulation systems and analyse their system performance
			[4]	Compute bit error performance of various modulation schemes.
7		Microprocessors and Microcontrollers	[1]	Execute programs using assembly language
			[2]	Design interfacing peripherals like, I/O, A/D, D/A, timer etc.
			[3]	Develop systems using different microcontrollers
			[4]	Characterize RSIC processors and design ARM microcontroller-based systems.
8		Measurement and Instrumentation	[1]	Use various types of Electrical Instruments
			[2]	Use various types of Electronic Instruments
9		Electromagnetic Fields and Waveguides	[1]	Determine the characteristics and wave propagation on HF transmission lines.
			[2]	Apply impedance transformation on Transmission lines.

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			[3]	Use transmission line sections for realizing circuit elements
			[4]	Characterize uniform plane wave.
			[5]	Calculate reflection and transmission of waves at media interface.
			[6]	Analyze wave propagation on metallic waveguide sin modal form.
			[7]	Determine the radiation and radiation characteristics of an antenna.
10		Microwave Engineering	[1]	Illustrate the concepts of propagation and analysis in RF and Microwave networks
			[2]	Understand various microwave system components and their properties.
			[3]	Analyze / synthesis the microwave systems
			[4]	Appreciate that during measurements of microwave systems, the different mathematicaltreatment is required compared to general circuit analysis
			[5]	Design microwave systems for different practical application.
11		Computer Architecture	[1]	Understand the basics structure of computers and instructions.
			[2]	Illustrate the fixed point and floating-point arithmetic for ALU operation.
			[3]	Discuss about implementation schemes of data-path and control units and pipelineperformance.
			[4]	Explain the concept, interfacing and organization of of various memories and I/O systems.
			[5]	Discuss parallel processing technique and unconventional architectures.
12		Digital Signal Processing	[1]	Apply DFT and FFT algorithms for the analysis of digital signals and systems.
			[2]	Design FIR filters for various applications.
			[3]	Design IIR filters for various applications.
			[4]	Characterize the effects of finite precision representation on digital filters.
			[5]	Design multi-rate filters
13		Computer Aided System Design	[1]	Understand the concepts of the simulation components and analysis for electronic devices and components in PSPICE.
			[2]	Develop the analog and digital modelling concepts in frequency and time domains inPSPICE.
			[3]	Develop programs for combinational and sequential logic circuits by identifying the differentabstraction

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				and delay models for digital circuits in VHDL
			[4]	Develop programs for combinational and sequential logic circuits by applying the differentabstraction and delay models for digital circuits in Verilog HDL.
			[5]	Develop programs for combinational and sequential logic circuits at switch level in VerilogHDL and understand Verilog synthesis flow.
14		Control Systems	[1]	Represent a control system and thereby to obtain the mathematical model
			[2]	Perform time domain analysis of control systems.
			[3]	Perform frequency domain analysis of control systems.
			[4]	Design compensators that can be used to design control systems with required specifications
			[5]	Understand the state variable analysis of systems
15		Computer Networks	[1]	Choose the required functionality at each layer for given application
			[2]	Detect and correct the error in the frame
			[3]	Apply the knowledge of addressing scheme and various routing protocols in datacommunication to select optimal path.
			[4]	Trace the flow of information from one node to another node in the network
			[5]	Develop real time applications of network
16		Principles of Management & Professional Ethics	[1]	Examine situations and to internalize the need for applying ethics principles, values to tackle withvarious situations.
			[2]	Develop a responsible attitude towards the use of computer as well as the technology.
			[3]	Able to envision the societal impact on the products / projects they develop in their career.
			[4]	Understanding the code of ethics and standards of computer professionals.
			[5]	Analyze professional responsibility and empowering access to information in the work place
17		Embedded Systems	[1]	Describe the architecture and programming of ARM processor.
			[2]	Outline the concepts of embedded systems.
			[3]	Use the system design techniques to develop software for embedded systems.
			[4]	Differentiate between the general purpose and real time operating system.
			[5]	Model real-time consumer/industrial applications

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				using embedded-system concepts
18		Optical Communication	[1]	Demonstrate an understanding of optical fiber communication link, structure, propagation andtransmission properties of an optical fiber.
			[2]	Estimate the losses and analyze the propagation characteristics of an optical signal in differenttypes of fibers.
			[3]	Describe the principles of optical sources and power launching-coupling methods.
			[4]	Compare the characteristics of fiber optic receivers.
			[5]	Design a fiber optic link based on budgets To assess the different techniques to improve thecapacity of the system.
19			[1]	

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Programme Name: **Electronics and Instrumentation Engineering**

Programme Code: **BE**

PSOs (Programme Specific Outcome)

Name of the Programme	PSO Statement
BE Electronics and Instrumentation Engineering	PSO 1.Graduates apply the knowledge of mathematical and physical science to solve problems in Control Engineering, Process Control, Robotics and Automation
	PSO 2.Graduates are capable of handling and applying modern engineering tools, software for Industrial Automation
	PSO 3.Graduates are capable of working in teams in industrial environment, research laboratory and carrying out major Industrial projects

PEOs (Programme Educational Objectives)

Name of the Programme	PEO Statement
Electronics and Instrumentation Engineering	[1] : To produce graduates having a strong background of basic science, Mathematics & Engineering and ability to use these tools.
	[2] : To produce graduates who can demonstrate technical competence in the field of instrumentation engineering and develop solutions to the complex problems
	[3] : To produce graduates having professional competence

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	through life-long learning such as advanced degrees, professional skills and other professional activities related globally to engineering & society
	[4] : To produce graduates who function effectively in a multi-disciplinary environment and individually, within a societal and environmental context
	[5] : To produce graduates who would be able to take individual responsibility and work as a part of a team towards the fulfillment of both individual and organizational goals.

COs (Course Outcomes)

S.No	Course Code	Course Name	Course Outcome
1	BEIF183T30	Electronic Devices and Circuits	[1] Identify the device for appropriate application. [2] Design amplifier and oscillator circuits using BJT, FET or MOSFET. [3] Demonstrate the knowledge to build projects in multidisciplinary environments.
2	BEIF183T40	Signal and Systems	[1] Understand the properties and representation of discrete and continuous signals. [2] Analyze and transform signals to different domains. [3] Perform the analysis and synthesis of discrete time systems [4] Perform the finite and infinite impulse response analysis of discrete time systems.
3	BEIF183T50	Electrical Measurement	[1] Understand Measurement systems and Bridge measurements. [2] Understand Know the principles of cathode ray oscilloscopes and other measuringinstruments [3] Understand the Compare analog and digital techniques and measurement errors
4	BEIF183T60	Sensors and Actuators	[1] Analyse the basics and design the resistive sensors. [2] Identify the materials and designing of inductive and capacitive sensors. [3] Analyze various types of Actuators [4] Design of micro sensors and micro actuators for

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				various applications.
			[5]	Implementfabrication process and technologies and compare various micro machining processes
5	BEIF183T20	Object Oriented Programming	[1]	Specify simple abstract data types and design implement at ions, using abstractionfunctions to document them.
			[2]	Recognize features of object -oriented design such as encapsulation, polymorphism, inheritance, and composition of systems based on object identity.
			[3]	Name and apply some common object-oriented design patterns and give examples of their use.
			[4]	Develop applications using OOPs Concept.
6	BEIF184T10	Digital Signal Processing	[1]	Understand discrete transform and its application.
			[2]	Design of infinite and finite impulse response filters for various applications.
			[3]	Apply signal processing concepts in systems having more than one sampling frequency
7	BEIF184T20	Industrial Instrumentation	[1]	Understand the various techniques used for the measurement of industrial parameters.
			[2]	Explain the design and working of various instruments
			[3]	Understand the installation techniques of various systems
			[4]	Understand the concept of various transducers used in industries
			[5]	Work with signal conditioning circuit of various measuring equipments
8	BEIF184T30	Principles of Communication	[1]	Understand the need for modulation and amplitude modulation techniques
			[2]	Understand frequency modulation, demodulation and the comparison of AM and FM
			[3]	Understand the PAM, PPM and PWM techniques
			[4]	Understand the different methods of PCM, PAM, DPCM, DM, ADM schemes which are used in digital communication.
9	BEIF184T50	Linear Integrated Circuits	[1]	Enumerate and analyze different steps involved in he fabrication process of integrated circuit
			[2]	Understand the concept of linear applications using Op-Amp and regulator

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			[3]	Ability to test and analyze the various applications of PLL and Timers.
			[4]	Understand the concept of Special Function Integrated Circuits
			[5]	Understand the concept of Application Integrated Circuits.
10	BEIF184T60	Digital Electronics	[1]	Understand the basic number system and Boolean algebra
			[2]	Understand the basics of combinational and sequential circuits
			[3]	Know about Flip Flops and their designing
			[4]	Analyze about State reduction techniques and various hazards present in the circuit
			[5]	Understanding the concepts of VHDL programming for designing Digital Circuits
11	BEIF185T10	Control Systems	[1]	Understand the basics of control system for the design and analysis
			[2]	Understand the issues related to time response analysis
			[3]	Perform frequency response and stability analysis.
			[4]	Design compensators in time and frequency domain.
			[5]	Understand the concept of stability and its assessment for linear time invariant systems.
12	BEIF185T20	Process Control Instrumentation	[1]	Understand basic principles and importance of process control in industrial process plant
			[2]	Acquire knowledge basic control action and its form
			[3]	Specify the required instrumentation and final control elements to ensure well-tuned control
			[4]	Apply the control system in various complex processes
			[5]	Gain the knowledge of Piping and Instrumentation Diagram.
13	BEIF185T30	Power Electronics and Industrial Drives	[1]	Choose the Power Devices based on the Application.
			[2]	Selection and Design of AC to DC, AC to AC Controlled Converters
			[3]	Design Choppers and Inverters.
			[4]	Implement the types of drives for different application.

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			[5]	Apply above conceptual things to real world problems in a Power System drives.
14	BEIF185T40	Power Plant Instrumentation	[1]	Understand the basic principles of powergeneration.
			[2]	Understand about measurement of various parameters in powerplant.
			[3]	Know the various analyzers in powerplant.
			[4]	Understand about the turbine boilercontrol.
			[5]	Understand about the turbine monitoring.
15	BEIF186T10	PLC and Data Acquisition System	[1]	Able to understand the need of computer in Automation.
			[2]	Understand the basics of data conversion and data acquisition.
			[3]	Understand the fundamental of PLC.
			[4]	Program a PLC with different logical languages.
			[5]	Various industrial applications of PLCs are studied.
16	BEIF186T20	Microprocessor and Microcontroller	[1]	Understand the block diagram, architecture and interrupts of 8085 microprocessor
			[2]	Understand the 16-bit microprocessor architecture and modes of operation
			[3]	Acquire knowledge about the co-processor configuration also the architecture of the co-processors 8087 and 8089
			[4]	Understand the ICs 8255 PPI, 8259 PIC, 8257 DMA, 8251 USART, 8279 Keyboard display controller interfacing
			[5]	Understand the architecture of microcontroller and SFR operations, interfacing with peripherals.
17	BEIF186T30	Principles of Management and Professional Ethics	[1]	Helps to examine situations and to internalize the need for applying ethics principles, values to tackle with various situations
			[2]	Develop a responsible attitude towards the use of computer as well as technology
			[3]	Able to envision the societal impact on the products/projects they develop in their career.
			[4]	Understanding the code of ethics and standards of computer professionals
			[5]	Analyze the professional responsibility and empowering access to information in the work place
18	BEIF186T40	Industrial Chemical Process	[1]	Understand the basic manufacturing various chemicals
			[2]	Get adequate knowledge about the Mass transfer/Distillation/Extraction/Leaching process
			[3]	Understand characteristics of chemical reactors.

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			[4] Understand about case study of process variables and control in unit operation.
			[5] Understand about various Automation techniques.
19	BEIF1867T10	Robotics and Automation	[1] Able to demonstrate the mechanical structures of industrial robots.
			[2] Able to understand the importance of robot vision.
			[3] Able to apply knowledge and choose the best end effectors for specific applications.
			[4] Forward and inverse kinematics of Robotics is learned.
			[5] Able to program and industrial robot through different methods and languages.
20	BEIF185EA0	Analytical Instrumentation	[1] Understand various techniques and methods of Spectral analysis.
			[2] Apply the knowledge of chromatography to separate the constituents from a complex mixture.
			[3] Get adequate knowledge about Gas sensor and pollution monitoring instruments.
			[4] Able to select an appropriate analyzer for an Industrial requirement. Able to understand the working principle of NMR and Mass spectroscopy.
21		Instrumentation and Control in Iron and Steel Industries	[1] Know the role of Instrumentation Engineer in such iron and steel industries.
			[2] Understand the basis of casting technology.
			[3] Understand the sensors and transducers for various measurements.
			[4] Know the role of furnace control.
			[5] Understand the specification of computer application in iron and steel industries.
22		Digital Instrumentation	[1] Understands various types of digital instruments.
			[2] Capableof understanding various digital measurement techniques used in the industrial processes.
			[3] Understands the use of various electrical/electronic instruments, their construction,applications, and principles of operation.
			[4] Understands the concepts of the standards and units of measurements.
			[5] Develops basic skills in the design of electronic

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				on different fuels
			[3]	Know the basic concepts of energy management.
			[4]	Acquire knowledge on the applications of Hazards
			[5]	Understand the Practical Issues and Implementation of industrial safety.
28	BEIF187EI0	Embedded Systems	[1]	Understand the various applications, challenges involved in Embedded system design
			[2]	Recognize the suitable processor, understanding the memory operations of the embedded system.
			[3]	Understand the communication types in the embedded systems and complete understanding about the communication protocols.
			[4]	Understand various functions, services of RTOS and different scheduling models to design an embedded system.
			[5]	Implement the concepts of programming & optimization techniques. Case studies to analyze the complete development of the embedded system.
29	BEIF187EJ0	Neural Network and Fuzzy Logic Control	[1]	Analyze the basic knowledge of neural networks.
			[2]	Analysis of learning systems in conjunction with feedback control systems
			[3]	Analyze the basics of Fuzzy Logics.
			[4]	Acquire knowledge on the applications of Computer simulation of intelligent controlsystems.
			[5]	Learn the usage of different types of algorithms.
30	BEIF187EK0	Instrumentation for Agriculture and Food Processing Industries	[1]	Able to understand the necessity of instrumentation in agriculture and food processing.
			[2]	Familiarized with instrumentation requirement in agriculture and food processing.
			[3]	Able to analyze and design systems/instruments for agriculture and foodprocessing.
			[4]	Able to understand on agriculture used in the measurement and control.
			[5]	Able to understand problems in agriculture and food processing and provide technological

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				solution to the same.
31	BEIF187EL0	Optimal Control System	[1]	Ability to understand the optimal control problem formulation and its selection of performance measures.
			[2]	Ability to recognize and recall the fundamentals of calculus of variation.
			[3]	Ability to implement optimal control concept for minimum time problem and ability to apply Matrix Ricatti Equation for real problem
			[4]	Ability to understand various iterative numerical technique and gradient projection algorithm.
			[5]	Ability to understand the concepts of dynamic programming.
32	BEIF187EM0	Computer Control of Process	[1]	Able to understand the analysis of discrete data system
			[2]	Able to Design various digital controlalgorithms.
			[3]	Able to learn the techniques of DAS, DDC, AI andSCADA.
			[4]	Ability to build models from Input-Output data.
			[5]	Ability to design Multi-loop and multivariable controller for multivariable system.
33	BEIF187EN0	Process Equipment Design	[1]	Able to interpret and formulate design specifications for instrumentation systems
			[2]	Able to understand the principle design of sensors like RTD and Thermistor
			[3]	Able to understand the principles design of sensors for Flow and Level
			[4]	Able to design a signal conditioning circuit for various process measuring sensors
			[5]	Able to design a final control element for a control loop.
34	BEIF187EO0	Mechatronics	[1]	Model and analyze electrical and mechanical systems and their interconnection.
			[2]	Able to use the drive systems.
			[3]	Be proficient in the use of fluid power systems in various Mechatronics applications.
			[4]	Demonstrate the use of industrial electronic

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				devices.
			[5]	Demonstrate the design of modern CNC machines, and Mechatronics elements
35	BEIF187EP0	Non-Linear Control Systems	[1]	Understand the basics of nonlinear systems.
			[2]	Understand the analytics behind nonlinear systems.
			[3]	Derive the Linearization methods and approximation methods
			[4]	Understand the stability analysis of nonlinear systems
			[5]	Understand the concepts of IO stability and its relationship.
36	BEIF187EQ0	Aircraft Instrumentation	[1]	Develop basic knowledge in the behavior and characteristics of various display devices in aircraft.
			[2]	Acquire knowledge on various pressure measuring instruments.
			[3]	Acquire knowledge on gyroscopic instruments and Magnetic instruments.
			[4]	Acquire knowledge on Flight instruments and Waring systems
			[5]	Acquire knowledge on Fuel Systems, maintenance and servicing.
37	BEIF187ER0	Engineering Economics	[1]	Acquire the skills to apply the basics of economics.
			[2]	Understand techniques and methods of sensitivity and expected-value decisions.
			[3]	Acquire the skills for cost analysis to engineering.
			[4]	Demonstrate knowledge of cost estimation techniques and probabilistic risk analysis.
			[5]	Acquire the skills to take economically sound decisions.
38	BEIF187ES0	Fiber Optics and Laser Instrumentation	[1]	Specify and operate optical test instrumentation, optical fibers, optical sources and detectors.
			[2]	Know about the Industrial applications of optical fibers.
			[3]	Ability to understand the fundamentals of Laser.
			[4]	Know about the Industrial applications of Laser.

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				[5]	Understand the concept of Holography and laser work area, citing unsafe conditions present.
39	BEIF187ET0	Digital Control Systems		[1]	Analyze digital systems in time domain.
				[2]	Analyze digital systems in frequency domain.
				[3]	Model and analysis digital systems in state space representation.
				[4]	Design state observer and state feedback by pole placement design
				[5]	Understand the concept of stability in discrete domain.
40	BEIF188EU0	Automotive Instrumentation		[1]	Understand depth knowledge on automobile system, its subsystems and components.
				[2]	Know about the concepts of various sensors used in automobile systems.
				[3]	Know the basic and advanced controls in automotive systems.
				[4]	Understand about safety system clearly.
				[5]	Understand depth knowledge about the electronics and software involved in automotive systems.
41	BEIF188EV0	VLSI Design		[1]	Analyze the basics of VLSI Technology and MOS Theory
				[2]	Understand the principles and design Rules of CMOS-VLSI technology.
				[3]	Analyze the performance of MOS and CMOS Circuits Logics.
				[4]	Analyze design issues involved at circuit logic and system level.
				[5]	Adequate knowledge about programmable logics.
42	BEIF188EW0	Autotronics		[1]	Develop through basic knowledge about various ignition and injection systems
				[2]	Acquire knowledge on the safety systems of the automobiles
				[3]	Learn about various methods of sensors for engine controls
43	BEIF188EX0	Real Time Embedded System Design		[1]	Understand the national and international job market, both in the industry as high – skilled expert and in the academia as a researcher or prospective PhD student.
				[2]	Acquire knowledge and understand fundamental

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			embedded systems design paradigms, architectures, possibilities and challenges, both with respect to software and hardware.	
			[3] Categorize the interrupts and program the interrupt controllers	
			[4] Understand the operation, services, and functions of Real time operating systems.	
			[5] Practically apply gained theoretical knowledge in order to design, analyze and implement embedded systems.	
44	BEIF188EY0	Biomedical Instrumentation	[1] Know the basic concepts of Anatomy & Physiology.	
			[2] Have adequate knowledge about different types of Electrodes, Transducers and Amplifiers.	
			[3] Understand the important and modern methods of imaging techniques.	
			[4] Comprehend about the Human Assist Devices and Therapeutic Equipments	
45	BEIF188EZ0	Machine Vision	[1] Develop through basic knowledge about Machine Vision.	
			[2] Acquire knowledge on the applications of image processing and analysis.	
			[3] Learn the usage of image processing and analysis.	
46	BEIF188EA1	MEMS	[1] Analyze the basics and scaling laws of micro fabrication methods.	
			[2] Identify the materials for MEMS sensors and designing of sensors.	
			[3] Design Micro actuators for various applications.	
			[4] Implement Micro system fabrication process and technologies.	
			[5] Analyze packaging methods and compare various Micro machining processes	
47	BEIF188EB1	Wireless Communication	[1] Understands the fundamentals of wireless channels with path loss.	
			[2] Capable of understanding of multiple access techniques.	
			[3] Acquired the knowledge of digital signaling of fading channels.	
			[4] Acquired the idea of multipath mitigation techniques.	

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			[5]	Understands multiple input multiple output antenna techniques
48		Green and Smart Buildings	[1]	Define a green building, along with its features, benefits and rating systems.
			[2]	Describe the criteria used for site selection and water efficiency methods.
			[3]	Explain the energy efficiency terms and methods used in green building practices.
			[4]	Select materials for sustainable built environment & adopt waste management methods.
			[5]	Describe the methods used to maintain indoor environmental quality.
49		Operation Research	[1]	Have the knowledge of the Mathematical formulation of the problem which is a tool in the development of theoretical of engineering science.
			[2]	Understand the model of Transportation and assignment design in engineers.
			[3]	Have the knowledge of Game theory and sequencing problems in engineering.
			[4]	Understand about Solution of integer programming and design of Inventory control in engineers.
			[5]	Have a knowledge of solving problems in Resource allocation Scheduling
50	BEIF185OEA	Electric Hybrid Vehicle Technology	[1]	Know and understand the fundamentals of electric vehicles.
			[2]	Understand the concept of Battery.
			[3]	Understand the DC and AC electrical machines
			[4]	Learn the concept of electric vehicles
			[5]	Ability to understand the hybrid electric vehicles.
51		Material Engineering	[1]	Identify crystal structures for various materials and understand the defects in such structures.
			[2]	Understand how to tailor material properties of ferrous and non-ferrous alloys and how to quantify mechanical integrity and failure in materials
			[3]	Understand the micro structural aspects and phases of Fe-C systems.

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			[4]	Understand the various heat treatment process.
			[5]	Properties and applications of ferrous and non-ferrous metals.
52	BEIF186OEE	Radar and Navigation	[1]	Understand the principles of navigation, radar equation and antenna parameters.
			[2]	Know about the concept of tracking system.
			[3]	Understand about the signal approach and landing aids as related to navigation.
			[4]	Derive and discuss the Range equation and the nature of detection.
			[5]	Describe about the navigation systems using the satellite.
53	BEIF186OEF	Human Resource Management	[1]	Understands the perspectives of Human resources management
			[2]	Best fit employee concept provided with demand and requirement.
			[3]	Acquired the knowledge of training and executive development
			[4]	Explained the concept of sustaining the employee with compensation plans
			[5]	Acquired the method of performance evaluation and control process
54	BEIF186OEG	Waste Water Engineering	[1]	An ability to estimate sewage generation and design sewer system including sewage pumping stations.
			[2]	An ability to perform basic design of the unit operations and processes that are used in sewage treatment.
			[3]	Understand the characteristics and composition of sewage.
			[4]	Understand the standard methods for disposal of sewage and self-purification of streams.
			[5]	Gain knowledge on sludge treatment and disposal.
55	BEIF186OEH	Computer Aided Design	[1]	Understand the basics of CAD/CAM.
			[2]	Exposure over the concepts of computer graphics.
			[3]	Learn about the geometric issues concerned to the manufacturing and its related areas.
			[4]	Understand the latest advances in the manufacturing perspectives.

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			[5]	Provide an overview of how computers are being used in design, development of manufacturing plants.
56	BEIF187OEI	Data Communication and Network Systems	[1]	Know and understand the fundamentals of the functions of the different layer of OSI Protocol.
			[2]	Ability to understand about wide-area networks (WANs), local area networks (LANs).
			[3]	Ability to design wide-area networks (WANs), local area networks (LANs) for thegiven requirement.
			[4]	For a given problem related TCP/IP protocol developed the network programming.
			[5]	Configure the Application Layer, software and tools
57	BEIF187OEJ	Energy Harvesting Technologies	[1]	Select proper Piezo electric materials for its applications.
			[2]	Identify and design the solar energy applications.
			[3]	Design wind turbines for various applications.
			[4]	Implement Tidal and Ocean wave harvesting methods and technologies.
			[5]	Analyze the basics and scaling laws of micro fabrication methods.
58	BEIF187OEK	Disaster Management	[1]	Distinguish the forms of disasters and their impact on the environment and society
			[2]	Assess the vulnerability and different approaches of risk reduction measures
			[3]	Understand the hazard and vulnerability profile of India
			[4]	Analyse the circumstances in the Indian context, for Disaster damage assessment and management
			[5]	Be an active, responsible citizen during the disasters and help to create safe society
59	BEIF187OEL	Battery Technology	[1]	Recognize the basic physical concepts and kinetics involved in electrochemical reactions
			[2]	Select the appropriate battery system with respect to application
			[3]	Analyze the characterization methods of batteries and interpret concepts describing battery performance

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			[4]	Describe the recent developments battery systems
			[5]	Understand the battery systems for automotive and discuss the Life Cycle Analysis according to cost and environmental aspects and energy consumption, reuse, recycling.
60	BEIF188OEL	Data Compression Techniques	[1]	Program, analyze Hoffman coding: Loss less image compression, Text compression, Audio Compression.
			[2]	Program and analyze various Image compression and dictionary-based techniques like static Dictionary, Diagram Coding, Adaptive Dictionary.
			[3]	Understand the statistical basis and performance metrics for lossless compression. Understand the conceptual basis for commonly used lossless compression techniques,
			[4]	and understand how to use and evaluate several readily available implementations of those techniques.
			[5]	Understand the structural basis for and performance metrics for commonly used lossy compression techniques and conceptual basis for commonly used lossy compression techniques.
61	BEIF188OEM	Satellite Communication	[1]	Visualize the architecture of satellite systems as a means of high speed, high range Communication system and to know about the orbital equations.
			[2]	State various aspects related to satellite sub-systems.
			[3]	Ability to understand the various phenomena in satellite communication.
			[4]	Ability to design link budget for the given parameters and conditions.
			[5]	Know about the modulation and multiple access schemes.
62	BEIF188OEN	Entrepreneurship Development	[1]	Have the ability to discern distinct entrepreneurial traits
			[2]	Know the parameters to assess opportunities and constraints for new business ideas
			[3]	Understand the systematic process to select and

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				screen a business idea
			[4]	Design new strategies for successful implementation family business.
			[5]	Write a business plan and understand social entrepreneurship skills.
63	BEIF188OEO	IoT in Automation	[1]	Understand the concepts of Internet of Things.
			[2]	Analyze basic protocols in wireless sensor network.
			[3]	Design IoT applications in different domain andbe able to analyze their performance
			[4]	Implement basic IoT applications on embedded platform.

Programme Name: **Mechatronics Engineering**

Programme Code: **BE**

PSOs (Programme Specific Outcome)

Name of the Programme	PSO Statement
BE Mechtronics Engineering	PSO 1.
	PSO 2.
	PSO 3.

PEOs (Programme Educational Objectives)

Name of the Programme	PEO Statement
Mechatronics Engineering	PEO. 1: Comprises strong fundamental knowledge in solving multi-

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	disciplinary problems
	PEO. 2: Possess successful technical or professional careers
	PEO. 3: Continue to learn and to adapt to the day to day evolving technology in the world
	PEO. 4: Encouraged to design industrial automation systems that are innovative and socially acceptable.

COs (Course Outcomes)

S.No	Course Code	Course Name	Course Outcome
1	CHSEN18T10	English	[1] Understand the nuances of grammar and vocabulary in speaking and writing. [2] Listen and comprehend different spoken excerpts critically, infer and implied meanings. [3] Speak convincingly, express their opinions clearly, initiate a discussion, negotiate, argue using appropriate communicative strategies. [4] Read different genres of texts, infer implied meanings and critically analyse and evaluate them for ideas as well as for method of presentation. [5] Write effectively and persuasively and by using different techniques of writing such as narration, description, exposition and argument as well as creative, critical, analytical and evaluative writing.
2	CBSMA18T20	Mathematics I	[1] The concept of convergence and divergence and their testing that is fundamental to application of analysis to Engineering problems. [2] The effective mathematical tools for the solutions of differential equations that model physical processes. [3] To apply differential and integral calculus to notions of curvature and to improper integrals. Apart from some other applications they will have a basic understanding of Beta and Gamma functions.

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			[4]	The mathematical tools needed in evaluating multiple integrals and their usage. To deal with functions of several variables that are essential in most branches of engineering.
			[5]	To improve the ability of numerical computations to find the solutions of a given polynomial and transcendental equations along knowing the process of inter and extrapolations that improves the ability of solving helps to performcomputational engineering problems
3	CBSPH18T30	Engineering Physics	[1]	To develop an understanding of the principles of optics.
			[2]	Experience the diverse applications of the wave equation. Learn the mathematical tools needed to solve quantum mechanics problems.
			[3]	To provide adequate knowledge on laser fundamentals types and applications and to expose the basics of signal propagation through fiber optics
			[4]	Understand the principles and concepts of semiconductor Physics. Understand and utilize the mathematical models of semiconductor junctions and MOS transistors for circuits and systems.
			[5]	Acquire basic knowledge on various newly developed smart materials
4	CESCS18T40	Programming for Problem Solving	[1]	To formulate simple algorithms for arithmetic and logical problems.
			[2]	To translate the algorithms to programs (in C language).
			[3]	To test and execute the programs and correct syntax and logical errors.
			[4]	To implement conditional branching, iteration and recursion.
			[5]	To use arrays, pointers and structures to formulate algorithms and programs.
			[6]	To decompose a problem into functions and synthesize a complete program using divide and conquer approach.
			[7]	To apply programming to solve matrix addition and multiplication problems and searching and sorting problems.

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			[8]	To apply programming to solve simple numerical method problems.
5	CBSCH18T20	Engineering Chemistry	[1]	Realize the importance of knowledge in atomic structure and wave mechanics in studying the properties of elements
			[2]	Analyze and deduce the properties molecules on the basis of different bonding modes
			[3]	Rationalizebulk properties and processes usingthermodynamic considerations
			[4]	Distinguish the ranges of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques
			[5]	Understand the major types of chemical reactions and effect of three-dimensional structures on the product of reactions
6	CBSMAF8T10	Mathematics – II	[1]	Determine consistency of liner system of equations, Rank, Eigen values and eigen vectors of the given square matrix also compute power, inverse of the matrix using cayley Hamilton theorem.
			[2]	Work numerically on the ordinary differential equations and partial differential equations using different methods through the theory of finitedifferences
			[3]	Apply Laplace transform and its inverse to solve initial value and other related problems.
			[4]	Use Fourier transforms and its inverse in practical applications of electronics engineering.
			[5]	Solving finite difference equation in z-transforms
7	CESEE18T30	Basic Electrical Engineering	[1]	Explain the basic electrical quantities and laws.
			[2]	Explain the construction, types and applications ofelectrical machines.
			[3]	Study the working principles of power converters.
			[4]	Show the tariff for a given load and energyconsumption.
			[5]	Introduce the components of low voltage electrical installations and its applications.
8	CMCCH28T50	Environmental Sciences and Engineering	[1]	Understand the individual responsibility towards environment
			[2]	Create Eco-centrism approach towards sustainable society

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			[3]	Enable the learners to understand, think and evolve strategies for management and conservation of environment for sustaining life on earth.
			[4]	Develop a new solution towards various environmental problems
			[5]	Understand the current environmental trends of India and the world and about environmental legislation
9	BMTF183T10	Mathematics III	[1]	Basic probability axioms and rules and the moments of discrete and continuous random variables as well as be familiar with common named discrete and continuous random variables.
			[2]	How to derive the probability function of transformations of random variables and use these techniques to generate data from various distributions.
			[3]	How to calculate and apply measures of location and measures of dispersion in grouped and ungrouped data cases.
			[4]	Test of Hypothesis as well as calculate confidence interval for a population parameter for single sample and two sample cases.
			[5]	How to translate real-world problems into probability models. Also, how to collectdata, analyze and deduce information from a real time survey without any unwilling bias.
10	BMTF183T20	Object Oriented Programming Using C++	[1]	Specify simple abstract data types and design implement at ions, using abstraction functions to document them.
			[2]	Outline the essential features of object-oriented programming such as encapsulation, polymorphism, inheritance, and composition of systems based on object identity using class and object.
			[3]	Apply the concept of run time polymorphism by using virtual functions, overriding functions and abstract class in programs to develop electronic related work.
			[4]	Name and apply some common object-oriented design patterns and give examples of their use.
			[5]	Develop applications using OOPs Concept by

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				designing and developing projects.
11	BMTF183T30	Electronic Devices and Circuits	[1]	Identify the device for appropriate application.
			[2]	Learn different transistor configurations
			[3]	Design amplifier circuits using BJT or FET.
			[4]	Design oscillator circuits using BJT or FET.
			[5]	Demonstrate the knowledge to build projects in multidisciplinary environments
12	BMTF183T40	Engineering Mechanics	[1]	Get familiarized with the basic laws of physics, vector operations and forces.
			[2]	Understand the principles of beams, supports and equilibrium of rigid bodies.
			[3]	Calculate the area and mass properties of various sections and solids.
			[4]	Know about dynamics of particles and their analysis by various methods.
			[5]	Know about the applications of friction and rigid body dynamics.
13	BMTF183T50	Manufacturing Technology for Mechatronics	[1]	Learn the process of metal casting.
			[2]	Understand different sheet metal operations.
			[3]	Explain the concept of different metal forming operations.
			[4]	Discuss the mechanism of metal cutting and different forces acting on the tools.
			[5]	Explain the different gear manufacturing processes and gear finishing operations.
			[6]	Understand the different advance manufacturing processes and their applications.
14	BMTF183T60	Sensors and Actuators	[1]	Analyse the basics and design the resistive sensors.
			[2]	Identify the materials and designing of inductive and capacitive sensors.
			[3]	Analyze various types of Actuators
			[4]	Design of micro sensors and micro actuators for various applications.
			[5]	Implementfabrication process and technologies and compare various micro machining processes
15	BMTF184T10	Strength of Materials and Fluid Mechanics	[1]	Find the stress distribution and strains in regular and composite structures subjected to axial loads.
			[2]	Assess the shear force, bending moment and bending stresses in beams under transverse loading.
			[3]	Apply torsion equation in design of circular shafts

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			and helical springs
			[4] Analyze the dimensional analysis concepts to derive fluid flow equation and derive the equation for flow through pipes.
			[5] Select a suitable pump and turbine for a given application and evaluate the operating characteristics of hydraulic pumps and turbines
16	BMTF184T20	Industrial Instrumentation	[1] Understand the various techniques used for the measurement of industrial parameters.
			[2] Explain the design and working of various instruments
			[3] Understand the installation techniques of various systems
			[4] Understand the concept of various transducers used in industries
			[5] Work with signal conditioning circuit of various measuring equipments
17	BMTF184T30	Materials Engineering	[1] Identify crystal structures for various materials and understand the defects in such structures.
			[2] Understand how to tailor material properties of ferrous and non-ferrous alloys and how to quantify mechanical integrity and failure in materials
			[3] Understand the micro structural aspects and phases of Fe-C systems.
			[4] Understand the various heat treatment process
			[5] Properties and applications of ferrous and nonferrous metals.
18	BMTF184T40	Thermodynamics	[1] Apply the Thermodynamic Principles to Mechanical Engineering Application.
			[2] Apply mathematical fundamentals to study the properties of steam, gas and gas mixtures.
			[3] Apply the different gas power cycles and use of them in Internal Combustion Engines.
			[4] Describe and analyze the performance of the Air Compressors
			[5] Describe the fundamentals of Refrigeration and Air conditioning systems
19	BEIF184T50	Linear Integrated Circuits	[1] Enumerate and analyze different steps involved in he fabrication process of integrated circuit
			[2] Understand the concept of linear applications using

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				Op-Amp and regulator
			[3]	Ability to test and analyze the various applications of PLL and Timers.
			[4]	Understand the concept of Special Function Integrated Circuits
			[5]	Understand the concept of Application Integrated Circuits.
20	BMTF184T60	Digital Electronics	[1]	Understand the basic number system and Boolean algebra
			[2]	Understand the basics of combinational and sequential circuits
			[3]	Know about Flip Flops and their designing
			[4]	Analyze about State reduction techniques and various hazards present in the circuit
			[5]	Understanding the concepts of VHDL programming for designing Digital Circuits
21	BMTF185EA0	Theory of Machines	[1]	Understand about the mechanisms and to analyze the forces acting in engines
			[2]	Draw profiles of cams.
			[3]	Design gear systems for machines.
			[4]	Understand about the balancing methods in machineries.
			[5]	Know about the influence of vibrations in machines.
22	BMTF185EB0	Metrology and quality control	[1]	Understand the basics of metrology and linear and angular measuring instruments
			[2]	Explain the working principles of comparators and limit gauges
			[3]	Determine the status of the measuring instruments and different parameters using measuring machines
			[4]	Understand the concepts of quality and to Solve the problems in process control charts for variables
			[5]	Solve the problems in process control charts for attributes
23	BMTF185EC0	Refrigeration and Air Conditioning	[1]	Explain the basic concepts of refrigeration.
			[2]	Explain the vapor compression refrigeration systems and to solve problems
			[3]	Discuss the various types of refrigeration systems
			[4]	Calculate the psychrometric properties and its use in psychrometric processes

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			[5]	Explain the concepts of air conditioning and to solve problems
24	BMTF185ED0	Internal Combustion Engines	[1]	Explain the principles of fuel supply system and combustion mechanism in SI engines
			[2]	Examine the air flow movements in various combustion chambers of CI engines
			[3]	Analyze the emission mechanism and controlling methods of pollutants in IC engines
			[4]	Understand the role of engine management systems and sensors.
			[5]	Gain knowledge about the recent trends in the engine development.
25	BMTF185OEA	Electrical and Mechanical Measurement	[1]	Explain the basic mechanisms of Measurement and analog instruments
			[2]	Understand signal conditioning methods.
			[3]	Describe the working of various electrical measurements
			[4]	Illustrate the function and mechanism of various parameters measurement
			[5]	Understand the principles of CROs and Recording instruments
26	BMTF185OEB	Operations Research	[1]	Have the knowledge of the Mathematical formulation of the problem which is a tool in the development of theoretical of engineering science.
			[2]	Understand the model of Transportation and assignment design in engineers.
			[3]	Have the knowledge of Game theory and sequencing problems in engineering.
			[4]	Understand about Solution of integer programming and design of Inventory control in engineers.
			[5]	Have a knowledge of solving problems in Resource allocation Scheduling.
27	BMTF185OEC	Green and Smart Buildings	[1]	Define a green building, along with its features, benefits and rating systems.
			[2]	Describe the criteria used for site selection and water efficiency methods.
			[3]	Explain the energy efficiency terms and methods used in green building practices.
			[4]	Select materials for sustainable built environment & adopt waste management

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				methods.
			[5]	Describe the methods used to maintain indoor environmental quality.
28	BMTF185OED	Electric Hybrid Vehicle Technology	[1]	Know and understand the fundamentals of electric vehicles.
			[2]	Understand the concept of Battery.
			[3]	Understand the DC and AC electrical machines
			[4]	Learn the concept of electric vehicles
			[5]	Ability to understand the hybrid electric vehicles.
29	BMTF185T10	Control Systems	[1]	Understand the basics of control system for the design and analysis
			[2]	Understand the issues related to time response analysis
			[3]	Perform frequency response and stability analysis.
			[4]	Design compensators in time and frequency domain.
			[5]	Understand the concept of stability and its assessment for linear time invariant systems.
30	BMTF185T20	Analytical Instrumentation	[1]	Understand various techniques and methods of Spectral analysis.
			[2]	Apply the knowledge of chromatography to separate the constituents from a complex mixture.
			[3]	Get adequate knowledge about Gas sensor and pollution monitoring instruments.
			[4]	Able to select an appropriate analyzer for an Industrial requirement.
			[5]	Able to understand the working principle of NMR and Mass spectroscopy.
31	BMTF185T30	Fluid Power Systems	[1]	Acquire knowledge of the working principles of fluid power systems and hydraulic pumps.
			[2]	Acquire knowledge of the working principles of hydraulic actuators and control components.
			[3]	Understand different types of hydraulic circuits and systems.
			[4]	Explain the working of different pneumatic circuits and systems.
			[5]	Summarize the various troubleshooting methods and applications of hydraulic and pneumatic systems

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			[2]	Understand frequency modulation, demodulation and the comparison of AM and FM
			[3]	Understand the PAM, PPM and PWM techniques
			[4]	Understand the different methods of PCM, PAM, DPCM, DM, ADM schemes which are used in digital communication.
			[5]	Understand the analysis of ASK, FSP, PSK, DPSK, QPSK schemes and Multiple access techniques
	BMTF186OEE	Biomedical Instrumentation	[1]	Understand the Fundamentals of Biomedical Engineering
			[2]	The graduate will be able to study about communication mechanics in a biomedical system with few examples
			[3]	Understands the basic principles in imaging techniques
			[4]	Acquires basic knowledge in life therapeutic devices
	BMTF186OEF	Human Resource Management	[1]	Understands the perspectives of Human resources management
			[2]	Best fit employee concept provided with demand and requirement.
			[3]	Acquired the knowledge of training and executive development
			[4]	Explained the concept of sustaining the employee with compensation plans
			[5]	Acquired the method of performance evaluation and control process
	BMTF186OEG	Waste Water Engineering	[1]	An ability to estimate sewage generation and design sewer system including sewage pumping stations.
			[2]	An ability to perform basic design of the unit operations and processes that are used in sewage treatment.
			[3]	Understand the characteristics and composition of sewage.
			[4]	Understand the standard methods for disposal of sewage and self-purification of streams.
			[5]	Gain knowledge on sludge treatment and disposal.
	BMTF186OEH	Radar and Navigation	[1]	Understand the principles of navigation, radar equation and antenna parameters.

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			[2]	Know about the concept of tracking system.
			[3]	Understand about the signal approach and landing aids as related to navigation.
			[4]	Derive and discuss the Range equation and the nature of detection.
			[5]	Describe about the navigation systems using the satellite.
	BMTF186T10	PLC and Data Acquisition System	[1]	Able to understand the need of computer in Automation.
			[2]	Understand the basics of data conversion and data acquisition.
			[3]	Understand the fundamental of PLC.
			[4]	Program a PLC with different logical languages.
			[5]	Various industrial applications of PLCs are studied.
	BMTF186T20	Microprocessor and Microcontroller	[1]	Understand the block diagram, architecture and interrupts of 8085 microprocessor
			[2]	Understand the 16-bit microprocessor architecture and modes of operation
			[3]	Acquire knowledge about the co-processor configuration also the architecture of the co-processors 8087 and 8089
			[4]	Understand the ICs 8255 PPI, 8259 PIC, 8257 DMA, 8251 USART, 8279 Keyboard display controller interfacing
			[5]	Understand the architecture of microcontroller and SFR operations, interfacing with peripherals.
	BMTF186T30	Principles of Management and Professional Ethics	[1]	Helps to examine situations and to internalize the need for applying ethics principles, values to tackle with various situations
			[2]	Develop a responsible attitude towards the use of computer as well as technology
			[3]	Able to envision the societal impact on the products/projects they develop in their career.
			[4]	Understanding the code of ethics and standards of computer professionals
			[5]	Analyze the professional responsibility and empowering access to information in the work place
	BMTF186T40	CAD/ CAM	[1]	Understand the basics of CAD/CAM.
			[2]	Exposure over the concepts of computer graphics.
			[3]	Learn about the geometric issues concerned to the manufacturing and its related areas.

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			[4]	Understand the latest advances in the manufacturing perspectives.
			[5]	Provide an overview of how computers are being used in design, development of manufacturing plants.
	BMTF187T10	Robotics and Automation	[1]	Able to demonstrate the mechanical structures of industrial robots.
			[2]	Able to understand the importance of robot vision.
			[3]	Able to apply knowledge and choose the best end effectors for specific applications.
			[4]	Forward and inverse kinematics of Robotics is learned.
			[5]	Able to program and industrial robot through different methods and languages.
	BMTF187EI0	Embedded Systems	[1]	Understand the various applications, challenges involved in Embedded system design
			[2]	Recognize the suitable processor, understanding the memory operations of the embedded system.
			[3]	Understand the communication types in the embedded systems and complete understanding about the communication protocols.
			[4]	Understand various functions, services of RTOS and different scheduling models to design an embedded system.
			[5]	Implement the concepts of programming & optimization techniques. Case studies to analyze the complete development of the embedded system.
	BMTF187EJ0	Power Plant Instrumentation	[1]	Understand the basic principles of powergeneration.
			[2]	Understand about measurement of various parameters in powerplant.
			[3]	Know the various analyzers in powerplant.
			[4]	Understand about the turbine boilercontrol.
			[5]	Understand about the turbine monitoring.
	BMTF187EK0	Neural Networks and Fuzzy Logic Control	[1]	Analyze the basic knowledge of Neural networks
			[2]	Analysis of learning systems in conjunction with feedback control systems

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			[3]	Analyze the basics of Fuzzy Logics
			[4]	Acquire knowledge on the applications of Computer simulation of intelligent control systems.
			[5]	Learn the usage of different types of algorithms
	BMTF187EL0	Battery Technology	[1]	Recognize the basic physical concepts and kinetics involved in electrochemical reactions
			[2]	Select the appropriate battery system with respect to application
			[3]	Analyze the characterization methods of batteries and interpret concepts describing battery performance
			[4]	Describe the recent developments battery systems
			[5]	Understand the battery systems for automotive and discuss the Life Cycle Analysis according to cost and environmental aspects and energy consumption, reuse, recycling.
	BMTF187EM0	Machine Design	[1]	Develop basic knowledge about the design process including various stresses and failure of machine components.
			[2]	Acquire knowledge on the shaft design for machines and various springs under loading.
			[3]	Learn the usage of gear drives and their designing mechanism for machines.
			[4]	Know the importance of designing the long transmission drives & their design methods.
			[5]	Understand about the use and design procedure for multispeed gear boxes in automobiles.
	BMTF187EN0	Finite Element Analysis	[1]	Apply the numerical methods to formulate the simple finite element
			[2]	Apply one dimensional finite element method to solve bar and truss type problems
			[3]	Apply two-dimensional finite element method to plane stress and strain type problems
			[4]	Determine temperature distribution of one-dimensional heat transfer problems using one dimensional finite element
			[5]	Implement finite element method using iso parametric elements
	BMTF187EO0	Design of Jigs and	[1]	Understand the locating and clamping methods for

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		Fixtures	machining operations.
			[2] Know the use of fixtures and to design fixtures for various machines.
			[3] Understand various sheet metal operations and the forces involved in them.
			[4] Know the basics of die and to design various dies.
			[5] Know the forces involved during forming operation and to design the forming dies.
	BMTF187EP0	Total Quality Management	[1] Understand the basics of TQM
			[2] Explain the principles of TQM
			[3] Solve problems on statistical process control
			[4] Use the tools for finding solutions
			[5] Gain knowledge on system standards
	BMTF187EQ0	Rapid Manufacturing Technologies	[1] Acquire basic knowledge about rapid prototyping and 3D modelling software in RPT.
			[2] Understand the operating principle, capabilities and limitations of liquid based rapid prototyping system
			[3] Understand the operating principle, capabilities and limitations of powder based rapid prototyping system
			[4] Understand the operating principle, capabilities and limitations of solid based rapid prototypingsystem
			[5] Learn the usage of rapid tooling in batch production.
	BMTF187ER0	Computer Integrated Manufacturing (CIM)	[1] To explain the classical and state-of-the-art production systems, control systems, management technology, cost systems, and evaluation techniques.
			[2] To summarize the fundamentals of CAD & CAM and its network systems.
			[3] To apply the concepts of group technology and process planning methods in manufacturing.
			[4] To summarize different numerical controls and its tooling systems in CIM.
			[5] To explain the advanced manufacturing systems and its developments.
	BMTF187ES0	Process Planning and Cost Estimation	[1] Associate the knowledge of engineering fundamentals for process planning.
			[2] Distinguish various process planning activities.
			[3] Discuss the various elements involved in costing.

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			[4]	Estimate the product cost of job done by various manufacturing methods.
			[5]	Estimate the machining time for various operations carried out in different machines.
			[6]	Apply the concept of process planning and cost estimation for various production processes.
	BMTF187ET0	Mechanical Vibration and Noise Control	[1]	Develop through basic knowledge about vibration on single and two degrees of freedom vibration
			[2]	Acquire knowledge on the applications of multi degree freedom vibrations
			[3]	Learn the usage of Rotor balancing.
			[4]	Describing the control methods used in vibration analysis
			[5]	Understanding the various instruments on noise control
	BMTF187OEI	Aircraft Instrumentation	[1]	Develop basic knowledge in the behavior and characteristics of various display devices in aircraft.
			[2]	Acquire knowledge on various pressure measuring instruments.
			[3]	Acquire knowledge on gyroscopic instruments and Magnetic instruments.
			[4]	Acquire knowledge on Flight instruments and Waring systems
			[5]	Acquire knowledge on Fuel Systems, maintenance and servicing.
	BMTF187OEJ	Energy Harvesting Technologies	[1]	Select proper Piezo electric materials for its applications.
			[2]	Identify and design the solar energy applications.
			[3]	Design wind turbines for various applications.
			[4]	Implement Tidal and Ocean wave harvesting methods and technologies.
			[5]	Analyze the basics and scaling laws of micro fabrication methods.
	BMTF187OEK	Disaster Management	[1]	Distinguish the forms of disasters and their impact on the environment and society
			[2]	Assess the vulnerability and different approaches of risk reduction measures
			[3]	Understand the hazard and vulnerability profile

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				of India
			[4]	Analyse the circumstances in the Indian context, for Disaster damage assessment and management
			[5]	Be an active, responsible citizen during the disasters and help to create safe society
	BMTF187OEL	Data Communication and Network Systems	[1]	Know and understand the fundamentals of the functions of the different layer of OSI Protocol.
			[2]	Ability to understand about wide-area networks (WANs), local area networks (LANs).
			[3]	Ability to design wide-area networks (WANs), local area networks (LANs) for thegiven requirement.
			[4]	For a given problem related TCP/IP protocol developed the network programming.
			[5]	Configure the Application Layer, software and tools
	BMTF188EU0	Machine Vision	[1]	To explain the fundamentals of machine vision systems and its techniques.
			[2]	To summarize the fundamentals of image acquisition systems.
			[3]	To explain the techniques involved in image processing.
			[4]	To summarize the basic techniques in image analysis.
			[5]	To summarize the different machine vision applications and its recent developments.
	BMTF188EV0	Autotronics	[1]	Understand the evolution of automotive electronics and charging system
			[2]	Develop through basic knowledge about various ignition and injection systems.
			[3]	Analyse required sensors and actuators for an automotive application.
			[4]	Understand the automotive electronics for engine management system
			[5]	Acquire knowledge on the safety systems of the automobile.
	BMTF188EW0	Design of Mechatronics Systems	[1]	Acquire knowledge of Mechatronics system design and simulation, advanced approaches and safety.
			[2]	Understand of various types of drives, basic system modeling and control.

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			[3]	Acquire knowledge of real time interfacing.
			[4]	Explain the case studies on Data Acquisition and control.
			[5]	Explain various case studies on Mechatronics system
	BMTF188EX0	Flexible Manufacturing Systems	[1]	Appreciate the fundamentals of flexible manufacturing systems
			[2]	Explain the use of software and computer control in flexible manufacturing systems
			[3]	Recognize the importance of simulation and database systems
			[4]	Explain the group technology and understand the justification of implementing flexible manufacturing systems
			[5]	Recognize the effectiveness of imparting flexible manufacturing systems in various industrial sectors
	BMTF188EY0	Micro Electro Mechanical Systems MEMS	[1]	Analyze the basics and scaling laws of micro fabrication methods.
			[2]	Identify the materials for MEMS sensors and designing of sensors.
			[3]	Design Micro actuators for various applications.
			[4]	Implement Micro system fabrication process and technologies.
			[5]	Analyze packaging methods and compare various Micro machining processes
	BMTF188EZ0	VLSI Design	[1]	Analyze the basics of VLSI Technology and MOS Theory
			[2]	Understand the principles and design Rules of CMOS-VLSI technology.
			[3]	Analyze the performance of MOS and CMOS Circuits Logics.
			[4]	Analyze design issues involved at circuit logic and system level.
			[5]	Adequate knowledge about programmable logics
	BMTF188EEA1	IoT in Automation	[1]	Understand the concepts of Internet of Things.
			[2]	Analyze basic protocols in wireless sensor network.
			[3]	Design IoT applications in different domain andbe able to analyze their performance
			[4]	Implement basic IoT applications on embedded

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				platform.
			[5]	Developing applications of IoT in Industrial and Real-World using Python.
	BMTF188EEB1	Digital Control Systems	[1]	Analyze digital systems in time domain.
			[2]	Analyze digital systems in frequency domain.
			[3]	Model and analysis digital systems in state space representation.
			[4]	Design state observer and state feedback by pole placement design
			[5]	Understand the concept of stability in discrete domain.
	BMTF188OEM	Nano Technology	[1]	Acquire knowledge on Challenges in the field of Nano Electronics.
			[2]	Acquire knowledge on nano electronics & computer architectures.
			[3]	Acquire knowledge on nano fabrication and structures.
			[4]	Acquire knowledge on spin polarization theories.
			[5]	Acquire knowledge on implementation of memory & sensors in nano electronics.
	BMTF188OEN	Big Data Analytics	[1]	Strong Foundations on Data Analytics Models and structure
			[2]	Understanding the Role of Big Data and its importance
			[3]	Data modelling and Link stream Analysis
			[4]	Able to setup Analytical Environment using R-Studio
			[5]	Able to perform simple analysis application and programs using R –Scripts.
	BMTF188OEO	Satellite Communication	[1]	Know and understand the fundamentals of the functions of the different layer of OSI Protocol.
			[2]	Ability to understand about wide-area networks (WANs), local area networks (LANs).
			[3]	Ability to design wide-area networks (WANs), local area networks (LANs) for the given requirement.
			[4]	For a given problem related TCP/IP protocol developed the network programming.
			[5]	Configure the Application Layer, software and tools.

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	BMTF188OEP	Data Compression Techniques	[1]	Program, analyze Hoffman coding: Loss less image compression, Text compression, Audio Compression
			[2]	Program and analyze various Image compression and dictionary-based techniques like static Dictionary, Diagram Coding, Adaptive Dictionary
			[3]	Understand the statistical basis and performance metrics for lossless compression
			[4]	Understand the conceptual basis for commonly used lossless compression techniques, and understand how to use and evaluate several readily available implementations of those techniques
			[5]	Understand the structural basis for and performance metrics for commonly used lossy compression techniques and conceptual basis for commonly used lossy compression techniques.
	BMTF188OEQ	Entrepreneurship Development	[1]	Have the ability to discern distinct entrepreneurial traits
			[2]	Know the parameters to assess opportunities and constraints for new business ideas
			[3]	Understand the systematic process to select and screen a business idea
			[4]	Design new strategies for successful implementation family business.
			[5]	Write a business plan and understand social entrepreneurship skills.

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Programme Name: **Mechanical Engineering**

Programme Code: **BE**

PSOs (Programme Specific Outcome)

Name of the Programme	PSO Statement
BE Mechanical Engineering	PSO 4.
	PSO 5.
	PSO 6.

PEOs (Programme Educational Objectives)

Name of the Programme	PEO Statement
Mechanical Engineering	PEO. 5
	PEO. 6
	PEO. 7
	PEO. 8
	PEO. 9

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COs (Course Outcomes)

S.No	Course Code	Course Name	Course Outcome
1	BMEF183T30	Fluid Mechanics and Machinery	[1] To understand the properties of fluids and concept of control volume. [2] To understand the applications of the conservation laws to flow through pipes. [3] To understand the importance of dimensional analysis [4] To understand the importance of various types of flow in pumps. [5] To understand the importance of various types of flow in turbines.
2	BMEF183T40	Thermodynamics	[1] Apply the first law of thermodynamics for simple open and closed systems under steady and unsteady conditions. [2] Apply second law of thermodynamics to open and closed systems and calculate entropy and availability. [3] Apply Rankine cycle to steam power plant and compare few cycle improvement methods [4] Derive simple thermodynamic relations of ideal and real gases [5] Calculate the properties of gas mixtures and moist air and its use in psychometric processes
3	BMEF183T50	Material Engineering	[1] Student will be able to identify crystal structures for various materials and understand the defects in such structures. [2] Understand how to tailor material properties of ferrous and non-ferrous alloys. How to quantify mechanical integrity and failure in materials
4		Basic Electronics Engineering	[1] Understand the principles of semiconductor devices and their applications. [2] Design an application using Operational amplifier. [3] Understand the working of timing circuits and oscillators. [4] Understand logic gates, flip flop as a building block of digital systems. [5] Learn the basics of electronic communication system
5		Applied Thermodynamics	[1] Upon completion of this course, the students will be able to analyse the problems of nozzles & turbines.

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			[2]	Explain the functioning & features of I.C. Engines & Calculate the performance ofI.C.Engines.
			[3]	Analyse & solve the problems of air standard cycles
			[4]	Analyse the performance behavior of single & multi stage reciprocating air compressors.
			[5]	Understand the different Refrigeration & A/C systems and solve the problems of VCRsystem
6		Strength of Materials	[1]	Recognize various types loads applied on machine components of simple and compositebars.
			[2]	Recognize the stresses developed on various types of beams.
			[3]	Recognize the slope and deflection developed on various types of beams.
			[4]	Evaluate the strains and deformation that will result due to the elastic stresses developedwithin the materials for simple types of loading.
			[5]	Understand the nature of internal stresses.
7		Kinematics of Machines	[1]	Understand the basics of mechanism
			[2]	Calculate velocity and acceleration in simple mechanisms
			[3]	Develop CAM profiles
			[4]	Solve problems on gears and gear trains
			[5]	Examine friction in machine elements
8		Manufacturing Processes	[1]	Apply the concepts of different metal casting processes, associated defects
			[2]	Gain the knowledge in various sheet metal making processes.
			[3]	Understand the mechanism of material removal processes
			[4]	Compare the different metal joining processes
			[5]	Understand the different unconventional Manufacturing Methods employed for makingdifferent products.

Programme Name: **Electrical and Electronics Engineering**

Programme Code: **BE**

PSOs (Programme Specific Outcome)

Name of the Programme	PSO Statement

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BE Electrical and Electronics Engineering	PSO 1.
	PSO 2.
	PSO 3.

PEOs (Programme Educational Objectives)

Name of the Programme	PEO Statement
Electrical and Electronics Engineering	PEO. 1: To provide students with the knowledge of Basic Sciences and acquire the necessary skills for analysis and synthesis of problems in generation, transmission and distribution
	PEO. 2: Prepare students to meet the demands of contemporary industrial requirements and successfully engage them in appropriate career.
	PEO. 3: Connectivity in learning and professional improvement
	PEO. 4: Develop technical leadership qualities with ethicality
	PEO. 5: To induce students to design electrical, electronics, computing systems that are innovative and socially acceptable

S.No	Course Code	Course Name	Course Outcome
1	CHSEN18T10	English	[1] Understand the nuances of grammar and vocabulary in speaking and w... [2] Listen and comprehend different spoken excerpts critically, infer and i... [3] Speak convincingly, express their opinions clearly, initiate a dis... appropriate communicative strategies. [4] Read different genres of texts, infer implied meanings and critically... ideas as well as for method of presentation. [5] Write effectively and persuasively and by using different techniqu... description, exposition and argument as well as creative, critical, analy...
2	CBSMA18T20	Mathematics I	[1] The concept of convergence and divergence and their testing that... analysis to Engineering problems.

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			[2]	The effective mathematical tools for the solutions of differential processes.
			[3]	To apply differential and integral calculus to notions of curvature and some other applications they will have a basic understanding of Beta a
			[4]	The mathematical tools needed in evaluating multiple integrals and th of several variables that are essential in most branches of engineering.
			[5]	To improve the ability of numerical computations to find the solut transcendental equations along knowing the process of inter and of ability of solving helps to performcomputational engineering problems
3	CBSPH18T30	Engineering Physics	[1]	To develop an understanding of the principles of optics.
			[2]	Experience the diverse applications of the wave equation. Learn the m quantum mechanics problems.
			[3]	To provide adequate knowledge on laser fundamentals types and appl of signal propagation through fiber optics
			[4]	Understand the principles and concepts of semiconductor Physi mathematical models of semiconductor junctions and MOS transistors
			[5]	Acquire basic knowledge on various newly developed smart materials
4	CESCS18T40	Programming for Problem Solving	[1]	Develop algorithms for solving simple mathematical and enginee suitability of appropriate repetition and/or selection structures for give
			[2]	Solve matrix problems, merging, searching, sorting and string manip modularization or recursion as applicable
			[3]	Organizes files to perform text operations like editing, pattern searchin
			[4]	Implement the algorithms for matric problems, merging, searching, so file problems and debug and test using any procedural programming la
5	CBSCH18T20	Engineering Chemistry	[1]	Realize the importance of knowledge in atomic structure and w properties of elements
			[2]	Analyze and deduce the properties molecules on the basis of different
			[3]	Rationalizebulk properties and processes usingthermodynamic conside
			[4]	Distinguish the ranges of the electromagnetic spectrum used for exc levels in various spectroscopic techniques
			[5]	Understand the major types of chemical reactions and effect of thr product of reactions
6	CBSMAF8T10	Mathematics – II	[1]	Determine consistency of liner system of equations, Rank, Eigen valu square matrix also compute power, inverse of the matrix using cayley
			[2]	Work numerically on the ordinary differential equations and par different methods through the theory of finitedifferences
			[3]	Apply Laplace transform and its inverse to solve initial value and othe
			[4]	Use Fourier transforms and its inverse in practical applications of elec
			[5]	Solving finite difference equation in z-transforms

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7	CESEE18T30	Basic Electrical Engineering	[1] Explain the basic electrical quantities and laws.
			[2] Explain the construction, types and applications of electrical machines.
			[3] Study the working principles of power converters.
			[4] Show the tariff for a given load and energy consumption.
			[5] Introduce the components of low voltage electrical installations and its
8	CMCCH28T50	Environmental Sciences and Engineering	[1] Understand the individual responsibility towards environment
			[2] Create Eco-centrism approach towards sustainable society
			[3] Enable the learners to understand, think and evolve strategies for r environment for sustaining life on earth.
			[4] Develop a new solution towards various environmental problems
			[5] Understand the current environmental trends of India and the v legislation
9	BEEF183T10	Mathematics III	[1] Basic probability axioms and rules and the moments of discrete and well as be familiar with common named discrete and continuous rando
			[2] How to derive the probability function of transformations of random v to generate data from various distributions.
			[3] How to calculate and apply measures of location and measures of disp data cases.
			[4] Test of Hypothesis as well as calculate confidence interval for a popul and two sample cases.
			[5] How to translate real-world problems into probability models. Also, deduce information from a real time survey without any unwilling bias
	BEEF183T30	Electromagnetic Theory	[1] To differentiate different types of coordinate systems
			[2] To use different coordinate systems for solving the problems of electro
			[3] To describe static electric and magnetic fields, their behavior in c boundary conditions and electromagnetic potentials
			[4] To use integral and point form of Maxwells equations for solving the p theory
			[5] To describe time varying fields, propagation of electromagnetic wa theorem.
			[6] To know the sources and effects of electromagnetic fields and to app waves in practical problems.
			[7] To apply concepts of wave reflection and refraction in practical field.
10	BMTF183T20	Programming in C++ with OOPS	[1] Write and execute C program for Simple applications
			[2] Write and execute Class/Objects programs for simple applications
			[3] Develop object-oriented programs for a given application using the c time polymorphism
			[4] Construct object-oriented programs for a given application by den between classes using inheritance.
			[5] Develop object-oriented applications that can handle exceptions and fi

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12	BEEF183T40	Analog Electronics	[1] Acquire basic knowledge of physical and electrical conducting proper
			[2] Develop the ability to understand the design and working of BJT/ FET
			[3] Able to design amplifier circuits using BJTs and FETs and obser responses of common amplifier circuits
			[4] Understand the fundamentals and areas of applications for the Integra types of integrated circuits of day-to-day requirements
			[5] Understand the differences among theoretical, practical and simula Choose the appropriate integrated circuit modules to build a given app
13	BMTF183T50	Electric Circuit Theory	[1] Concepts, Nodal and Mesh Methods
			[2] Sinusoidal Analysis, Resonance, Three phase circuits
			[3] Network Theorem and Applications
			[4] Circuit Response RLC, DC & AC Excitation.
			[5] Two port Networks, Synthesis Networks
15	BEEF184T10	DC Machines and Transformers	[1] DC Machine construction and DC motor, generator characteristics, sta
			[2] Speed control of DC machines, Faradays Laws
			[3] Testing of DC Machines, Parallel operation of DC motor and generato
			[4] Determination of losses and efficiency of DC machines
			[5] Equivalent circuit of transformer.
16	BEEF184T20	Measurements and Instrumentation	[1] Understand Measurement systems, Bridge measurements
			[2] Know the principles of cathode ray oscilloscopes and other measurin
			[3] Compare analog, digital techniques and measurement errors
17	BEEF184T30	Database Management	[1] Explain the features of database management systems and Relational
			[2] Design conceptual models of a database using ER modeling for real li queries in Relational Algebra.
			[3] Create and populate a RDBMS for a real-life application, with constra
			[4] Retrieve any type of information from a database by formulating, com
			[5] Analyze the existing design of a database schema and apply concep optimal database.
			[6] Build indexing mechanisms for efficient retrieval of information from
	BEEF184T40	Digital Electronics	[1] Explain the different number systems and coding schemes and arithme
			[2] Explain the basic theorems and properties of Boolean algebra.
			[3] Construct combinational logic circuits for the given requirement and d
			[4] Utilize K-Map for gate level minimization of the given Boolean functi
			[5] Know about flip flops and synchronous sequential circuits and their de
19	BEEF184T50	Generation Transmission and Distribution	[1] Calculate the transmission network parameters for various configurati
			[2] Calculate the performance characteristics of the given transmission methods and power circle diagram
			[3] Explain the effect of overhead transmission lines
			[4] Calculate overhead line for various conditions

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			[5]	Explain the various types of insulators, cables and their construction.
			[6]	Calculate string efficiency of the suspension type insulators.
	BEEF184T60	Data Structures	[1]	Select appropriate data structures as applied to specified problem defin
			[2]	Implement operations like searching, insertion and deletion, traversing structures.
			[3]	Students will be able to implement Linear and Non-Linear data structu
			[4]	Implement appropriate sorting/searching technique for given problem.
			[5]	Determine and analyze the complexity of given algorithms.
	BEEF185T10	Digital Signal Processing and its Applications	[1]	Characteristics of different digital systems
			[2]	Compute Discrete Fourier Transform for the given signals
			[3]	Design the Digital Infinite Impulse Response Filters (IIR) from given
			[4]	To describe about TMS320F24XX processor
			[5]	Use of TMS320F24XX processor for power electronics applications.
	BEEF185T20	Microprocessor and Microcontroller	[1]	Demonstrate potential knowledge in internal hardware details of micro
			[2]	Assembly language programs for data manipulating and accessing on
			[3]	Design suitable interfaces for real time applications
			[4]	Exhibit programming skills, choose suitable hardware and program problems
	BEEF185T30	Control Systems	[1]	Basics of systems, modelling of various kind of systems, reductio pictorial representation
			[2]	Analyse the performance of the systems with time base
			[3]	Analyse the performance of the systems with frequency base
			[4]	Stability analysis and compensation techniques
			[5]	Understand the concept of state space analysis of the systems
	BEEF185T40	Induction and Synchronous Machines	[1]	Types of alternators, induction motors, applications of alternators, fra
			[2]	Construction and working of synchronous, induction and special revolving theory
			[3]	Determination of Voltage Regulation of Alternator by EMF, MMF, ZI
			[4]	Performance analysis of three phase and single pjase induction motors
			[5]	Phasor diagrams, V-curve and inverted V-curve of synchronous machi
			[6]	Estimation of torque and power output
	BEEF185T50	Power Systems – I (Modeling and Components)	[1]	Explain the structure of a power system
			[2]	Analysis of simple three-phase circuits
			[3]	Explain the lightening and Switching Surges
			[4]	Method of Symmetrical Components
			[5]	Types of Circuit Breakers
	BEEF186T10	Power Electronics	[1]	Understand the basic structure, working and switching characteristics
			[2]	Various protection circuit for power semiconductior devices
			[3]	Principle and working of AC-DC controlled converters
			[4]	Different types, voltage control strategies for DC choppers

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			[5]	Operation of AC-AC converters and controlled techniques
	BEEF186T20	Embedded Systems	[1]	Understand basic concept of embedded systems
			[2]	Analyse the applications in various processors and domains of embedd
			[3]	To describe about ARM architecture
			[4]	To understand the building blocks of ARM LPC 214X
			[5]	To describe about the Real time operating systems and its function.
	BEEF187T10	Power System II (Analysis and Control)	[1]	Review of the structure of a Power System and its components.
			[2]	Explain the N-R and G-S method for load flow studies
			[3]	Derive the swing equation for Single Machine Infinite Bus System
			[4]	Explain the concept of Equal area criterion
			[5]	Calculation of bus voltages and line flows, fuel cost for thermal unit s
	BEEF187T20	PLC and SCADA	[1]	Understand the PLC architecture
			[2]	Understand the programming of PLC
			[3]	Understand the SCADA Architecture
			[4]	Implement the PLC and SCADA based automation in simple industria
	BEEF187T30	Electric Drives	[1]	Variable Speed Drives- requirements and different types, characteristi
			[2]	Rating and Selection of motors
			[3]	Working of different types of DC converters fed DC drives
			[4]	Apply different control methods for DC drives
			[5]	Speed Control of different types of AC converters fed Induction motor
			[6]	Different types of inverters and cyclo converter fed Synchronous moto
	BEEF186E	Computer Architecture	[1]	Understand the theory and architecture of central processing unit.
			[2]	Analyze some of the design issues in terms of speed, technology, cost,
			[3]	Design a simple CPU with applying the theory concepts
			[4]	Use appropriate tools to design verify and test the CPU architecture
			[5]	Learn the concepts of parallel processing, pipelining and inter process
			[6]	Understand the architecture and functionality of central processing uni
		Java Programming and Applications	[1]	Design, Implement, test, debug and document programs that use ba simple I/O, conditional and iterative structures and function
			[2]	Describe and use the mechanics of Interfaces and Packages
			[3]	Discuss and use of Multithread Programming
			[4]	Implement applet exception handling
			[5]	Develop network and window application using AWT and Swings
		Cloud Computing Fundamentals	[1]	Define Cloud Computing and memorize the different cloud service an
			[2]	Describe importance of virtualization along with their technologies
			[3]	Use and examine different cloud computing services
			[4]	Analyze the components of open stack and Google Cloud platform Computing
			[5]	Design and develop backup strategies for cloud data based on features
			[6]	Illustrate the capabilities of Cloud Security
		Fundamentals of Big Data	[1]	Explain the big data perspective and its real-world requirement.
			[2]	Illustrate the working principle of big data architecture and its technolo

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		Analysis	[3]	Compare and contrast the nature of data in distributed file systems
			[4]	Make use of certain analytical techniques on big data
			[5]	Determine the results of big data analysis using certain analytical tech
		Electrical Machine Design	[1]	Calculation of MMF for air gap and teeth sections
			[2]	Explain heating and cooling characteristics of rotating machines
			[3]	Derive the output equations of DC and AC Machines
			[4]	Design of main dimensions of DC and AC machines and transformers
			[5]	Explain the concept of computer aided design
			[6]	Concept of analysis and synthesis methods
		Special Electrical Machines	[1]	Illustrate the basic construction and operating principle of synch Stepper motor, PMSM, PMBLDC motor and linear induction motor
			[2]	Explain the motor characteristics, power input and torque develop Motor, SRM, Stepper motor, PMSM and PMBLDC Motor.
			[3]	Develop the drive systems and control schemes for stepper motors.
			[4]	Select the suitable special purpose motor for the specific application
			[5]	Explain the Microprocessor/DSP based control of stepper motors, SRM
			[6]	Analyse the performance of a drive system using Matlab-Simulink
		Control and Maintenance of Electrical Equipments	[1]	Symbols of various components, control diagram-Two wire control Primary Cell Storage batteries.
			[2]	Fuses and combination fuse switch units. Miniature circuit breaker, Co types, Over-load relays, Mechanical brakes for motors, Control Transf
			[3]	Requirements of electric drive, Solid state devices used in electric dri Drives.
			[4]	Preventive and predictive maintenance of electric machines
			[5]	Digital UPS testing Systems
		Electrical Energy Conservation and Auditing	[1]	To have knowledge in the Concepts of Commercial and Noncor resources, commercial energyproduction, finalenergy consumptio economy,long term energyscenario, energy pricing, energy environment,energy security, energy conservation and its importance,
			[2]	Toanalyzetheimportanceof electricitytariff,loadmanagement andmax factor improvement, selection &locationofcapacitors,ThermalBasics-f
			[3]	To conceptsofenergymanagement(audit)approachunderstandingenergycos nce, matching energy useto requirement, maximizing theinputenergyrequirements, fuel &energysubstitution,energyaudit ins
		Electrical Safety and Management	[1]	To understand different types of protection systems,electricalhazardsa
			[2]	To understandthesixstepsafetymethods.
			[3]	Toanalyse the importanceof groundingof electrical equipment-hotst signs, safety tags, locking devicesvoltagemeasuring instruments- prox
		Smartgrid	[1]	Explain the fundamentals of smart power grids and its international an
			[2]	Calculate Voltage and power loss for the given distribution system.

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			[3]	Explain advanced metering infrastructure and demand side manageme
			[4]	Describe the operation of transmission system with synchro phasor me
		Design and Layout of Power Apparatus	[1]	Design of main dimensions and other major part of the transformer
			[2]	Design of main dimensions and other major part DC and AC rotating
			[3]	Procedure for the design of main dimensions and other major part of t
			[4]	Procedure for the design of main dimensions and other major part of t
		High Voltage Engineering	[1]	Understanding the over voltage phenomenon and insulation coordinati
			[2]	Ability to understand the various breakdown mechanisms of different
			[3]	Able to analyse and generate high voltage and high current
			[4]	Understanding measurements techniques of high voltages and curren demerits
			[5]	Ability to understand dielectric tests on various electrical equipmen Labs
		High Voltage DC Transmission	[1]	Explain the modern technology used in HVDC
			[2]	Describe control strategies used in HVDC system with HVDC conver
			[3]	Apply suitable method for power flow analysis in AC/DC systems.
			[4]	Simulate simple HVDC system for the given specifications
		Power Plant Engineering	[1]	Able to get the basics of power plants
			[2]	Able to get the idea about the power generation by renewable and non
			[3]	Able to know about the different types of cycles and natural resourc applications
		Automotive Electronics	[1]	Understand concepts of Automotive Electronics
			[2]	Understand various sensors and actuators used in the automobile engi
			[3]	Understand the various electronics fuel and ignition system
			[4]	Apply the control techniques in different subsystem of the automobile
		Biomedical Engineering	[1]	Understand the basic structure of a cell, its functionalities.
			[2]	To understand various recording systems like ECG, EEG, EMG
			[3]	To understand the applications of transducers in Biomedical Field
			[4]	To analyse the need for recorders, plotters and signal conditioners
			[5]	To understand various display devices
			[6]	To understand various cardiac measurements
			[7]	To apply how computers can be applied for medicines
		Principles of Communication Engineering	[1]	Describe the basic principle of communication system
			[2]	Demonstrate and solve communication system parameters for va demodulation techniques
			[3]	Use of different modulation and demodulation techniques used in anal
			[4]	Analyse transmitter and receiver circuits
			[5]	Compare and contrast design issues, advantages, disadvantag communication systems
		Sensors for Engineering Applications	[1]	Explain the static and dynamic characteristics of transducers
			[2]	Explain the operation of electrical, magnetic, piezoelectric, fiberoptic
			[3]	Explain the operation of digital transducers and their application

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			[4]	Explain the application of smart sensors
			[5]	Identify a sensor for a particular industrial application
		Digital Control Systems	[1]	Basics of discrete control systems
			[2]	Z transform and inverse Z transform for discrete system with time resp
			[3]	Analyse the performance of the discrete systems with stability
			[4]	State Space Approach for discrete time systems
			[5]	Design of Controllers and Compensators for discrete Systems
			[6]	Feedback controllers design for discrete time systems
		Advanced Power Electronics and Drives	[1]	Understand the basic structure, working and switching characteristics
			[2]	Principle and working of configuration of AC-DC controlled Converte
			[3]	Working of different types of DC-AC Converters
			[4]	Apply different PWM Methods and Control Strategies
			[5]	Speed control of different types of DC converters fed DC Drives, Slip
		Electric Vehicle and Hybrid Vehicle	[1]	Basic concept of Hybrid and electric Vehicle
			[2]	Basic concept of hybrid traction, types of hybrid drive-train topologies
			[3]	Analysis of fuel efficiency
			[4]	Study the configuration and control of Permanent Magnet Motor drives
			[5]	Matching the electric machine and the internal combustion engine
			[6]	Classification of different energy management strategies
		Power Quality	[1]	Understand various power quality problems
			[2]	Discuss the impact of power quality issues on various electrical comp
			[3]	Discuss the need for power quality monitoring and measurement
			[4]	Compute the harmonics distortion in the given electrical drive