	S J P N Trust's	IQAC
	Hirasugar Institute of Technology, Nidasoshi	Academics
	Approved by AICTE, New Delhi, Permanently Affiliated to VTU, Belagavi	POs & COs
	Recognized under2(f) &12B of UGC Act, 1956	Awareness
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Revised Programme Outcomes (POs) and Course Outcomes (COs)

for all Programmes and 1ˢᵗ year academics offered by the institution in line with the Outcome Based Education (OBE) suggested by the National Board of Accreditation (NBA) and NEP-2020 based revised curriculum by Visvesvaraya Technological University, Belagavi (2018 Scheme, 2021 Scheme and 2022 Scheme).

In view of outcome-based education (OBE) and in the interest of the holistic development of engineering students, the National Board of Accreditation (NBA) has stated 12 Program Outcomes (POs) and are also called as graduate attributes (GAs). In line with these POs and in consultation with the stakeholders, vision and missions of the institute are articulated. All visions and missions are displayed in the strategic locations and in the students study materials. In view of the emerging trends and relevancies of the engineering and technology in specific domains, ability enhancements and skills required among the students' fraternity and to cater to industry and society, each program of the institute interacted with the various stakeholders and has stated 3 Program Specific Outcomes (PSOs). In view of assessment and attainment of POs and PSOs during graduation, the Course Outcomes (COs) are defined by the respective course coordinator in consultation with HOD and module coordinator and displayed in the students study materials and faculty members documents. The COs will be revised in line with the revised curriculum time to time.

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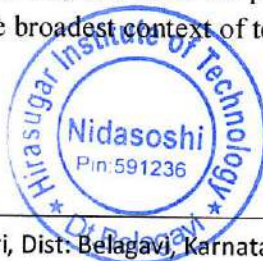|	S J P N Trust's	IQAC
	Hirasugar Institute of Technology, Nidasoshi.	**ACADEMIC**
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	Accredited at 'A' Grade by NAAC	
	Programmes Accredited by NBA: CSE, ECE, EEE & ME	**2018-19**

Program Outcomes (POs)

The graduates of the program will be able to;

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

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

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

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

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

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

7. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

8. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

9. **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

10. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

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

12. **Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.
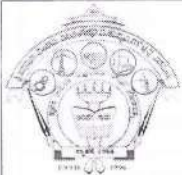
IQAC Coordinator
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III SEMESTER

SUB: Transform Calculus, Fourier Series And Numerical Techniques   Sub Code: 18MAT31

After successful completion of this course, the students will be able to:

CO	Description
C201.1	Use Laplace transform and inverse Laplace transform in solving differential/ integral equation arising in network analysis, control systems and other fields of engineering.
C201.2	Demonstrate Fourier series to study the behavior of periodic functions and their applications in system communications, digital signal processing and field theory.
C201.3	Make use of Fourier transform and Z-transform to illustrate discrete/continuous function arising in wave and heat propagation, signals and systems.
C201.4	Solve first and second order ordinary differential equations arising in engineering problems using single step and multistep numerical methods.
C201.5	Determine the externals of functional using calculus of variations and solve problems arising in dynamics of rigid bodies and vibrational analysis.

SUB: Data Structures and Applications   Sub Code: 18CS32

After successful completion of this course, the students will be able to:

CO	Description
C202.1	Use different types of data structures, operations and algorithms
C202.2	Apply searching and sorting operations on files
C202.3	Use stack, Queue, Lists, Trees and Graphs in problem solving
C202.4	Implement all data structures in a high-level language for problem solving.

SUB: Analog and Digital Electronics   Sub Code: 18CS33

After successful completion of this course, the students will be able to:

CO	Description
C203.1	Design and analyze application of analog circuits using photo devices, timer IC, power supply and regulator IC and op-amp.
C203.2	Explain the basic principles of A/D and D/A conversion circuits and develop the same.
C203.3	Simplify digital circuits using Karnaugh Map and Quine-McClusky Methods
C203.4	Explain Gates and flip flops and make us in designing different data processing circuits, registers and counters and compare the types.
C203.5	Develop simple HDL programs.

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SUB: Computer Organization   Sub Code: 18CS34

After successful completion of this course, the students will be able to:

CO	Description
C204.1	Explain the basic structure of computers, performance of processor, memory organization, machine instructions and assembly language.
C204.2	Demonstrate functioning of different subsystems, such as processor, input output and memory.
C204.3	Explain the working principles of different type's memory system.
C204.4	Apply the knowledge of arithmetic operations and analyze simple arithmetic and logical units.
C204.5	Illustrate hardwired control and micro programmed control, pipelining, embedded system and other computing systems.

SUB: Software Engineering   Sub Code: 18CS35

After successful completion of this course, the students will be able to:

CO	Description
C205.1	Design a software system, component, or process to meet desired needs within realistic constraints.
C205.2	Assess professional and ethical responsibility
C205.3	Function on multi-disciplinary teams
C205.4	Use the techniques, skills, and modern engineering tools necessary for engineering practice
C205.5	Analyze, design, implement, verify, validate, implement, apply, and maintain software systems or parts of software systems

SUB: Discrete Mathematical Structures   Sub Code: 18CS36

After successful completion of this course, the students will be able to:

CO	Description
C206.1	Demonstrate the correctness of an argument using propositional and predicate logic, and truth tables.
C206.2	Demonstrate the properties of Integers & fundamental principles of Counting.
C206.3	Make use of Relation and Function's properties to solve logical problems.
C206.4	Solve problems involving principle of Inclusion & Exclusion, and recurrence relations.
C206.5	Explain the fundamentals of Graphs and Trees.

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SUB: Analog and Digital Electronics Laboratory   Sub Code: 18CSL37

After successful completion of this course, the students will be able to:

CO	Description
C207.1	Use appropriate design equations / methods to design the given circuit.
C207.2	Examine and verify the design of both analog and digital circuits using simulators
C207.3	Make us of electronic components, ICs, instruments and tools for design and testing of circuits for the given the appropriate inputs.
C207.4	Compile a laboratory journal which includes; aim, tool /instruments /software /components used, design equations used and designs, schematics, program listing, procedure followed, relevant theory, results as graphs and tables, interpreting and concluding the findings.

SUB: Data Structures Laboratory   Sub Code: 18CSL38

After successful completion of this course, the students will be able to:

CO	Description
C208.1	Implement various linear and non-linear data structures.
C208.2	Demonstrate the working nature of different types of data structures and their applications.
C208.3	Implement the searching and sorting algorithms.
C208.4	Select the appropriate data structures for solving computing problems.

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IV SEMESTER

SUB: Complex Analysis, Probability and Statistical Methods   Sub Code: 18MAT41

After successful completion of this course, the students will be able to:

CO	Description
C210.1	Use the concepts of analytic function and complex potentials to solve the problems arising in Electromagnetic field theory.
C210.2	Utilize conformal transformation and complex integral arising in aerofoil theory, fluid flow Visualization and image processing.
C210.3	Apply discrete and continuous probability distributions in analyzing the probability models arising in engineering field.
C210.4	Make use of the correlation and regression analysis to fit a suitable mathematical model for the Statistical data.
C210.5	Construct joint probability distributions and demonstrate the validity of testing the hypothesis.

SUB: Design and Analysis of Algorithms   Sub Code: 18CS42

After successful completion of this course, the students will be able to:

CO	Description
C211.1	Explain the specifications of algorithms, fundamental data structures and their operations.
C211.2	Explain various searching problem solving techniques.
C211.3	Explain various sorting problem solving techniques.
C211.4	Estimate the computational complexity of different algorithms.
C211.5	Choose appropriate algorithmic strategies for problem solving.

SUB: Operating Systems   Sub Code: 18CS43

After successful completion of this course, the students will be able to:

CO	Description
C212.1	Demonstrate need for Operating System and its types.
C212.2	Explain the multithreaded systems and scheduling algorithms.
C212.3	Illustrate the concept of process synchronization and Deadlock.
C212.4	Explain the concept of memory management and File System.
C212.5	Illustrate the different concepts of disk management, Protection and Linux System case studies.

SUB: Microcontrollers and Embedded Systems   Sub Code: 18CS44

After successful completion of this course, the students will be able to:

CO	Description
C213.1	Describe the architectural features and instructions of ARM microcontroller.
C213.2	Apply the knowledge gained for Programming ARM for different applications.
C213.3	Interface external devices and I/O with ARM microcontroller.
C213.4	Interpret the basic hardware components and their selection method based on the characteristics and attributes of an embedded system.
C213.5	Develop the hardware /software co-design and firmware design approaches.

SUB: Object Oriented Concepts   Sub Code: 18CS45

After successful completion of this course, the students will be able to:

CO	Description
C214.1	Explain concepts of object oriented programming with C++.
C214.2	Develop Java programs to solve problems.
C214.3	Explain Inheritance, Exceptions, Packages and Interfaces in Java.
C214.4	Develop multithreaded programs.
C214.5	Develop simple event based Graphical User Interfaces using Swings.

SUB: Data Communication   Sub Code: 18CS46

After successful completion of this course, the students will be able to:

CO	Description
C215.1	Explain the various components of data communication.
C215.2	Explain the fundamentals of digital communication and switching.
C215.3	Compare and contrast data link layer protocols.
C215.4	Summarize IEEE 802.xx standards

SUB: Design, Analysis of Algorithms Laboratory   Sub Code: 18CSL47

After successful completion of this course, the students will be able to:

CO	Description
C216.1	Develop Java programs to demonstrate Inheritance, Exception handling and multi-threading concepts.
C216.2	Develop a Java Program to demonstrate the stack operations.
C216.3	Develop the variety of algorithms using Greedy, dynamic programming and Backtracking techniques.
C216.4	Analyze the performance of sorting algorithms based on divide-and-conquer technique.

SUB: Microcontrollers and Embedded Systems Laboratory   Sub Code: 18CSL48

After successful completion of this course, the students will be able to:

CO	Description
C217.1	Develop and test Assembly Language Program (ALP) using ARM7TDMI/LPC2148
C217.2	Conduct the following experiments on an ARM7TDMI/LPC2148 evaluation board using evaluation version of Embedded 'C' & Keil Uvision-4 tool /compiler tool/ compiler.
C217.3	Choose micro controllers for various kinds of applications.

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V SEMESTER

SUB: Management & Entrepreneurship For IT Industry   Sub Code: 18CS51

After successful completion of this course, the students will be able to:

CO	Description
C301.1	Explain the basic concepts of management, planning, Organizing and Staffing.
C301.2	Summarize the appropriate leadership styles, motivation theories, communications, Coordination and controlling, methods
C301.3	Interpret the meaning of entrepreneur, entrepreneurship and role in economic development on India. Along with Identification of business opportunities and feasibility study
C301.4	Inferring the new ideas, Prepare project report based on guidelines of planning commission by utilizing the resources available effectively through ERP
C301.5	Explain the IPRs and institutional support in Micro and Small Enterprises as per the Indian Industrial Policy 2007.

SUB: Computer Networks   Sub Code: 18CS52

After successful completion of this course, the students will be able to:

CO	Description
C302.1	Explain principles of application layer protocols
C302.2	Identify transport layer services and infer UDP and TCP protocols
C302.3	Classify routers, IP and Routing Algorithms in network layer
C302.4	Explain the Wireless and Mobile Networks covering IEEE 802.11 Standard
C302.5	Explain Multimedia Networking and Network Management

SUB: Database Management Systems   Sub Code: 18CS53

After successful completion of this course, the students will be able to:

CO	Description
C303.1	Define, Identify and analyze database objects, enforce integrity constraints on a database using RDBMS.
C303.2	Use Structured Query Language (SQL) for database manipulation.
C303.3	Build simple database systems
C303.4	Develop application to interact with databases.

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SUB: Automata Theory and Computability   Sub Code: 18CS54

After successful completion of this course, the students will be able to:

CO	Description
C304.1	Apply the fundamental understanding of automata theory to design FSMs for regular Languages.
C304.2	Demonstrate the understanding of the regular expressions & Regular grammar and their Equivalence.
C304.3	Apply the fundamental understanding of automata theory to design and develop CFG and PDA and their relative powers.
C304.4	Apply the fundamental understanding of automata theory to design and develop Turing Machine.
C304.5	Explain the fundamental understanding of Decidability and Complexity of the problems.

SUB: Application Development Using Python   Sub Code: 18CS55

After successful completion of this course, the students will be able to:

CO	Description
C305.1	Demonstrate proficiency in handling of loops and creation of functions
C305.2	Identify the methods to create and manipulate lists, tuples and dictionaries.
C305.3	Discover the commonly used operations involving regular expressions and file system.
C305.4	Interpret the concepts of Object-Oriented Programming as used in Python.
C305.5	Determine the need for scraping websites and working with CSV, JSON and other file formats.

SUB: Unix Programming   Sub Code: 18CS56

After successful completion of this course, the students will be able to:

CO	Description
C306.1	Explain Unix Architecture, File system and use of Basic Commands
C306.2	Illustrate Shell Programming and to write Shell Scripts
C306.3	Categorize, compare and make use of Unix System Calls
C306.4	Build an application/service over a Unix system
C306.5	Explain signal and daemon characteristics

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SUB: Computer Networks Laboratory   Sub Code: 18CSL57

After successful completion of this course, the students will be able to:

CO	Description
C307.1	Analyze and Compare various networking protocols.
C307.2	Demonstrate the working of different concepts of networking.
C307.3	Implement, analyze and evaluate networking protocols in NS2 / NS3 and Java Programming.

SUB: DBMS Laboratory with Mini Project   Sub Code: 18CSL58

After successful completion of this course, the students will be able to:

CO	Description
C308.1	Demonstrate creation and manipulation operations on database.
C308.2	Demonstrate the working of different concepts of DBMS
C308.3	Develop and demonstrate the project developed for an application.

SUB: Environmental Studies   Sub Code: 18CIV59

After successful completion of this course, the students will be able to:

CO	Description
C309.1	Understand the principles of ecology and environmental issues that apply to air, land, and water issues on a global scale.
C309.2	Develop critical thinking and/or observation skills, and apply them to the analysis of a problem or question related to the environment.
C309.3	Demonstrate ecology knowledge of a complex relationship between biotic and abiotic components
C309.4	Apply their ecological knowledge to illustrate and graph a problem and describe the realities that managers face when dealing with complex issues.

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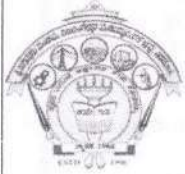
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VI SEMESTER

SUB: System Software and Compilers   Sub Code: 18CS61

After successful completion of this course, the students will be able to:

CO	Description
C310.1	Explain system software such as assemblers and Loader
C310.2	Apply the fundamental concepts learnt for designing & implementing lexical analysis phase of compiler.
C310.3	Apply the concepts studied for designing & Developing Syntax analysis phase.
C310.4	Make use of translation techniques learnt for code generation phase.
C310.5	Utilize LEX and YACC tools for implementing different concepts of system software.

SUB: Computer Graphics and Visualization   Sub Code: 18CS62

After successful completion of this course, the students will be able to:

CO	Description
C311.1	Explain hardware, software and OpenGL Graphics Primitives.
C311.2	Illustrate Geometric transformations on both 2D and 3D objects.
C311.3	Apply concepts of clipping, color and Illumination Models in 2D and 3D objects.
C311.4	Apply the concepts of viewing and visible surface detection of 3D objects
C311.5	Explain curve generating concepts and interactive computer graphics using the OpenGL.

SUB: Web Technology and its Applications   Sub Code: 18CS63

After successful completion of this course, the students will be able to:

CO	Description
C312.1	Adapt HTML and CSS syntax and semantics to build web pages.
C312.2	Construct and visually format tables and forms using HTML and CSS.
C312.3	Develop Client-Side Scripts using JavaScript and Server-Side Scripts using PHP to generate and display the contents dynamically.
C312.4	Appraise the principles of object oriented development using PHP
C312.5	Inspect JavaScript frameworks like jQuery and Backbone which facilitates developer to focus on core features.
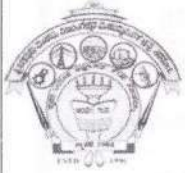
SUB: Data Mining and Data Warehousing   Sub Code: 18CS641

After successful completion of this course, the students will be able to:

CO	Description
C313.1	Explain data warehouse and multi-dimensional data models.
C313.2	Explain various operations on data warehouse and data models.
C313.3	Apply concept, algorithms and applications of association rules for solving data mining problems.
C313.4	Apply concept, algorithms and applications of classifications for solving data mining problems.
C313.5	Apply concept, algorithms and applications clustering for solving data mining problems.

SUB: Programming in Java   Sub Code: 18CS653

After successful completion of this course, the students will be able to:

CO	Description
C320.1	Explain the object-oriented concepts and JAVA.
C320.2	Develop computer programs to solve real world problems in Java.
C320.3	Develop simple GUI interfaces for a computer program to interact with users.

SUB: System Software Laboratory   Sub Code: 18CSL66

After successful completion of this course, the students will be able to:

CO	Description
C322.1	Demonstrate the Lexical analysis using Lexer.
C322.2	Demonstrate the syntax analysis phase of Compiler design using Parser.
C322.3	Develop the different CPU scheduling algorithms.
C322.4	Demonstrate the different memory management algorithms.
C322.5	Demonstrate the deadlock handling algorithm.
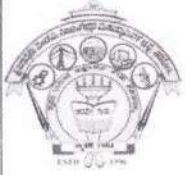
SUB: Computer Graphics Laboratory with Mini Project   Sub Code: 18CSL67

After successful completion of this course, the students will be able to:

CO	Description
C323.1	Demonstrate simple algorithms using OpenGL Graphics Primitives and attributes.
C323.2	Demonstrate line drawing and clipping algorithms using OpenGL functions.
C323.3	Demonstrate 2D and 3D Geometric transformations using OpenGL functions.
C323.4	Demonstrate computer graphics applications using OpenGL.
C323.5	Make use of OpenGL functions to animate real world problems.

SUB: Mobile Application Development   Sub Code: 18CSMP68

After successful completion of this course, the students will be able to:

CO	Description
C324.1	Create, test and debug Android application by setting up Android development environment.
C324.2	Implement adaptive, responsive user interfaces that work across a wide range of devices.
C324.3	Infer long running tasks and background work in Android applications.
C324.4	Demonstrate methods in storing, sharing and retrieving data in Android applications.
C324.5	Infer the role of permissions and security for Android applications.

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VII SEMESTER

SUB: Artificial Intelligence and Machine Learning   Sub Code: 18CS71

After successful completion of this course, the students will be able to:

CO	Description
C401.1	Appraise the theory of Artificial intelligence and Machine Learning
C401.2	Illustrate the working of AI and ML Algorithms.
C401.3	Demonstrate the applications of AI and ML.

SUB: Big Data Analytics   Sub Code: 18CS82

After successful completion of this course, the students will be able to:

CO	Description
C402.1	Understand fundamentals of Big Data analytics.
C402.2	Investigate Hadoop framework and Hadoop Distributed File system.
C402.3	Illustrate the concepts of NoSQL using MongoDB and Cassandra for Big Data.
C402.4	Demonstrate the MapReduce programming model to process the big data along with Hadoop tools.
C402.5	Use Machine Learning algorithms for real world big data and analyze web contents and Social Networks to provide analytics with relevant visualization tools.

SUB: Advanced Computer Architecture   Sub Code: 18CS733

After successful completion of this course, the students will be able to:

CO	Description
C405.1	Explain the fundamentals of computer architecture.
C405.2	Explain the basic concepts of Pipelining.
C405.3	Explain Internal Data Forwarding, Software Interlocking, Hardware Score boarding, Hazard avoidance, Branch handling and Instruction issuing techniques.
C405.4	Explain multi-processor and thread level parallelism.
C405.5	Explain parallel programming model.

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SUB: Cryptography   Sub Code: 18CS744

After successful completion of this course, the students will be able to:

CO	Description
C411.1	Define and Explain cryptography, its principles and algorithms.
C411.2	Illustrate Public and Private key cryptography
C411.3	Explain Key management, distribution and certification
C411.4	Explain authentication protocols
C411.5	Explain IP Security.

SUB: Artificial Intelligence and Machine Learning Laboratory   Sub Code: 18CSL76

After successful completion of this course, the students will be able to:

CO	Description
C417.1	Implement and demonstrate AI and ML algorithms.
C417.2	Evaluate different algorithms.

SUB: Project Work Phase - I   Sub Code: 18CSP77

After successful completion of this course, the students will be able to:

CO	Description
C418.1	Understanding of the state of things.(Literature Survey)
C418.2	Serious needs/problems of the people where it demands solution.(Problem Identification)
C418.3	Discover answers to problems through the application of scientific procedures. (Methodology)
C418.4	Written and overall communication.
C418.5	Understand the planning of Project.

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VIII SEMESTER

SUB: Internet of Things   ·   Sub Code: 18CS81

After successful completion of this course, the students will be able to:

CO	Description
C419.1	Assess the genesis and impact of IoT applications, architectures in real world.
C419.2	Illustrate diverse methods of deploying smart objects and connect them to network.
C419.3	Compare different Application protocols for IoT.
C419.4	Infer the role of Data Analytics and Security in IoT.
C419.5	Appraise and Identify sensor technologies for sensing real world entities and understand the role of IoT in various domains of Industry.

SUB: Storage Area Networks   Sub Code: 18CS822

After successful completion of this course, the students will be able to:

CO	Description
C421.1	Identify key challenges in managing information and analyze different storage networking technologies and virtualization.
C421.2	Explain components and the implementation **Network-Attached Storage** NAS.
C421.3	Describe CAS architecture and types of archives and forms of virtualization.
C421.4	Illustrate the storage infrastructure and management activities.

SUB: Project Work Phase - 2   Sub Code: 18CSP83

After successful completion of this course, the students will be able to:

CO	Description
C424.1	Determine, dissect, and estimate the parameters, required in the solution.
C424.2	Evaluate the solution by considering the standard data / Objective function and by using appropriate performance metrics.
C424.3	Compile the report and take part in presentation.
C424.4	Formulate and Analyze the problem and determine the scope of the solution chosen
C424.5	Identify a issue and derive problem related to society, environment, economics, energy and technology
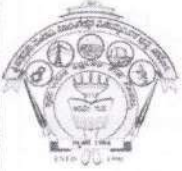
SUB: Technical Seminar ·   Sub Code: 18CSS84

After successful completion of this course, the students will be able to:

CO	Description
C425.1	Choose the modern topic, carryout the comprehensive survey & understand the relevance.
C425.2	Analyze and interpret the impact of the topic on the society/Environment/ domain.
C425.3	Build the report with Technical content and communicating it to the audience, following the moral and ethics.
C425.4	Select appropriate Communication and Visual aids for effective presentation

SUB: Internship   Sub Code: 18CSI85

After successful completion of this course, the students will be able to:

CO	Description
C426.1	Adapt easily to the industry environment.
C426.2	Take part in team work.
C426.3	Make use of modern tools.
C426.4	Decide upon project planning and financing.
C426.5	Adapt ethical values.
C426.6	Motivate for lifelong learning.

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Course Outcomes of all the courses from 3rd Semester to 8th Semester

Subject: **Transform Calculus, Fourier Series And Numerical Techniques**   Sub Code: 18MAT31

After successful completion of this course, the students will be able to;

CO	Description
C201.1	Use Laplace transform and inverse Laplace transform in solving differential/ integral equation arising in network analysis, control systems and other fields of engineering.
C201.2	Demonstrate Fourier series to study the behavior of periodic functions and their applications in system communications, digital signal processing and field theory.
C201.3	Make use of Fourier transform and Z-transform to illustrate discrete/continuous function arising in wave and heat propagation, signals and systems
C201.4	Solve first and second order ordinary differential equations arising in engineering problems using single step and multistep numerical methods.
C201.5	Determine the externals of functional using calculus of variations and solve problems arising in dynamics of rigid bodies and vibration analysis.

Subject: **Network Theory**   Sub Code: 18EC32

After successful completion of this course, the students will be able to;

CO	Description
C202.1	Determine currents and voltages using source transformation/ source shifting/ mesh/ nodal analysis and reduce givennetwork using star-delta transformation/source transformation/ source shifting.
C202.2	Solve network problems by applying Superposition/ Reciprocity/ Thevenin's/ Norton's/ Maximum Power Transfer/ Millman's Network Theorems and electrical laws to reduce circuit complexities and to arrive at feasible solutions.
C202.3	Calculate current and voltages for the given circuit under transient conditions.
C202.4	Apply Laplace transform to solve the given network.
C202.5	Solve the given network using specified two port network parameter like Z or Y or T or h and to understand the concept of resonance

Subject:**Electronic Devices**Sub Code: 18EC33

After successful completion of this course, the students will be able to;

CO	Description
C203.1	Understand the principles of semiconductor Physics.
C203.2	Understand the principles and characteristics of different types of semiconductor devices.
C203.3	Utilize the mathematical models of transistor for circuits and systems.
C203.4	Utilize the mathematical models of MOS transistors for circuits and systems.
C203.5	Understand the fabrication process of semiconductor devices.

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Subject**: Digital System Design**   Sub Code: 18EC34

After successful completion of this course, the students will be able to;

CO	Description
C204.1	Explain the concepts of combinational and sequential logic circuits.
C204.2	Analyze &Design the combinational logic circuits.
C204.3	Describe & Characterize flip-flops & its applications.
C204.4	Design the sequential circuits using SR, JK, D, T flip-flops and Mealy & Moore machines.
C204.5	Design the applications of combinational and sequential circuits.

Subject: **Computer Organization and Architecture**Sub Code: 18EC35

After successful completion of this course, the students will be able to;

CO	Description
C205.1	Explain the basic organization of a computer system.
C205.2	Explain different addressing modes and additional instructions.
C205.3	Explain different ways of accessing an input / output device including interrupts.
C205.4	Illustrate the organization of different types of semiconductor and other secondary storage memories.
C205.5	Illustrate simple processor organization based on hardwired control and micro programmed control.

Subject: **Power Electronics and Instrumentation**   Sub Code: 18EC36

After successful completion of this course, the students will be able to;

CO	Description
C206.1	Build and test circuits using power electronic devices.
C206.2	Analyze and design controlled rectifier, DC to DC converters, DC to AC inverters and SMPS.
C206.3	Develop circuits for multirange Ammeters, Voltmeters and Bridges to measure passive component values and frequency and Define instrument errors.
C206.4	Describe the principle of operation of Digital instruments and PLCs.
C206.5	Use Instrumentation amplifier for measuring physical parameters.

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Subject: **Electronic Devices and Instrumentation Lab**   Sub Code: 18ECL37

After successful completion of this course, the students will be able to;

CO	Description
C207.1	Recognize and demonstrate functioning of semiconductor power devices.
C207.2	Evaluate characteristics, switching, power conversion and control by semiconductor devices.
C207.3	Analyze the response and plot characteristics of transducers such as LDR, Photo diode etc.
C207.4	Design and test simple electronic circuit for measurement of temperature and resistance.
C207.5	Use circuit simulation software for the implementation and characterization of electronic circuit devices.

Subject: **Digital System Design Lab**   Sub Code: 18ECL38

After successful completion of this course, the students will be able to;

CO	Description
C208.1	Design, realize and verify Demorgan's theorems, SOP & POS forms.
C208.2	Demonstrate the truth table of various expressions & combinational circuits using logic gates.
C208.3	Design various combinational circuits such as adders, subtractors, comparators, multiplexers and de-multiplexers.
C208.4	Construct flip-flops, shift registers and counters.
C208.5	Simulate serial adder and binary multiplier.

Subject: **COMPLEX ANALYSIS, PROBABILITY AND STATISTICAL METHODS** Sub Code: 18EC41

After successful completion of this course, the students will be able to;

CO	Description
C209.1	Use the concepts of analytic function and complex potentials to solve the problems arising in electromagnetic field theory.
C209.2	Utilize conformal transformation and complex integral arising in aerofoil theory, fluid flowvisualization and image processing.
C209.3	Apply discrete and continuous probability distributions in analyzing the probability models arising in engineering field.
C209.4	Make use of the correlation and regression analysis to fit a suitable mathematical model for thestatistical data.
C209.5	Construct joint probability distributions and demonstrate the validity of testing the hypothesis.

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Subject: **Analog Circuits**   Sub Code: 18EC42

After successful completion of this course, the students will be able to;

CO	Description
C210.1	Analysis of biasing types and small signal models of BJT and MOSFET.
C210.2	Study of MOSFET amplifier configuration and Oscillators.
C210.3	Describe the construction and working principle of feedback amplifiers and Power amplifiers.
C210.4	Understand the functioning of linear ICs.
C210.5	Design of linear IC based circuits.

Subject: **Control Systems**   Sub Code: 18EC43

After successful completion of this course, the students will be able to;

CO	Description
C211.1	Develop the mathematical model of Mechanical & Electrical Systems.
C211.2	Develop transfer function for a given control system using block diagram reduction techniques & signal flow graph method.
C211.3	Determine the time domain specifications for first & Second order systems.
C211.4	Determine the stability of a system in the time domain using Routh Hurwitz criterion & Root Locus Techniques.
C211.5	Determine the stability of a system in the frequency domain using Nyquist & Bode Plots.

Subject: **Engg. Statistics and Linear Algebra**   Sub Code: 18EC44

After successful completion of this course, the students will be able to;

CO	Description
C212.1	Identify and associate Random Variables and Random Processes in Communication events.
C212.2	Analyze and model the Random events in typical communication events to extract quantitative statistical parameters.
C212.3	Analyze and model typical signal sets in terms of a basis function set of Amplitude, phase and frequency
C212.4	Explain vector spaces and it's dimensions
C212.5	Compute determinats, diagonalize and Singular Value Decomposition

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Subject: **Signals and Systems**   Sub Code: 18EC45

After successful completion of this course, the students will be able to;

CO	Description
C213.1	Classify signals as continuous/discrete, periodic/ aperiodic, even odd, energy/power and deterministic/random signals.
C213.2	Determine linearity, causality, time-invariance and stability properties of continuous and discrete time systems.
C213.3	Compute the response of continuous and discrete LTI system using convolution integral and Sum
C213.4	Determine the spectral characteristics of continuous and discrete time signal using Fourier analysis
C213.5	Compute Z-transforms, inverse Z-transforms and transfer functions of complex LTI systems.

Subject:**Microcontroller**   Sub Code: 18EC46

After successful completion of this course, the students will be able to;

CO	Description
C214.1	Explain the difference between Microprocessor & Microcontroller Architecture of 8051 &Interfacing it to external memory.
C214.2	Write 8051 Assembly level programs using instruction set.
C214.3	Explain interfacing of 8051 with LEDs and Switches using the concepts of stack, subroutines concepts of Assembly level programming.
C214.4	Explain the Interrupt system, operation of Timers/Counters and serial port of 8051
C214.5	Write an Assembly language program to generate timings and waveforms using 8051 timers, to send & receive serial data using port and to generate external interrupt using switch

Subject: **Microcontroller Lab**   Sub Code: 18ECL47

After successful completion of this course, the students will be able to;

CO	Description
C215.1	Write Assembly language programs in 8051 for solving simple problems.
C215.2	Write Assembly language programs that manipulate input data using different instructions of 8051.
C215.3	Interface different input and output devices to 8051.
C215.4	Control input and output devices to 8051 using Assembly language programs.
C215.5	Interface the serial devices to 8051 and do the serial transfer using C programming

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Subject: **Analog Circuits Lab**   Sub Code: 18ECL48

After successful completion of this course, the students will be able to;

CO	Description
C216.1	Analyze frequency response of JFET/MOSFET amplifier.
C216.2	Design BJT/FETs amplifier with and without feedback and evaluate their performance characteristics.
C216.3	Apply the knowledge gained in design of BJT/FETs circuits in oscillators.
C216.4	Design analog circuits using OPAMPs for different applications.
C216.5	Simulate and analyze analog circuits that uses ICs for different electronic applications.

Subject: **Management & Entrepreneurship**   Sub Code: 18EC51

After successful completion of this course, the students will be able to;

CO	Description
C301.1	Understand the fundamental concepts of Management & Entrepreneurship & Opportunities in order to setup a business.
C301.2	Identify the various organizations architecture.
C301.3	Describe the functions of Managers, Entrepreneurs & their Social Responsibilities.
C301.4	Understand the components in developing a business plan.
C301.5	Recognize the various sources of funding & institutions supporting entrepreneurs

Subject: **Digital Signal Processing**   Sub Code: 18EC52

After successful completion of this course, the students will be able to;

CO	Description
C302.1	Determine response of LTI systems using time domain and DFT techniques.
C302.2	Compute DFT of real and complex discrete time signals.
C302.3	Computation of DFT using FFT algorithms and linear filtering approach.
C302.4	Design and realize FIR and IIR digital filters
C302.5	Understand the DSP processor architecture.

Subject: **Principles of Communication Systems**   Sub Code: 18EC53

After successful completion of this course, the students will be able to;

CO	Description
C303.1	Analyze and Compute performance of amplitude modulation schemes in time and frequency domains.
C303.2	Analyze and compute performance angle modulation schemes in time and frequency domains.
C303.3	Analyze and Compute the performance of AM and FM system in the presence of noise.
C303.4	Understand the characteristics of pulse amplitude modulation, pulse position modulation and pulse code modulation systems.

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C303.5	Analyze and Compute the performance digital formating process and demon stare its use in multiplexers and encoders.

Subject: **Information Theory and Coding**   Sub Code: 18EC54

After successful completion of this course, the students will be able to;

CO	Description
C304.1	Explain concept of dependent & independent source, measure of information, entropy, rate of information and order of a source.
C304.2	Represent the information using Shannon Encoding, Shannon Fano, Prefix and Huffman encoding algorithms.
C304.3	Model the continuous and discrete communication channels using input, output and joint probabilities.
C304.4	Determine a codeword comprising of the check bits computed using linear block codes, cyclic codes & convolutional codes.
C304.5	Design the encoding and decoding circuits for linear block codes, cyclic codes, convolutional codes, BCH and Golay codes.

Subject: **Electromagnetic waves**   Sub Code: 18EC55

After successful completion of this course, the students will be able to;

CO	Description
C305.1	Evaluate problems on electrostatic force, electric field due to point, linear, volume charges by applying conventional methods and charge in a volume.
C305.2	Apply Gauss law to evaluate Electric fields due to different charge distributions and Volume Charge distribution by using Divergence Theorem.
C305.3	Determine potential and energy with respect to point charge and capacitance using Laplace equation and Apply Biot-Savart's and Ampere's laws for evaluating Magnetic field for different currentconfigurations
C305.4	Calculate magnetic force, potential energy and Magnetization with respect to magnetic materials and voltage induced in electric circuits.
C305.5	Apply Maxwell's equations for time varying fields, EM waves in free space and conductors and Evaluate power associated with EM waves using Poynting theorem.

Subject: **Verilog HDL**Sub Code: 18EC56

After successful completion of this course, the students will be able to;

CO	Description
C306.1	Write Verilog programs in gate, dataflow (RTL), behavioral and switch modeling levels of Abstraction.
C306.2	Design and verify the functionality of digital circuit/system using test benches.

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C306.3	Identify the suitable Abstraction level for a particular digital design.
C306.4	Write the programs more effectively using Verilog tasks, functions and directives.
C306.5	Perform timing and delay Simulation. Interpret the various constructs in logic synthesis.

Subject:**DSP Lab** Sub Code: 18ECL57

After successful completion of this course, the students will be able to;

CO	Description
C307.1	Understand the concepts of analog to digital conversion of signals and frequency domain sampling of signals.
C307.2	Modeling of discrete time signals and systems and verification of its properties and results.
C307.3	Implementation of discrete computations using DSP processor and verify the results.
C307.4	Realize the digital filters using a simulation tool and analyze the response of the filter for an audio signal.

Subject:**HDL Lab** Sub Code: 18EC58

After successful completion of this course, the students will be able to;

CO	Description
C308.1	Write the Verilog programs to simulate Combinational circuits in Dataflow and Behavioral.
C308.2	Write the Verilog programs to simulate Combinational circuits in Gate level Abstractions.
C308.3	Describe sequential circuits like flip flops and counters in Behavioral description and obtain simulation waveforms.
C308.4	Synthesize Combinational and Sequential circuits on programmable ICs and test the hardware.
C308.5	Interface the hardware to the programmable chips and obtain the required output

Subject:**Digital Communication** Sub Code: 18EC61

After successful completion of this course, the students will be able to;

CO	Description
C309.1	Associate and apply the concepts of Bandpass sampling to well specified signals and channels.
C309.2	Analyze and compute performance parameters and transfer rates for low pass and bandpass symbol under ideal and corrupted non band limited channels.
C309.3	Explain digital modulation techniques.
C309.4	Test and validate symbol processing and performance parameters at the receiver under ideal and corrupted bandlimited channels.

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C309.5	Demonstrate that bandpass signals subjected to corruption and distortion in a bandlimited channel can be processed at the receiver to meet specified performance criteria.

Subject:**Embedded Systems** Sub Code: 18EC62

After successful completion of this course, the students will be able to;

CO	Description
C310.1	Describe the architectural features and instructions of 32 bit microcontroller ARM Cortex M3.
C310.2	Apply the knowledge gained for Programming ARM Cortex M3 for different applications.
C310.3	Understand the basic hardware components and their selection method based on the characteristics and attributes of an embedded system.
C310.4	Develop the hardware software co-design and firmware design approaches.
C310.5	Explain the need of real time operating system for embedded system applications.

Subject:**Microwave and Antenna**   Sub Code: 18EC63

After successful completion of this course, the students will be able to;

CO	Description
C311.1	Describe the use and advantages of microwave transmission
C311.2	various parameters related to microwave transmission lines and waveguides
C311.3	Identify microwave devices for several applications
C311.4	Analyze various antenna parameters necessary for building a RF system
C311.5	Recommend various antenna configurations according to the applications

Subject: **Operating Systems**   Sub Code: 18EC64

After successful completion of this course, the students will be able to;

CO	Description
C312A.1	Explain the goals, structure, operation and types of operating systems.
C312A.2	Apply scheduling techniques to find performance factors.
C312A.3	Apply suitable techniques for contiguous and non-contiguous memory allocation.
C312A.4	Explain organization of file systems and IOCS.
C312A.5	Describe message passing, deadlock detection and prevention methods.

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Subject: **Python Application Programming**   Sub Code:18EC646

After successful completion of this course, the students will be able to;

CO	Description
C312B.1	Examine syntax and semantics and be fluent in the use of python flow control and functions.
C312B.2	Demonstrate proficiency in handling strings and file systems.
C312B.3	Create, run and manipulate python programs using core data structures like Lists, Dictionaries and use regular expressions.
C312B.4	Interpret the concepts of object-oriented programming as used in python.
C312B.5	Implement exemplary applications related to network programming, Web services and databases in python

Subject: **Sensors and signal conditioning**   Sub Code: 18EC652

After successful completion of this course, the students will be able to;

CO	Description
C314.1	Appreciate various types of sensors and the material properties required to make sensors.
C314.2	Understand reactance and electromagnetic sensors and signal conditioning for it.
C314.3	Describe the self generating sensors.
C314.4	Explain digital and intelligent sensors.
C314.5	Understand sensors based on semiconductor junction.

Subject: **Communication Lab**   Sub Code: 18EC66

After successful completion of this course, the students will be able to;

CO	Description
C314.1	Design and test circuits for analog modulation and demodulation schemes.
C314.2	Determine the characteristics and response of microwave waveguide.
C314.3	Determine characteristics of microstrip antennas and devices and compute the parameters associated with it.
C314.4	Design and test the digital and analog modulation circuits and display the waveforms.
C314.5	Simulate the digital modulation systems & compare the error performance of basic digital

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Subject: **Embedded System Lab**   Sub Code: 18ECL67

After successful completion of this course, the students will be able to;

CO	Description
C315.1	Understand the instruction set of 32 bit microcontroller ARM Cortex M3, and the software tool required for programming in Assembly and C language.
C315.2	Develop assembly language programs using ARM Cortex M3 for different applications.
C315.3	Interface external devices and I/O with ARM Cortex M3.
C315.4	Develop C language programs for embedded system applications.
C315.5	Develop library functions for embedded system applications.

Subject: **Mini-Project**   Sub Code: 18ECMP68

After successful completion of this course, the students will be able to;

CO	Description
C316.1	Students will be able to practice acquired knowledge within the chosen area of technology for project development
C316.2	Identify, discuss and justify the technical aspects of the chosen project with a comprehensive and systematic approach.
C316.3	Reproduce, improve and refine technical aspects for engineering projects.
C316.4	Work as an individual or in a team in development of technical projects.
C316.5	Communicate and report effectively project related activities and findings.

Subject:**Computer Networks**   Sub Code: 18EC71

After successful completion of this course, the students will be able to;

CO	Description
C401.1	Understand the concepts of networking thoroughly
C401.2	Describe various networking architectures
C401.3	Identify the protocols and services of different layers.
C401.4	Distinguish the basic network configurations and standards associated with each network
C401.5	Analyze a simple network and measurement of its parameters.

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	Programmes Accredited by NBA: CSE, ECE, EEE & ME	2019-20

Subject: **VLSI Design**   Sub Code: 18EC72

After successful completion of this course, the students will be able to;

CO	Description
C402.1	Demonstrate understanding of MOS transistor theory, CMOS fabrication flow and technology scaling.
C402.2	Draw the basic gates using the stick and layout diagrams with the knowledge of physical design aspects.
C402.3	Demonstrate ability to design Combinational, sequential and dynamic logic circuits as per the requirements
C402. 4	Interpret Memory elements along with timing considerations.
C402. 5	Interpret testing and testability issues in VLSI Design

Subject: **Digital Image Processing**   Sub Code: 18EC733

After successful completion of this course, the students will be able to;

CO	Description
C403.1	Understand image formation and the role human visual system plays in perception of gray and color image data.
C403.2	Apply image processing techniques in spatial domain.
C403.3	Apply image processing techniques in frequency domain
C403.4	Conduct independent study and analysis of Image Enhancement and restoration techniques.
C403.5	Design and evaluate image analysis techniques

Subject: **Machine Learning with Python**   Sub Code: 18EC745

After successful completion of this course, the students will be able to;

CO	Description
C404.1	Identify the problems in machine learning.
C404.2	Select supervised, unsupervised or reinforcement learning for problem solving.
C404.3	Apply theory of probability and statistics in machine learning
C404.4	Apply concept learning, ANN, Bayes classifier, k nearest neighbour
C404.5	Perform statistical analysis of machine learning techniques.

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	S J P N Trust's	ME
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	Programmes Accredited by NBA: CSE, ECE, EEE & ME	2019-20

Subject: **Energy And Environment**   Sub Code:18EC751

After successful completion of this course, the students will be able to;

CO	Description
C404.1	Summarize the basic concepts of energy, its distribution and general Scenario.
C404.2	Explain different energy storage systems, energy management, audit and economic analysis.
C404.3	Summarize the environment eco system and its need for awareness.
C404.4	Identify the various types of environment pollution and their effects.
C404.5	Discuss the social issues of the environment with associated acts.

Subject: **Computer Networks Laboratory**   Sub Code: 18ECL76

After successful completion of this course, the students will be able to;

CO	Description
C406.1	Choose suitable tools to model network and understand the protocols at various OSI reference levels.
C406.2	Design a suitable network and simulate using a network simulator tool.
C406.3	Analyze the networking concepts and protocols using C/C++ Programming.
C406.4	Model the networks for different configurations and analyze the results.
C406.1	Choose suitable tools to model network and understand the protocols at various OSI reference levels.

Subject:**VLSI Laboratory**   Sub Code: 18ECL77

After successful completion of this course, the students will be able to;

CO	Description
C407.1	Design and simulate combinational and sequential digital circuits using Verilog HDL
C407.2	Understand the Synthesis process of digital circuits using EDA tool
C407.3	Perform ASIC design flow and understand the process of synthesis, synthesis constraints and evaluating the synthesis reports to obtain optimum gate level net list
C407.4	Design and simulate basic CMOS circuits like inverter, common source amplifier and differential amplifiers amplifiers
C407.5	Perform RTL-GDSII flow and understand the stages in ASIC design

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	S J P N Trust's	ME
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Subject:**Project Work Phase – I**   Sub Code: 18ECP78

After successful completion of this course, the students will be able to;

CO	Description
C408.1	Demonstrate a sound technical knowledge of their selected project topic.
C408.2	Undertake problem identification, formulation and solution.
C408.3	Design engineering solutions to complex problems utilizing a systems approach
C408.4	Survey the changes and advancements in the related area.
C408.5	Engineers and the community at large in written/oral forms.

Subject: **Wireless and Cellular Communication**   Sub Code: 18EC81

After successful completion of this course, the students will be able to;

CO	Description
C409.1	Explain concepts of propagation mechanisms like Reflection, Diffraction, Scattering in wireless channels.
C409.2	Develop a scheme for idle mode, call set up, call progress handling and call tear down in a GSM cellular network.
C409.3	Develop a scheme for idle mode, call set up, call progress handling and call tear down in a CDMA cellular network.
C409.4	Understand the basic operations and architecture of air interface in a LTE 4G system.
C409.1	Understand the concepts of OFDMA and SC-FDMA used in 4G LTE systems.

Subject: **Network Security**   Sub Code: 18EC821

After successful completion of this course, the students will be able to;

CO	Description
C410.1	Explain network security services and mechanisms and explain security concepts
C410.2	Understand the concept of Transport Level Security and Secure Socket Layer.
C410.3	Explain Security concerns in Internet Protocol security
C410.4	Explain Intruders, Intrusion detection and Malicious Software
C410.5	Explain Firewalls, Firewall Characteristics, Biasing and Configuration

Subject: **Project Work**   Sub Code: 18ECP83

After successful completion of this course, the students will be able to;

CO	Description
C412.1	Learn on their own, reflect on their learning and take appropriate actions to improve it.
C412.2	Make links across different areas of knowledge and to generate, develop and evaluate ideas and information so as to apply these skills to the project task
C412.3	Design and implementation of engineering solutions to societal/ environment/energy and automation problems utilizing a systems Approach.
C412.4	Present the project and be able to defend it.
C412.5	Communicate effectively and to present ideas clearly and coherently in both the written and oralforms.

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Subject: **Seminar Work**   Sub Code: 18ECS84

After successful completion of this course, the students will be able to;

CO	Description
C413.1	Identify a topic and survey the changes in the technologies/concepts relevant to the topic
C413.2	Discuss the technology and interpret the impact on the society, environment and the domain.
C413.3	Describe the behaviours and characteristics of an effective learner.
C413.4	Exhibiting good oral and written communication skills.
C413.5	Apply principles of ethics and respect in interaction and compile the report

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	S J P N Trust's	EEE
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DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

Course Outcomes for 8th Semester

Sub: Power System Operation & Control   **Sub. Code:** 18EE81

After successful completion of the course, the student will be able to:

CO	Description
C420.1	Describe various levels of controls in power systems, architecture and configuration of SCADA.
C420.2	Develop and analyze mathematical models of Automatic Load Frequency Control.
C420.3	Develop mathematical model of Automatic Generation Control in Interconnected Power system.
C420.4	Discuss the Control of Voltage, Reactive Power and Voltage collapse.
C420.5	Explain security, contingency analysis, state estimation of power systems.

Sub: Electrical Estimation and Costing   **Sub. Code:** 18EE822

After successful completion of the course, the student will be able to:

CO	Description
C422.1	Explain the architectural design, Communication and measurement technology and performance analysis tools for smart grid.
C422.2	Discuss various stability analysis tools for smart grid..
C422.3	Explain computational tools and pathway/barrier for smart grid design.
C422.4	Develop cleaner, more environmentally responsible technologies for the electric system.
C422.5	Explain methods to promote smart grid awareness and making the existing transmission system smarter by investing in new technology.

Sub: Big Data Analytics in Power Systems   **Sub. Code:** 18EE823

After successful completion of the course, the student will be able to:

CO	Description
C423.1	Discuss role of big data and machine-learning methods applicable to power systems and in particular to Smart Grid communications.
C423.2	Discuss optimization methods which are suitable for big data models in power systems.
C423.3	Discuss various cyber security issues, electricity theft detection and mitigation that exist in IoT-enabled future power systems.
C423.4	Discuss renewable energy planning concerns associated with planned future power systems that have high renewable penetration.
C423.5	Discuss various methods for transformer differential Protection.

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Sub: Project Work Phase – II   **Sub. Code:** 18EEP83

After successful completion of the course, the student will be able to:

CO	Description
C426.1	Demonstrate the knowledge of engineering fundamentals to identify, formulate and solve engineering problems.
C426.2	Present the project and be able to defend it.
C426.3	Make links across different areas of knowledge and to generate, develop and evaluate ideas and information so as to apply these skills to the project task.
C426.4	habituated to critical thinking and use problem solving skills
C426.5	Communicate effectively and to present ideas clearly and coherently in both the written and oral forms.
C426.6	Work in a team to achieve common goal.
C426.7	Learn on my own and take appropriate actions.

Sub: Technical Seminar   **Sub. Code:** 18EES84

After successful completion of the course, the student will be able to:

CO	Description
C427.1	Use and develop knowledge in the field of engineering and other disciplines through independent learning and collaborative study.
C427.2	Identify, understand and discuss current, real-time issues.
C427.3	Improve oral and written communication skills.
C427.4	Explore an appreciation of the self in relation to its larger diverse social and academic contexts.
C427.5	Apply principles of ethics and respect in interaction with others.

Sub: Internship   **Sub. Code:** 18EEI85

After successful completion of the course, the student will be able to:

CO	Description
C428.1	Gain practical experience within industry in which the internship is done.
C428.2	Acquire knowledge of the industry in which the internship is done.
C428.3	Apply knowledge and skills learned to classroom work.
C428.4	Develop a greater understanding about career options while more clearly defining personal career goals.
C428.5	Experience the activities and functions of professionals.
C428.6	Develop and refine oral and written communication skills.

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Course Outcome

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Course Outcomes for 7th Semester

Sub: Power System Analysis – II   **Sub. Code:** 18EE71

After successful completion of the course, the student will be able to:

CO	Description
C401.1	Formulate network matrices and models for solving load flow problems.
C401.2	Perform steady state power flow analysis of power systems using numerical iterative techniques.
C401.3	Solve issues of economic load dispatch and unit commitment problems.
C401.4	Analyze short circuit faults in power system networks using bus impedance matrix.
C401.5	Discuss optimal scheduling for hydro-thermal system, power system security and reliability.
C401.6	Apply Point by Point method and Runge Kutta Method to solve Swing Equation.

Sub: Power System Protection   **Sub. Code:** 18EE72

After successful completion of the course, the student will be able to:

CO	Description
C402.1	Discuss performance of protective relays, components of protection scheme.
C402.2	Explain the working of distance relays and the effects of arc resistance, power swings, line length and source impedance on performance of distance relays.
C402.3	Discuss various Pilot protection schemes, protection of generators, motors, Transformers and construction, operating principles, performance of differential relays for differential protection.
C402.4	Explain the principle of circuit interruption in different types of circuit breakers.
C402.5	Describe the construction and operating principle of different types of fuses and modern trends in power system protection.

Sub: Micro- and Nano-Scale Sensors Transducers   **Sub. Code:** 18EE732

After successful completion of the course, the student will be able to:

CO	Description
C404.1	Explain the differences between the sensor and transducer technology based on nanotechnology, nanofabrication and the classical sensor technologies.
C404.2	Develop an informed selection of a sensor or transducer for a particular application.
C404.3	Analyze the technologies that are available commercially at the present time.

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Course Outcome

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Sub: Integration of Distributed Generation **Sub. Code:** 18EE733

After successful completion of the course, the student will be able to:

CO	Description
C405.1	Explain energy generation by wind and solar power & discuss the flexibilities in choosing locations with respect to wind and solar systems.
C405.2	Explain the performance of the system when distributed generation is integrated to the system.
C405.3	Discuss effects of the integration of DG: the increased risk of overload, increased losses, increased risk of over voltages.
C405.4	Discuss effects of the integration of DG: incorrect operation of the protection and increased levels of power quality disturbances.
C405.5	Discuss effects of the integration of DG for different types of power quality disturbances.

Sub: Utilization of Electrical Power **Sub. Code:** 18EE742

After successful completion of the course, the student will be able to:

CO	Description
C409.1	Discuss different methods of electric heating & welding, laws of electrolysis, extraction, refining of metals and electro deposition process.
C409.2	Discuss the laws of illumination, different types of lamps, lighting schemes and design of lighting systems.
C409.3	Analyze systems of electric traction, speed time curves and mechanics of train movement.
C409.4	Explain the motors used for electric traction, their control & braking and power supply system used for electric traction.
C409.5	Explain the working of electric and hybrid electric vehicles.

Sub: Smart Grid **Sub. Code:** 18EE744

After successful completion of the course, the student will be able to:

CO	Description
C411.1	Explain the concept of Smart grid and need of smart grid.
C411.2	Outline the benefits and drivers of DC Power delivery system.
C411.3	Summarize the Intelligrid Architecture for the smart grid.
C411.4	Explain the Efficient Electric End-use Technology Alternatives.
C411.5	Discuss Demand side planning and Evaluation.

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Sub: Energy and Environment   **Sub. Code:** 18ME751

After successful completion of the course, the student will be able to:

CO	Description
C413.1	Summarize the basic concepts of energy, its distribution and general Scenario.
C413.2	Explain different energy storage systems, energy management, audit and economic analysis.
C413.3	Summarize the environment eco system and its need for awareness.
C413.4	Identify the various types of environment pollution and their effects.
C413.5	Discuss the social issues of the environment with associated acts.

Sub: Python Application Programming   **Sub. Code:** 18CS752

After successful completion of the course, the student will be able to:

CO	Description
C414.1	Examine Python syntax and semantics and be fluent in the use of Python flow control and functions.
C414.2	Demonstrate proficiency in handling Strings and File Systems.
C414.3	Create, run and manipulate Python Programs using core data structures like Lists, Dictionaries and use Regular Expressions.
C414.4	Interpret the concepts of Object-Oriented Programming as used in Python.
C414.5	Develop exemplary applications related to Network Programming, Web Services and Databases in Python.

Sub: Power system Simulation Laboratory   **Sub. Code:** 18EEL76

After successful completion of the course, the student will be able to:

CO	Description
C417.1	Develop a program in MATLAB to assess the performance of medium and long transmission lines.
C417.2	Develop a program in MATLAB to obtain the power angle characteristics of salient and non-salient pole alternator.
C417.3	Develop a program in MATLAB to assess the transient stability under three phase fault at different locations in a of radial power systems.
C417.4	Develop programs in MATLAB to formulate bus admittance and bus impedance matrices of interconnected power systems.
C417.5	Use Mi-Power package to solve power flow problem for simple power systems.
C417.6	Use Mi-Power package to study unsymmetrical faults at different locations in radial power systems.
C417.7	Use of Mi-Power package to study optimal generation scheduling problems for thermal power plants.

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Sub: Rely and High Voltage Laboratory   **Sub. Code:** 18EEL77

After successful completion of the course, the student will be able to:

CO	Description
C418.1	Experimentally verify the characteristics of over current, over voltage, under voltage and negative sequence relays of both electromagnetic and static type.
C418.2	Experimentally verify the characteristics of microprocessor based over current, over voltage, under voltage relays and distance relay.
C418.3	Justify knowledge of protection schemes of generator, motor and feeders.
C418.4	Analyze the spark over characteristics for both uniform and non-uniform field configurations using High voltage AC and DC.
C418.5	Measure high AC and DC voltages and breakdown strength of transformer oil.
C418.6	Draw electric field lines and measure the capacitance of different electrode configuration models.
C418.6	Justify knowledge of generating standard lightning impulse voltage to determine efficiency, energy of impulse generator and 50% probability flashover voltage for air insulation.

Sub: Project Phase – I   **Sub. Code:** 18EEP78

After successful completion of the course, the student will be able to:

CO	Description
C419.1	Demonstrate a sound technical knowledge of their selected project topic.
C419.2	Undertake problem identification, formulation and solution.
C419.3	Design engineering solutions to complex problems utilizing a systems approach.
C419.4	Communicate with engineers and the community at large in written an oral forms.

29.2.24

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DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

Course Outcomes for 6th Semester

Sub: Control Systems   **Sub. Code:** 18EE61

After successful completion of the course, the student will be able to:

CO	Description
C310.1	Demonstrate the mathematical modelling of electrical, mechanical and analogous systems.
C310.2	Apply block diagram and signal flow graph methods to obtain transfer function of systems.
C310.3	Determine transient and steady state time response of a simple control system& investigate the performance of a given system in time and frequency domains.
C310.4	Determine the stability of the system by using Routh criterion, root locus, bode plot and Nyquist plot methods.
C310.5	Design control system using different controllers.

Sub: Power System Analysis-1   **Sub. Code:** 18EE62

After successful completion of the course, the student will be able to:

CO	Description
C311.1	Model the power system components & construct per unit impedance diagram of power system.
C311.2	Analyze three phase symmetrical faults on power system.
C311.3	Compute unbalanced phasors in terms of sequence components and vice versa, also develop sequence networks.
C311.4	Analyze various unsymmetrical faults on power system.
C311.5	Examine dynamics of synchronous machine and determine the power system stability.

Sub: Digital Signal Processing   **Sub. Code:** 18EE63

After successful completion of the course, the student will be able to:

CO	Description
C312.1	Evaluate the DFT of various signals using its properties and linear filtering of two sequences.
C312.2	Apply fast and efficient algorithms for computing DFT and inverse DFT of a given sequence.
C312.3	Design digital IIR filters by using different transformation techniques.
C312.4	Design digital FIR filters using different sampling techniques.
C312.5	Model digital filters using different realization methods.

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Sub: Electrical Engineering Materials   **Sub. Code:** 18EE642

After successful completion of the course, the student will be able to:

CO	Description
C314.1	Discuss electrical and electronics materials, their importance, classifications and operational requirement.
C314.2	Discuss conducting materials used in engineering, their properties and classification.
C314.3	Discuss dielectric materials used in engineering, their properties and classification.
C314.4	Discuss insulating materials used in engineering, their properties and classification.
C314.5	Discuss magnetic materials used in engineering, their properties and classification.
C314.6	Explain the phenomenon superconductivity, super conducting materials and their application in engineering.
C314.7	Explain the plastic and its properties and applications.
C314.8	Discuss materials used for Opto electronic devices.

Sub: Sensors and Transducers   **Sub. Code:** 18EE647

After successful completion of the course, the student will be able to:

CO	Description
C319.1	Use gauges and transducers to measure pressure, direction and distance.
C319.2	Discuss the use of light transducers and other devices used for the measurement of electromagnetic radiations.
C319.3	Explain the working of different temperature sensing devices.
C319.4	Discuss the principles and applications of audio electrical sensors and transducers used for the measurement of sound.
C319.5	Discuss the use of sensors for the measurement of mass, volume and environmental quantities.

Sub: Non-Conventional Energy Sources   **Sub. Code:** 18ME651

After successful completion of the course, the student will be able to:

CO	Description
C317.1	Describe the environmental aspects of non-conventional energy resources. In Comparison with various conventional energy systems, their prospects and limitations.
C317.2	Know the need of renewable energy resources, historical and latest developments.
C317.3	Describe the use of solar energy and the various components used in the energy production with respect to applications like-heating, cooling, desalination, power generation, drying, cooking etc.
C317.4	Appreciate the need of Wind Energy and the various components used in energy generation and know the classifications.
C317.5	Understand the concept of Biomass energy resources and their classification, types of biogas Plants- applications.
C317.6	Compare Solar, Wind and bio energy systems, their prospects, Advantages and limitations.
C318.6	Acquire the knowledge of fuel cells, wave power, tidal power and geothermal principles and applications.

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Sub: Programming In Java   **Sub. Code:** 18CS653

After successful completion of the course, the student will be able to:

CO	Description
C320.1	Explain the object-oriented concepts and JAVA.
C320.2	Develop computer programs to solve real world problems in Java.
C320.3	Develop simple GUI interfaces for a computer program to interact with users.

Sub: Control System Lab   **Sub. Code:** 18EEL66

After successful completion of the course, the student will be able to:

CO	Description
C324.1	Determine the speed – torque characteristics of a D.C. and A.C. servomotor & Synchro pair characteristics.
C324.2	Determine time response characteristics of a second order system using MATLAB and frequency response characteristics of a second order system using MATLAB and experimental setup and evaluate time and frequency domain specifications.
C324.3	Design passive RC lead, lag, lead-lag compensating network for given specifications and determine the frequency response characteristics of the same using MATLAB and experimental setup.
C324.4	Determine the effect of P, PI, PD and PID controller on the step response of a feedback control system using MATLAB and experimental setup.
C324.5	Demonstrate a DC position control system by using MATLAB and determine its step response.
C324.6	Examine the stability of a system by root locus, bode plot and Nyquist plot methods, verify and compare the same by using MATLAB.

Sub: Digital Signal Processing Lab   **Sub. Code:** 18EEL67

After successful completion of the course, the student will be able to:

CO	Description
C325.1	Explain physical interpretation of sampling theorem in time and frequency domains.
C325.2	Evaluate the impulse response of a system.
C325.3	Perform convolution of given sequences to evaluate the response of a system.
C325.4	Compute DFT and IDFT of a given sequence using the basic definition and/or fast methods.
C325.5	Develop solution for a given difference equation.
C325.6	Design and implement IIR and FIR filters.

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| EEE |
| Course Outcome |
| 2018 Scheme |

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

Sub: Mini-Project   **Sub. Code:** 18EEP68

After successful completion of the course, the student will be able to:

CO	Description
C326.1	Demonstrate the knowledge of engineering fundamentals to identify, formulate and solve engineering problems.
C326.2	Present the project and be able to defend it.
C326.3	Make links across different areas of knowledge and to generate, develop and evaluate ideas and information so as to apply these skills to the project task.
C326.4	habituated to critical thinking and use problem solving skills
C326.5	Communicate effectively and to present ideas clearly and coherently in both the written and oral forms.
C326.6	Work in a team to achieve common goal.
C326.7	Learn on my own and take appropriate actions.

29.2.24

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EEE

Course Outcome

2018 Scheme

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

Course Outcomes for 5ᵗʰ Semester

Sub: Management and Entrepreneurship   **Sub. Code:** 18EE51

After successful completion of the course, the student will be able to:

CO	Description
C301.1	Explain the field of management, task of the manager, planning and steps in decision making.
C301.2	Discuss the structure of organization, importance of staffing, leadership styles, modes of communication techniques of coordination and importance of managerial control in business.
C301.3	Explain the concepts of entrepreneurship and a businessman's social responsibilities towards different groups.
C301.4	Explain the social responsibility of business and leadership and discuss role of SSI's in the development of country and state/central level institutions/agencies supporting business enterprises.
C301.5	Discuss the concepts of project management, capital budgeting, project feasibility studies, need for project report and new control techniques

Sub: Microcontroller   **Sub. Code:** 18EE52

After successful completion of the course, the student will be able to:

CO	Description
C302.1	Discuss the history, features, internal architecture and addressing modes of 8051.
C302.2	Write assembly level program using arithmetic, logic, jump and call instructions.
C302.3	Develop 8051C programs for time delay, I/O, logic, data conversion/serialization and timer operation.
C302.4	Develop 8051 serial port and interrupt programming in assembly and C.
C302.5	Interface 8051 with real-world devices such as LCD's, keyboards, ADC, DAC chips, sensors, motor control devices and with 8255.

Sub: Power Electronics   **Sub. Code:** 18EE53

After successful completion of the course, the student will be able to:

CO	Description
C303.1	Explain application areas of power electronics, types of power electronic circuits and switches, their characteristics and specifications.
C303.2	Explain different types of power diodes, its effects on RL circuits and operation and analysis of single phase diode rectifier circuits.
C303.3	Explain steady state, switching characteristics and gate control requirements of different power transistors and their comparison.
C303.4	Discuss different types of thyristors, their operation, characteristics and firing circuits.
C303.5	Discuss the principle of operation and analysis of controlled rectifiers, AC voltage controllers, DC – DC and DC –AC converters.

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EEE
Course Outcome
2018 Scheme

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

Sub: Signals and Systems   **Sub. Code:** 18EE54

After successful completion of the course, the student will be able to:

CO	Description
C304.1	Explain the classifications, basic operations of signals and properties of systems.
C304.2	Apply convolution in both continuous and discrete domain for the analysis of systems given impulse response of a system.
C304.3	Solve the continuous time and discrete time systems by various methods and their representation by block diagram.
C304.4	Perform Fourier analysis for continuous and discrete time, linear time invariant systems.
C304.5	Apply Z-transform and properties of Z transform for the analysis of discrete time systems.

Sub: Electrical Machine Design   **Sub. Code:** 18EE55

After successful completion of the course, the student will be able to:

CO	Description
C305.1	Discuss design factors, limitations, modern trends in design, manufacturing of electrical machines and properties of materials used in the electrical machines.
C305.2	Design different parts of DC machines.
C305.3	Design single phase and three phase transformers.
C305.4	Design three phase Induction motors.
C305.5	Design three phase Synchronous machines.

Sub: High Voltage Engineering   **Sub. Code:** 18EE56

After successful completion of the course, the student will be able to:

CO	Description
C306.1	Examine conduction and breakdown phenomenon in gases, liquid and solid dielectrics.
C306.2	Illustrate various techniques of generation of different forms of high voltages and currents
C306.3	Outline measurement techniques for high voltages and currents.
C306.4	Analyze overvoltage phenomenon and insulation coordination in electric power systems.
C306.5	Illustrate non-destructive testing of materials and electric apparatus and high voltage testing of electric apparatus.

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Sub: Microcontroller Laboratory   **Sub. Code:** 18EEL57

After successful completion of the course, the student will be able to:

CO	Description
C307.1	Write assembly language programs for data transfer, arithmetic, Boolean and logical instructions.
C307.2	Write ALP for code conversions
C307.3	Write ALP using subroutines for generation of delays, counters, configuration of SFRs for serial communication and timers.
C307.4	Perform interfacing of stepper motor and dc motor for controlling the speed
C307.5	Generate different waveforms using DAC interface.
C307.6	Perform interfacing of LCD, Elevator, ADC and temperature controller to 8051.

Sub: Power Electronics Laboratory   **Sub. Code:** 18EEL58

After successful completion of the course, the student will be able to:

CO	Description
C308.1	Analyze the static characteristics of semiconductor devices to discuss their performance.
C308.2	Experiment with different methods of triggering the SCR.
C308.3	Verify the performance of single phase controlled full wave rectifier and AC voltage controller with different types of load conditions.
C308.4	Determine the speed control of a stepper motor, universal motor and DC motors using different types of converter.
C308.5	Experiment with single phase MOSFET/IGBT based PWM inverter.

Sub: Environmental Studies   **Sub. Code:** 18CIV59

After successful completion of the course, the student will be able to:

CO	Description
C309.1	Understand the principles of ecology and environmental issues that apply to air, land, and water issues on a global scale.
C309.2	Develop critical thinking and/or observation skills, and apply them to the analysis of a problem or question related to the environment.
C309.3	Demonstrate ecology knowledge of a complex relationship between biotic and abiotic components.
C309.4	Apply their ecological knowledge to illustrate and graph a problem and describe the realities that managers face when dealing with complex issues.
C309.5	Understand the principles of ecology and environmental issues that apply to air, land, and water issues on a global scale.

29.2.24

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DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

Course Outcomes for 4th Semester

Sub: Complex Analysis, Probability And Statistical Methods   **Sub. Code:** 18MAT41

After successful completion of the course, the student will be able to:

CO	Description
C213.1	Use the concepts of analytic function and complex potentials to solve the problems arising in Electromagnetic field theory.
C213.2	Utilize conformal transformation and complex integral arising in aerofoil theory, fluid flow Visualization and image processing.
C213.3	Apply discrete and continuous probability distributions in analyzing the probability models arising in engineering field.
C213.4	Make use of the correlation and regression analysis to fit a suitable mathematical model for the Statistical data.
C213.5	Construct joint probability distributions and demonstrate the validity of testing the hypothesis.

Sub: Power Generation & Economics   **Sub. Code:** 18EE42

After successful completion of the course, the student will be able to:

CO	Description
C214.1	Describe the working of hydroelectric, power plant and state functions of major equipment of the power plant.
C214.2	Describe the working of steam power plant and state functions of major equipment of power plant.
C214.3	Describe the working of Nuclear power plant and explain classification of Nuclear reactors.
C214.4	Classify various substations and explain the importance of grounding.
C214.5	Understand the economic aspects of power system operation, its effects and importance of power factor improvement.

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Course Outcome

2018 Scheme

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

Sub: Transmission & Distribution   **Sub. Code:** 18EE43

After successful completion of the course, the student will be able to:

CO	Description
C215.1	Explain the importance of HVAC, EHVAC, UHVAC and HVDC transmission. identify various types of conductors, Calculate sag for supports at equal & unequal levels. Explain properties of insulators, calculate string efficiency, explain various methods used to improve string efficiency.
C215.2	Calculate inductance, capacitance & of 1-ph & 3- ph transmission lines, define GMD & GMR.
C215.3	Calculate the parameters of the transmission line for different configurations and assess the performance of the line.
C215.4	Explain the phenomenon of Corona, advantages & disadvantages of Corona. Explain the construction & use of underground cables, explain the grading of cables.
C215.5	Explain various types of distribution systems, reliability and quality of distribution system.

Sub: Electric Motors   **Sub. Code:** 18EE44

After successful completion of the course, the student will be able to:

CO	Description
C216.1	Explain the constructional features, characteristics, speed control of DC Motors and condition for maximum efficiency.
C216.2	Demonstrate & explain the methods of testing of DC machines.
C216.3	Explain the performance of Three Phase induction motor.
C216.4	Explain starting methods and speed control of induction motor by a suitable method & Explain the construction and operation of single phase induction & Motors.
C216.5	Explain the construction, operation and performance of synchronous motor. Discuss construction and operation of special motors; Universal motor, AC servomotor, Linear induction motor and stepper motor.

Sub: Electromagnetic Field Theory   **Sub. Code:** 18EE45

After successful completion of the course, the student will be able to:

CO	Description
C217.1	Use different coordinate systems, coulomb's Law and Gauss Law for the evaluation of electric fields produced by different charge configurations.
C217.2	Calculate the energy and potential due to a system of charges & Explain the behavior of electric field across boundary conditions.
C217.3	Explain Poison's , Laplace equations and behavior of steady magnetic field.
C217.4	Explain the behavior of magnetic fields and magnetic materials.
C217.5	Assess time varying fields and propagation of waves in different media.

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DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

Sub: Operational Amplifiers & Linear IC's   **Sub. Code:** 18EE46

After successful completion of the course, the student will be able to:

CO	Description
C218.1	Describe the characteristics of ideal and practical operational amplifier.
C218.2	Design filters and voltage regulators using Op-amp.
C218.3	Demonstrate the application of Linear ICs as comparators and rectifiers.
C218.4	Analyze voltage regulators for given specification using op-amp and IC voltage regulators.
C218.5	Summarize the basics of PLL and Timer.

Sub: Electrical Machines Laboratory -2   **Sub. Code:** 18EEL47

After successful completion of the course, the student will be able to:

CO	Description
C219.1	Test dc machines to determine their characteristics.
C219.2	Change the speed of dc motor by selecting suitable method.
C219.3	Pre-determine the performance characteristics of dc machines by conducting suitable tests.
C219.4	Assess the performance of single phase and three phase induction motor by conducting load test.
C219.5	Experiment with induction motor to pre-determine the performance characteristics.
C219.5	Test on synchronous motor to draw the performance curves.

Sub: Operational Amplifier & Linear IC's Laboratory   **Sub. Code:** 18EEL48

After successful completion of the course, the student will be able to:

CO	Description
C220.1	To conduct experiment to determine the characteristic parameters of Op-Amp.
C220.2	To design test the OP-Amp as Amplifier, Adder, Subtractor, Differentiator and Integrator.
C220.3	To design test the OP-Amp as oscillators and filters.
C220.4	To Design and study of Linear IC's as multivibrator power supplies.

29.2.24

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EEE

Course Outcome

2018 Scheme

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

Course Outcomes for 2018 Scheme Syllabus

Course Outcomes for 3rd Semester

Sub: Transform Calculus, Fourier Series and Numerical Techniques   **Sub. Code:** 18MAT31

After successful completion of the course, the student will be able to:

CO	Description
C201.1	Use Laplace transform and inverse Laplace transform in solving differential/ integral equationarising in network analysis, control systems and other fields of engineering.
C201.2	Demonstrate Fourier series to study the behavior of periodic functions and their applications insystem communications, digital signal processing and field theory.
C201.3	Make use of Fourier transform and Z-transform to illustrate discrete/continuous function arisingin wave and heat propagation, signals and systems.
C201.4	Solve first and second order ordinary differential equations arising in engineering problemsusing single step and multistep numerical methods.
C201.5	Determine the externals of functionals using calculus of variations and solve problems arising in dynamics of rigid bodies and vibrational analysis.

Sub: Electric Circuit Analysis   **Sub. Code:** 18EE32

After successful completion of the course, the student will be able to:

CO	Description
C202.1	Explain the basic concepts, basic laws and methods of analysis of DC and AC networks and reduce the complexity of network using source shifting, source transformation and network reduction using transformations.
C202.2	Analyze complex electric circuits using network theorems.
C202.3	Discuss resonance in series and parallel circuits and also the importance of initial conditions and their evaluation.
C202.4	Analyze typical waveforms using Laplace transformation.
C202.5	Discuss unbalanced three phase systems and also evaluate the performance of two port networks.

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DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

Sub: Transformers and Generator   **Sub. Code:** 18EE33

After successful completion of the course, the student will be able to:

CO	Description
C203.1	Understand the construction and operation of 1-phase, 3-Phase transformers and Autotransformer.
C203.2	Analyze the performance of transformers by polarity test, Sumpner's Test, phase conversion, 3-phase connection, and parallel operation.
C203.3	Understand the construction and working of AC and DC Generators.
C203.4	Determine the regulation of AC Generator by EMF, MMF, and ZPF Methods.
C203.5	Analyze the performance of synchronous generators through power angle characteristics (salient and non salient pole), power angle diagram & reluctance power.

Sub: Analog Electronic Circuits   **Sub. Code:** 18EE34

After successful completion of the course, the student will be able to:

CO	Description
C204.1	Obtain the output characteristics of clipper and clamper circuits.
C204.2	Design and compare biasing circuits for transistor amplifiers & explain the transistor switching.
C204.3	Explain the concept of feedback, its types and design of feedback circuits.
C204.4	Design and analyze the power amplifier circuits and oscillators for different frequencies.
C204.5	Design and analysis of FET and MOSFET amplifiers.

Sub: Digital System Design   **Sub. Code:** 18EE35

After successful completion of the course, the student will be able to:

CO	Description
C205.1	Develop simplified switching equation using Karnaugh Maps and QuineMcClusky techniques.
C205.2	Design Multiplexer, Encoder, Decoder, Adder, Subtractors and Comparator as digital combinational control circuits.
C205.3	Design flip flops, counters, shift registers as sequential control circuits.
C205.4	Develop Mealy/Moore Models and state diagrams for the given clocked sequential circuits.
C205.5	Explain the functioning of Read only and Read/Write Memories, Programmable ROM, EPROM and Flash memory.

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EEE
Course Outcome
2018 Scheme

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

Sub: Electrical & Electronic Measurements
Sub. Code: 18EE36

After successful completion of the course, the student will be able to:

CO	Description
C206.1	Explain the measurement of resistance, inductance and capacitance using bridges and determine earth resistance.
C206.2	Discuss adjustments, calibration and errors in energy meters and Explain the construction and operation of power factor meter, frequency meter and phase sequence indicator.
C206.3	Explain measurements magnetic parameters; iron loss, air gap flux, field strength and Explain the methods of extending the range of instruments and instrument transformers.
C206.4	Discuss electronic and digital instruments used in measurements.
C206.5	Discuss display and recording devices used in measurements.

Sub: Electrical Machines Laboratory-I
Sub. Code: 18EEL37

After successful completion of the course, the student will be able to:

CO	Description
C207.1	Evaluate the performance of transformers from the test data obtained.
C207.2	Connect and operate two single phase transformers of different KVA rating in parallel.
C207.3	Connect single phase transformers for three phase operation and phase conversion.
C207.4	Compute the voltage regulation of synchronous generator using the test data obtained in the
C207.5	Evaluate the performance of synchronous generators from the test data and assess the performance of synchronous generator connected to infinite bus.

Sub: Electronics Laboratory– I
Sub. Code: 18EEL38

After successful completion of the course, the student will be able to:

CO	Description
C208.1	Design and test rectifier circuits with and without capacitor filters.
C208.2	Determine h-parameter models of transistor for all modes.
C208.3	Design and test BJT and FET amplifier and oscillator circuits.
C208.4	Realize Boolean expressions, adders and subtractors using gates.
C208.5	Design and test Ring counter/Johnson counter, Sequence generator and 3 bit counters.

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Course Outcomes of all the courses of 3rd semester to 8th semester
CBCS 2018 Scheme
III-SEM

Subject: Transform calculus, Fourier series and Numerical techniques Sub. Code: 18MAT31

After successful completion of this course, the students will be able to;

CO	Description
C201.1	Know the use of periodic signals and Fourier series to analyze circuits and system communications.
C201.2	Explain the general linear system theory for continuous-time signals and digital signal processing using the Fourier Transform and z-transform
C201.3	Employ appropriate numerical methods to solve algebraic and transcendental equations.
C201.4	Apply Green's Theorem, Divergence Theorem and Stokes' theorem in various applications in the field of electro-magnetic and gravitational fields and fluid flow problems.
C201.5	Determine the external of functional and solve the simple problems of the calculus of variations.

Subject: Mechanics of Materials   **Subject Code: 18ME32**

After successful completion of this course, the students will be able to;

CO	Description
C202.1	Appreciate the concepts of stress, strain, Hooks law, evaluation of deformations in axially loaded bars, Elastic constants and thermal stresses
C202.2	Determine components of stresses on inclined plane at a point subjected to plane stress system by analytically and graphically and stresses induced in pressure vessels.
C202.3	Determine shear forces, bending moments, bending stresses and deflections at all sections of beam subjected to transverse load and couples.
C202.4	Determine the dimensions of shafts based on torsional strength, rigidity and flexibility and also elastic stability of columns using Euler's and Rankin's theory.
C202.5	Explain the concept of strain energy, Castiglione's theorem, Theories of failures and evaluate lateral deflections in beams using strain energy theory.

Subject: Basic Thermodynamics   **Subject Code: 18ME33**

After successful completion of this course, the students will be able to;

CO	Description
C203.1	Explain fundamentals of thermodynamics and evaluate energy interactions across the boundary of thermodynamic systems.
C203.2	Evaluate the feasibility of cyclic and non-cyclic processes using 2nd law of thermodynamics.
C203.3	Apply the knowledge of entropy, reversibility and irreversibility to solve numerical problems and apply 1st law of thermodynamics to closed and open systems and determine quantity of energy transfers and change in properties.
C203.4	Interpret the behavior of pure substances and its application in practical problems.
C203.5	Recognize differences between ideal and real gases and evaluate thermodynamic properties of ideal and real gas mixtures using various relations.

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Subject: Material Science   **Subject Code: 18ME34**

After successful completion of this course, the students will be able to;

CO	Description
C204.1	Describe the mechanical properties of metals, their alloys and various modes of failure.
C204.2	Understand the microstructures of ferrous and non-ferrous materials to mechanical properties.
C204.3	Explain the processes of heat treatment of various alloys.
C204.4	Understand the properties and potentialities of various materials available and material selection procedures.
C204.5	Understand composite materials and their processing as well as applications.

Subject: Metal casting and welding   **Subject Code: 18ME35A/18ME45A**

After successful completion of this course, the students will be able to;

CO	Description
C205.1	Classify manufacturing process and elaborate the parts of casting process.
C205.2	Categorize the different casting process and select the melting furnace based on ferrous and non-ferrous alloys.
C205.3	Explain the solidification, gasification, casting defects and different methods to achieve directional solidification.
C205.4	Understand and make use of different conventional welding processes.
C205.5	Analyze structure of weld and explain soldering, brazing and NDT.

Subject: Machine Tools Operations   **Subject Code: 18ME35B/18ME45B**

After successful completion of this course, the students will be able to;

CO	Description
C206.1	Classify and demonstrate basic working of all the machine tools.
C206.2	Explain the different types of relative motions in machining process
C206.3	Explain cutting tool materials, tool geometry, and surface finish and make use of machining equations for cutting operations.
C206.4	Analyze the different mechanics of machining process.
C206.5	Appreciate the concept of tool wear, tool life and economics of machining processes with simple numerical

Subject: Computer Aided Machine Drawing   **Subject Code: 18ME36A/18ME46A**

After successful completion of this course, the students will be able to;

CO	Description
C207.1	Have hands on experience on mechanical modeling software.
C207.2	Draw true shape of sections of polyhedrons.
C207.3	Visualize and draw orthographic views of simple machine components, thread forms, fasteners, riveted, cotter, knuckle joints and couplings as per BIS.
C207.4	Visualize and prepare models of given detailed parts of machine component and its assembly with bill of materials and specifications.

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Subject: Mechanical measurements and metrology   Subject Code: 18ME36B/18ME46B

After successful completion of this course, the students will be able to;

CO	Description
C208.1	Illustrate the principle of operation and calibration of an instrument and Compare engineering measuring instruments for a particular application
C208.2	Understand the concepts of limits, fits, tolerance and make use of measuring instruments.
C208.3	Make use of concepts of interferometer and screw thread measurement methods.
C208.4	Explain the concepts of measurement, measurement systems and intermediate modifying devices
C208.5	Interpret the working of force, torque, pressure, strain and Temperature measuring devices

Subject: Material Testing Lab   Subject Code: 18MEL37A/18MEL47A

After successful completion of this course, the students will be able to;

CO	Description
C209.1	Demonstrate the applications of metallography and material science.
C209.2	Select the standard experiments to determine the mechanical properties of different materials using UTM, torsion test, fatigue test, hardness test, wear test and impact test.
C209.3	Identify and compare the structure of the materials using metallurgical microscope.
C209 .4	Identify the flaws or defects of materials using NDT methods.
C209 .5	Modify the properties of metal specimens by heat treatment processes.

Subject: Mechanical Measurements and Metrology Lab   Subject Code: 18MEL37B/47B

After successful completion of this course, the students will be able to;

CO	Description
C210.1	Select the set of combination of slip gauge height based on given dimensions.
C210.2	Calibrate the Thermocouple, Load cell and LVDT to measure physical quantities.
C210.3	Find major and minor diameters using Two or Three wire method and Angle of screw thread using Toolmaker's microscope.
C210.4	Measure slope or angle of the given work piece using Sine bar, Sine center and Bevel protractor.
C210.5	Measure width and height of gear tooth at pitch circle diameter using Gear tooth vernier calipers

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Subject: Workshop and Machine Shop Practice   **Subject Code: 18MEL38A/18MEL48A**

After successful completion of this course, the students will be able to;

CO	Description
C211.1	Able to prepare fitting models according to drawings using fitting tools
C211.2	Able to carry out any kind of operation on Machine tools (Lathe)
C211.3	Capable of preparing various types of jobs accurately to the given dimensions.
C211.4	Able to perform groove cutting and gear cutting operations.

Subject: Foundry, Forging and Welding lab   **Subject Code: 18MEL38B/18MEL48B**

After successful completion of this course, the students will be able to;

CO	Description
C212. 1	Demonstrate the applications of basic of Foundry and Forging processes.
C212. 2	Experiment with molding sand to determine tensile, compression and Shear strength of Sand Specimen by USTM.
C212. 3	Evaluate the sand properties by conducting permeability, clay content and sieve analysis tests.
C212. 4	Apply sand molding process through preparation of moulds using two molding boxes with or without patterns.
C212. 5	Determine the length of the raw material required and create the forging models involving upsetting, drawing and bending operations.

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IV-SEM

Subject: Mathematics   **Subject Code: 18MAT41**

After successful completion of this course, the students will be able to;

CO	Description
C216.1	Solve first and second order ordinary differential equations by using appropriate numerical methods.
C216.2	Explain the idea of analyticity, potential field's residues and poles of complex potentials in field theory and electromagnetic theory.
C216.3	Solve Engineering problems using complex variable techniques
C216.4	Explain the basic concepts of probability, random variables, probability distribution and joint probability distribution.
C216.5	Analyze and Evaluate scientific hypotheses using rigorous statistical methods.

Subject: Applied thermodynamics   **Subject Code: 18ME42**

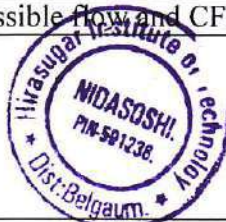After successful completion of this course, the students will be able to;

CO	Description
C217.1	Recall thermodynamic concepts to analyze the performance of I C engine and gas power cycles including propulsion systems.
C217.2	Analyze Rankine cycle for the improvement in performance of steam power plant.
C217.3	Perform the Combustion analysis of fuels or flue gases and Conduct the performance analysis of I.C. Engines.
C217.4	Compare the working principles and applications of different refrigeration systems and evaluate the psychometric properties of air conditioning systems.
C217.5	Explain the thermodynamic analysis of reciprocating air compressors and function of steam nozzle.

Subject: Fluid Mechanics   **Subject Code: 18ME43**

After successful completion of this course, the students will be able to;

CO	Description
C218.1	Define and formulate the properties of fluids, fluid statics and effect of buoyancy.
C218.2	Interpret and apply the principles of fluid kinematics and dynamics, fluid flow measuring devices.
C218.3	Formulate the correlations for the different fluid flows and analysis of different losses during the flow.
C218.4	Analyze the flow over bodies and dimensional analysis.
C218.5	Understand the basic concepts of compressible flow and CFD.

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Subject: Kinematics of Machines   **Subject Code: 18ME44**

After successful completion of this course, the students will be able to;

CO	Description
C219.1	Identify mechanisms with basic understanding of motion.
C219.2	Comprehend velocity and acceleration analysis of planar mechanisms using graphical method, Instantaneous Center Method and Klein's Construction
C219.3	Comprehend velocity and acceleration analysis of planar mechanisms using analytical method
C219.4	Define gear terminology and identify types of gear, law of gearing, interference and examine gear trains for velocity ratio, tooth load and torque by algebraic and tabular column methods.
C219.5	Carry out motion analysis of cam profiles by analytical and graphical methods.

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V-SEM

Subject: Management and Economics   **Subject Code: 18ME51**

After successful completion of this course, the students will be able to;

CO	Description
C301.1	Understand needs, functions, roles, scope and evolution of Management
C 301.2	Understand importance, purpose of Planning and hierarchy of planning and also analyze its types
C 301.3	Discuss Decision making, Organizing, Staffing, Directing and Controlling
C 301.4	Select the best economic model from various available alternatives
C 301.5	Understand various interest rate methods and implement the suitable one.

Subject: Design of Machine Elements-I   **Subject Code: 18ME52**

After successful completion of this course, the students will be able to;

CO	Description
C302.1	Explain phases of design process, mechanical behavior & selection of engineering materials, its codes & standards and stress concentration in machine elements.
C302.2	Determine the behavior of machine components under impact and fatigue loading.
C302.3	Design keys, shafts, joints and couplings.
C302.4	Design of riveted and welded joints.
C302.5	Design of threaded fasteners and power screws

Subject: Dynamics of Machines   **Subject Code: 18ME53**

After successful completion of this course, the students will be able to;

CO	Description
C303.1	Determine the forces and couples for static and dynamic conditions of four bar and slider crank mechanisms to keep the system in equilibrium.
C303.2	Determine magnitude and angular position of balancing masses under static and dynamic condition of rotating and reciprocating masses in same and different planes.
C303.3	Determine sensitiveness, isochronism, effort and power of porter and hartnell governors.
C303.4	Determine gyroscopic couple and effects related to 2, 4 wheeler, plane disc, ship and aero planes.
C303.5	Understand types of vibration, SHM and methods of finding natural frequencies of simple mechanical systems.

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Subject: Turbo Machines   **Subject Code: 18ME54**

After successful completion of this course, the students will be able to;

CO	Description
C304.1	Model studies and thermodynamics analysis of turbo machines.
C304.2	Analyze the energy transfer in Turbo machine with degree of reaction and utilization factor.
C304.3	Classify, analyze and understand various type of steam turbine.
C304.4	Classify, analyze and understand various type of hydraulic turbine.
C304.5	Understand the concept of radial power absorbing machine and the problems involved during its operation.

Subject: Fluid Power Engg.   **Subject Code: 18ME55**

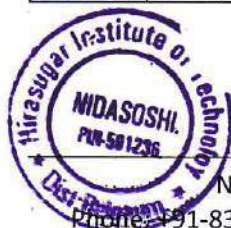After successful completion of this course, the students will be able to;

CO	Description
C305.1	Identify and analyze the functional requirements of a fluid power transmission system for a given application
C305.2	Visualize how a hydraulic/pneumatic circuit will work to accomplish the function
C305.3	Design an appropriate hydraulic or pneumatic circuit or combination circuit like electro-hydraulics, electro-pneumatics for a given application.
C305.4	Select and size the different components of the circuit
C305.5	Develop a comprehensive circuit diagram by integrating the components selected for the given application

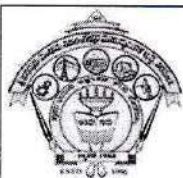**Subject: Operations Management**   **Subject Code: 18ME56**

After successful completion of this course, the students will be able to;

CO	Description
C306.1	Explain the concept and scope of operations management in a business context
C306.2	Recognize the role of Operations management among various business functions and its role in the organizations' strategic planning and gaining competitive advantage.
C306.3	Analyze the appropriateness and applicability of a range of operations management systems/models in decision making.
C306.4	Assess a range of strategies for improving the efficiency and effectiveness of organizational operations.
C306.5	Evaluate a selection of frameworks used in the design and delivery of operations

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Subject: Fluid Mechanics and Machinery lab **Subject Code: 18MEL57**

After successful completion of this course, the students will be able to;

CO	Description
C307.1	Perform experiments to determine the coefficient of discharge of flow measuring devices.
C307.2	Conduct experiments to measure the loss of head in flow through pipes.
C307.3	Determine the force exerted by a jet on different geometry vanes
C307.4	Test basic performance parameters of hydraulic turbines and pumps and execute the knowledge in real life situations.
C307.5	Conduct the performance of reciprocating Air compressor and Air blower

Subject: Energy Conversion Lab **Subject Code: 18MEL58**

After successful completion of this course, the students will be able to;

CO	Description
C308.1	Perform experiments to determine the properties of fuels and oils.
C308.2	Conduct experiments on engines and draw characteristics.
C308.3	Test basic performance parameters and the energy flow pattern of I.C. Engine and implement the knowledge in industry.
C308.4	Estimate exhaust emission, factors affecting them and report the remedies.
C308.5	Exhibit his competency towards preventive maintenance of IC engines

Subject: Environmental Studies **Subject Code: 18CIV59**

After successful completion of this course, the students will be able to;

CO	Description
C309.1	Understand the principles of ecology and environmental issues that apply to air, land, and water issues on a global scale.
C309.2	Develop critical thinking and/or observation skills, and apply them to the analysis of a problem or question related to the environment.
C309.3	Demonstrate ecology knowledge of a complex relationship between biotic and abiotic components.
C309.4	Apply their ecological knowledge to illustrate and graph a problem and describe the realities that managers face when dealing with complex issues.
C309.5	Understand the principles of ecology and environmental issues that apply to air, land, and water issues on a global scale.

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VI-SEM

Subject: Finite Element Analysis   **Subject Code: 18ME61**

After successful completion of this course, the students will be able to;

CO	Description
C310.1	Understand the concepts behind formulation methods in FEM and Choose interpolation polynomial equation for simplex elements
C310.2	Develop element characteristic equation and solve the global equation of FEA elements such as bars and trusses.
C310.3	Develop element characteristic equation and solve the global equation of FEA for beams and circular shafts
C310.4	Develop element characteristic equation and solve the global equation of FEA for 1D heat transfer and fluid flow
C310.5	Develop element characteristic equation and solve the global equation of FEA for axis symmetric and dynamic problems

Subject: Design of Machine Element-II   **Subject Code: 18ME62**

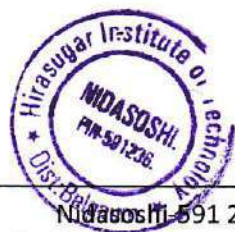After successful completion of this course, the students will be able to;

CO	Description
C311.1	Design and analyze behaviour of stresses in curved beams and compound cylinders.
C311.2	Design belts, wire ropes and chain drives & springs for Mechanical systems
C311.3	Design different types of gears and simple gear boxes for different applications.
C311.4	Design brakes and clutches
C311.5	Select suitable lubricants and analyze performance of hydrodynamic, hydrostatic and antifriction bearings.

Subject: Heat Transfer   **Subject Code: 18ME63**

After successful completion of this course, the students will be able to;

CO	Description
C312.1	Understand the modes of heat transfer and apply the basic laws to formulate engineering systems.
C312.2	Understand and apply the basic laws of heat transfer to extended surface, composite material and unsteady state heat transfer problems.
C312.3	Analyze heat conduction through numerical methods and apply the fundamental principle to solve radiation heat transfer problems.
C312.4	Analyze heat transfer due to free and forced convective heat transfer.
C312.5	Understand the design and performance analysis of heat exchangers and their practical applications, Condensation and Boiling phenomena.

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Subject: Non Traditional Machining   **Subject Code: 18ME641**

After successful completion of this course, the students will be able to;

CO	Description
C313.1	Understand and compare traditional and non-traditional machining process and recognize the need for Non-traditional machining process.
C313.2	Understand the constructional features, performance parameters, process characteristics, applications, advantages and limitations of USM, AJM and WJM.
C313.3	Understand chemical and electro-chemical machining process along with the constructional features, process parameters, process characteristics, applications, advantages and limitations.
C313.4	Understand the constructional feature of the equipment, process parameters, process characteristics, applications, advantages and limitations EDM & PAM.
C313.5	Understand the LBM equipment, LBM parameters, and characteristics. EBM equipment and mechanism of metal removal, applications, advantages and limitations LBM & EBM.

SUB: PLC & SCADA   **Sub Code: 18EE652**

After successful completion of this course, the students will be able to;

CO	Description
C319.1	Summarize the history, features, hardware, memory organization and basic programming with respect to PLC.
C319.2	Explain basic relay instruction operation and converting narrative expression to Ladder Diagrams.
C319.3	Explain Timer Instructions in PLC and I am able to describe Counter Instructions and Program Control Instructions of PLC.
C319.4	Discuss the execution of data transfer instructions, data compare instructions, arithmetic instructions and the basic operation of PLC closed-loop control system.
C319.5	Describe sequencer, bit shift register and SCADA in conjunction with PLC.

Subject: PROGRAMMING IN JAVA   **Subject Code: 18CS653**

After successful completion of this course, the students will be able to;

CO	Description
C320.1	Explain the object-oriented concepts and JAVA.
C320.2	Develop computer programs to solve real world problems in Java.
C320.3	Develop simple GUI interfaces for a computer program to interact with users.

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SUB: Computer Aided Modeling and Analysis Lab   **Sub Code: 18MEL66**

After successful completion of this course, the students will be able to;

CO	Description
C323.1	Demonstrate the basic features of an analysis package.
C323.2	Use the modern tools to formulate the problem, and able to create geometry, descritize, apply boundary condition to solve problems of bars, truss, beams, plate to find stress with different loading conditions.
C323.3	Demonstrate the deflection of beams subjected to point, uniformly distributed and varying loads further to use the available results to draw shear force and bending moment diagrams.
C323.4	Analyze the given problem by applying basic principle to solve and demonstrate 1D and 2D heat transfer with conduction and convection boundary conditions.
C323.5	Carry out dynamic analysis and finding natural frequencies for various boundary conditions and also analyze with forcing function.

SUB: Heat Transfer Lab   **Sub Code: 18MEL67**

After successful completion of this course, the students will be able to;

CO	Description
C324.1	Perform experiments to determine the thermal conductivity of a metal rod
C324.2	Conduct experiments to determine convective heat transfer coefficient for free and forced convection and correlate with theoretical values.
C324.3	Estimate the effectiveness and efficiency in pin-fin
C324.4	Determine the emissivity of the given test plate and Prove Stefan Boltzmann law of radiation.
C324.5	Conduct and measure the overall heat transfer coefficient, effectiveness of parallel and counter flow heat exchangers.
C324.6	Estimate the heat transfer coefficient for film wise and drop wise condensation processes.
C324.7	Demonstrate the working of Refrigeration and Air-conditioning system.
C324.8	Calculate temperature distribution of study and transient heat conduction through plane wall, cylinder and fin using numerical approach.

SUB: Mini-Project   **Sub Code: 18MEMP68**

After successful completion of this course, the students will be able to;

CO	Description
C325.1	Practice acquired knowledge within the chosen area of technology for project development.
C325.2	Identify the technical aspects of the chosen project
C325.3	Work as an individual or in a team in development of technical projects.
C325.4	Communicate and report effectively project related activities and findings.

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VII-SEM

Subject: Control Engineering   **Subject Code: 18ME71**

After successful completion of this course, the students will be able to;

CO	Description
C401.1	Recognize control system and its types, control action, and determine the system governing equations for physical models (Electrical, Thermal, Mechanical, Electro Mechanical).
C401.2	Estimate the response and error in response of first and second order systems subjected standard input signals.
C401.3	Calculate the gain of the system using block diagram and signal flow graph for a given application.
C401.4	Analyze a linear feedback control system for stability using Routh"s criterion and root Locus technique in complex domain.
C401.5	Analyze the stability of linear feedback control systems in frequency domain using polar plots, Nyquist and Bode plots.

Subject: Computer Aided Design and Manufacturing   **Subject Code: 18ME72**

After successful completion of this course, the students will be able to;

CO	Description
C402.1	Define Automation, CIM, CAD, CAM and explain the differences between these concepts. And Explain the basics of automated manufacturing industries through mathematical models and analyze different types of automated flow lines
C402.2	Solve simple problems of transformations of entities on computer screen and Categorize CAPP, MRP, PPC and CRP in Manufacturing system
C402.3	Understand the overall FMS and Solve the manual assembly line balancing problem
C402.4	Explain the use of different computer applications in manufacturing, and prepare part programs for simple jobs on CNC machine tools and robot programming.
C402.5	Visualize and appreciate the modern trends in Manufacturing like additive manufacturing, Industry 4.0 and applications of Internet of Things leading to Smart Manufacturing

SUB: Total Quality Management   **Sub Code: 18ME734**

After successful completion of this course, the students will be able to;

CO	Description
C406.1	Explain the various approaches of TQM and QMS.
C406.2	Identify the role of leader & leadership styles which helps for their future.
C406.3	Explain the methods to satisfy the customer, employee involvement and motivation techniques.
C406.4	Apply statistical tools for continuous improvement of quality systems
C406.5	Apply the tools and technique for effective implementation of TQM

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	S J P N Trust's	Mech. Engg. Dept.
	Hirasugar Institute of Technology, Nidasoshi.	**Academic**
	Inculcating Values, Promoting Prosperity	
	Approved by AICTE, New Delhi, Permanently Affiliated to VTU, Belagavi	**Course Outcome**
	Recognized under 2(f) &12B of UGC Act, 1956.	
	Accredited at 'A' Grade by NAAC & Programmes Accredited by NBA: CSE &ECE	**AY: 2022-23**

Subject: Mechatronics   Subject Code: 18ME754

After successful completion of this course, the students will be able to;

CO	Description
C411.1	Explain the basics of theory, operation, design and application of sensors and actuators.
C411.2	Explain the basics of architecture, programming and application of microcontrollers and microprocessors.
C411.3	Explain the PLC, basic structure, principle of operations and integration of different elements
C411.4	Apply knowledge of mechanical & electrical actuation systems.
C411.5	Explain the pneumatic and hydraulic actuation system

Subject: CIM LAB   Subject Code: 18MEL76

After successful completion of this course, the students will be able to;

CO	Course Outcome
C417. 1	Appreciate NC & CNC machines & its practical use in industry.
C417. 2	Distinguish between absolute & incremental coordinate system.
C417. 3	Make use of computer assisted part programming software to perform milling, drilling and turning operations in design, simulation and manufacturing.
C417. 4	Write manual part programs for milling, turning operations.
C417. 5	Explain what is FMS & ASRS
C417. 6	Develop the robot program by using basic commands.
C417. 7	Read and explain Hydraulics & Pneumatic circuits.

Subject: Design Lab   Subject Code: 18MEL77

After successful completion of this course, the students will be able to;

CO	Description
C418.1	To understand the working principles of machine elements such as Governors, Gyroscopes etc
C418.2	To identify forces and couples in rotating mechanical system components
C418.3	To identify vibrations in machine elements and design appropriate damping methods and to determine the critical speed of a rotating shaft
C418.4	To measure strain in various machine elements using strain gauges
C418.5	To determine the minimum film thickness, load carrying capacity, frictional torque and pressure distribution of journal bearing

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	S J P N Trust's	Mech. Engg. Dept.
	Hirasugar Institute of Technology, Nidasoshi.	**Academic**
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	Accredited at 'A' Grade by NAAC & Programmes Accredited by NBA: CSE &ECE	**AY: 2022-23**

VIII-SEM

Subject: Energy Engineering   **Subject Code: 18ME81**

After successful completion of this course, the students will be able to;

CO	Course Outcome
C420.1	Understand the construction and working of steam generators and their accessories.
C420.2	Identify solar and biomass renewable energy sources and their utilization.
C420.3	Understand principles of energy conversion from alternate sources including wind, geothermal and tidal.
C420.4	Understand principles of energy conversion from alternate sources including Ocean and hydel.
C420.5	Understand principles of energy conversion from Nuclear energy source.

Subject: Automobile Engineering   **Subject Code: 18ME824**

After successful completion of this course, the students will be able to;

CO	Course Outcome
C424.1	To identify the different parts of an automobile and it's working
C424.2	To understand the working of transmission and braking systems
C424.3	To comprehend the working of steering and suspension systems
C424.4	To learn various types of fuels and injection systems
C424.5	To know the cause of automobile emission, its effects on environment and methods to reduce the emissions.

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	S J P N Trust's	**FIRST YEAR**
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	Programmes Accredited by NBA: CSE, ECE, EEE & ME	**2018-19**

Course Outcomes of all the courses from 1st Semester & 2nd Semester

SUB: Calculus And Linear Algebra   Sub Code: 18MAT11
After successful completion of this course, the students will be able to;

CO	Description
C101.1	Apply the knowledge of calculus to solve problems related to polar curves and its applications in Determining the bentness of a curve.
C101.2	Learn the notion of partial differentiation to calculate rates of change of multivariate functions and solve problems related to composite functions and Jacobeans.
C101.3	Apply the concept of change of order of integration and variables to evaluate multiple integrals and their usage in computing the area and volumes.
C101.4	Solve first order linear/nonlinear differential equation analytically using standard methods.
C101.5	Make use of matrix theory for solving system of linear equations and compute eigen values and Eigenvectors required for matrix diagonalization process.

SUB: Engineering Physics   Sub Code: 18PHY12/22
After successful completion of this course, the students will be able to;

CO	Description
C102.1	Understand various types of oscillations and their implications, the role of Shock waves in various fields and Recognize the elastic properties of materials for engineering applications.
C102.2	Realize the interrelation between time varying electric field and magnetic field, the transverse nature of the EM waves and their role in optical fiber communication.
C102.3	Compute Eigen values, Eigen functions, momentum of Atomic and subatomic particles using Time independent 1-D Schrodinger's wave equation.
C102.4	Apprehend theoretical background of laser, construction and working of different types of laser and its applications in different fields.
C102.5	Understand various electrical and thermal properties of materials like conductors, semiconductors and dielectrics using different theoretical models.

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	S J P N Trust's	FIRST YEAR
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	Programmes Accredited by NBA: CSE, ECE, EEE & ME	2018-19

SUB: Elements Of Civil Engineering & Mechanics　　　　　　Sub Code: 18CIV14/24

After successful completion of this course, the students will be able to;

CO	Description
C103.1	Describing the basics of civil engineering, its scope of study, knowledge about roads, bridges and dams. Understanding the action of forces, moments and other loads on systems of rigid bodies.
C103.2	Understanding the concept of equilibrium and friction- Static and Dynamic.
C103.3	Analyzing and Interpreting the reactive forces and the effects those develop as a result of external loads on beams and trusses.
C103.4	Finding the centroid and moment of inertia of composite plane and curved figures.
C103.5	Describing the basics of kinematics and kinetics, different types of motions. Analyzing the motion of the body

SUB: Elements Of Mechanical Engineering　　　　　　Sub Code: 18ME15/25

After successful completion of this course, the students will be able to;

CO	Description
C104.1	Identify different sources of energy and their conversion process.
C104.2	Explain the working principle of hydraulic turbines, pumps, IC engines and refrigeration.
C104.3	Recognize various metal joining processes and power transmission elements.
C104.4	Understand the properties of common engineering materials and their applications in engineering industry.
C104.5	Discuss the working of conventional machine tools, machining processes, tools and accessories.
104.6	Describe the advanced manufacturing systems.

SUB: Basic Electrical Engineering　　　　　　Sub Code: 18ELE23

After successful completion of this course, the students will be able to;

CO	Description
C105.1	Analyze DC circuits; explain the generation of AC and its fundamentals.
C105.2	Analyze single phase and three phase AC circuits.
C105.3	Explain the construction and working of single phase transformer, concepts of electrical wiring, circuit protecting devices and earthing.
C105.4	Explain the principle of operation and construction of DC machines.
C105.5	Explain the principle of operation and construction of three phase synchronous generator & induction motors.

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	Programmes Accredited by NBA: CSE, ECE, EEE & ME	2018-19

SUB: Basic Electrical Engineering Laboratory   Sub Code: 18ELEL17/27

After successful completion of this course, the students will be able to;

CO	Description
C106.1	Identify the common electrical components and measuring instruments used for conducting experiments in the electrical Laboratory.
C106.2	Compare power factors of lamp.
C106.3	Determine the impedance of an electrical circuit and power consumed in a 3 phase load.
C106.4	Determine earth resistance and understand two way and three way control of lamps.

SUB: Engineering Physics Laboratory   Sub Code: 18PHY16/26

After successful completion of this course, the students will be able to;

CO	Description
C107.1	Develop skills to impart practical knowledge in real time solution.
C107.2	Explain principle, concept, working and application of new technology and comparison of results with theoretical calculations.
C107.3	Gain knowledge of new concept in the solution of practical oriented problems and to understand more deep knowledge about the solution to theoretical problems.

SUB: Technical Communication (English) - I   Sub Code: 18EGH18

After successful completion of this course, the students will be able to;

CO	Description
C108.1	Acquire basic English grammar and essentials of language skills and also clarifies the nuances of phonetics, intonation and pronunciation.
C108.2	Get familiarized with English vocabulary and language proficiency
C108.3	Improve the functional effectiveness through identifying common errors in spoken and written communication.
C108.4	Understand and Improve the non verbal communication and kinesics.
C108.5	Write campus recruitment exams, engineering competitive exams and all other general competitive exams

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	S J P N Trust's	FIRST YEAR
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	Programmes Accredited by NBA: CSE, ECE, EEE & ME	2018-19

SUB: Advanced Calculus and Numerical Methods   Sub Code: 18MAT21

After successful completion of this course, the students will be able to;

CO	Description
C109.1	Illustrate the applications of multivariate calculus to understand the Solenoidal and Irrotational vectors and also exhibit the inter dependence of line, surface and volume integrals.
C109.2	Demonstrate various physical models through higher order differential equations and solve such linear ordinary differential equations.
C1O9.3	Construct a variety of partial differential equations and solution by exact methods/ method of separation of variables.
C1O9.4	Explain the applications of infinite series and obtain series solution of ordinary differential equations.
C1O9.5	Apply the knowledge of numerical methods in the modeling of various physical and engineering phenomena.

SUB: Engineering Chemistry   Sub Code: 18CHE12/22

After successful completion of this course, the students will be able to;

CO	Description
C110.1	Use of free energy in equilibria, rationalize bulk properties and processes using thermodynamic considerations, electrochemical energy systems.
C110.2	Causes & effects of corrosion of metals and control of corrosion. Modification ofsurface properties of metals to develop resistance to corrosion, wear, tear, mpact etc. by electroplating and electroless plating.
C110.3	Production & consumption of energy for industrialization of country and living standards of people. Electrochemical and concentration cells. Classical, modern batteries and fuel cells. Utilization of solar energy for different useful forms of energy.
C110.4	Environmental pollution, waste management and water chemistry.
C110.5	Different techniques of instrumental methods of analysis. Fundamental principles of nanomaterials.

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	S J P N Trust's	FIRST YEAR
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	Programmes Accredited by NBA: CSE, ECE, EEE & ME	2018-19

SUB: C Programming For Problem Solving   Sub Code: 18CPS13/23

After successful completion of this course, the students will be able to;

CO	Description
C111.1	Illustrate simple algorithms from the different domains such asmathematics, physics, etc.
C111.2	Construct a programing solution to the given problem using C.
C111.3	Identify and correct the syntax and logical errors in C Program.
C111.4	Modularize the given problem using functions and structures.

SUB: Engineering Graphics   Sub Code: 18EGD15/25

After successful completion of this course, the students will be able to;

CO	Description
C112.1	Prepare engineering drawings as per BIS conventions mentioned in the relevant
C112.2	Produce computer generated drawings using CAD software.
C112.3	Use the knowledge of orthographic projections to represent engineering information / concepts and present the same in the form of drawings.
C112.4	Develop isometric drawings of simple objects reading the orthographicprojections
C112.5	Convert pictorial and isometric views of simple objects to orthographic views.

SUB: Basic Electronics   Sub Code: 18ELN14/24

After successful completion of this course, the students will be able to;

CO	Description
C113.1	Describe the working of diodes and their applications in rectifiers &regulators.
C113.2	Explain the working and applications of the devices like SCR, UJT& JFET's.
C113.3	Understand the op-amp circuit and its applications.
C113.4	Understand the BJT applications and concept of feedback amplifier& oscillators.
C113.5	Describe the digital number system and basic principle of communication system.

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	Programmes Accredited by NBA: CSE, ECE, EEE & ME	**2018-19**

SUB: C Programming Laboratory   Sub Code: 18CPL17/27
After successful completion of this course, the students will be able to;

CO	Description
C114.1	Write algorithms, flowcharts and program for simple problems.
C114.2	Correct syntax and logical errors to execute a program.
C114.3	Write iterative and wherever possible recursive programs.
C114.4	Demonstrate use of functions, arrays, strings, structures and pointers in problem solving.

SUB: Engineering Chemistry Laboratory   Sub Code: 18CHEL16/26
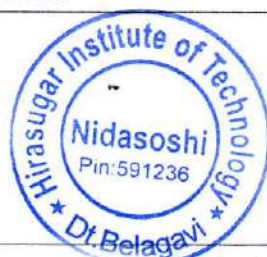After successful completion of this course, the students will be able to;

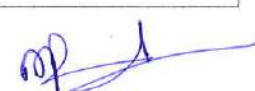| CO	Description
C115.1	Handling different types of instruments for analysis of materials using small quantities of materials involved for quick and accurate results.
C115.2	Carrying out different types of titrations for estimation of concerned in materials usingcomparatively more quantities of materials involved for good results.

SUB: Technical Communication (English) - II   Sub Code: 18EGH18/28
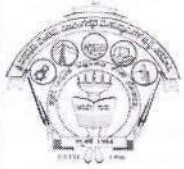After successful completion of this course, the students will be able to;

CO	Description
C116.1	Acquire basic English grammar and essentials of language skills.
C116.2	Get familiarized with English vocabulary and language proficiency.
C116.3	Improve the functional effectiveness through identifying common errors in spoken and written communication.
C116.4	Improve nature and style of sensible writing, and also improve employment and workplace communication skills.
C116.5	Improve their Technical Communication Skills through Technical writing and Reading practices.
C116.6	Write campus recruitment exams, engineering competitive exams and all other general competitive exams.

CO-ORDINATOR
First Year Engineering
Hirasugar Institute of Technolog:
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	S J P N Trust's	CSE
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	Accredited at 'A' Grade by NAAC	2021 Scheme
	Programmes Accredited by NBA: CSE, ECE	

III SEMESTER

SUB: Transform Calculus, Fourier Series And Numerical Techniques   **Sub Code: 21MAT31**

After successful completion of this course, the students will be able to:

CO	Description
C201.1	Use Laplace transform and inverse Laplace transform in solving differential/ integral equation arising in network analysis, control systems and other fields of engineering.
C201.2	Demonstrate Fourier series to study the behavior of periodic functions and their applications in system communications, digital signal processing and field theory.
C201.3	Make use of Fourier transform and Z-transform to illustrate discrete/continuous function arising in wave and heat propagation, signals and systems.
C201.4	Solve first and second order ordinary differential equations arising in engineering problems using single step and multistep numerical methods.
C201.5	Determine the externals of functional using calculus of variations and solve problems arising in dynamics of rigid bodies and vibrational analysis.

SUB: Data Structures and Applications   **Sub Code: 21CS32**

After successful completion of this course, the students will be able to:

CO	Description
C202.1	Identify different data structures and their applications.
C202.2	Apply stack and queues in solving problems.
C202.3	Demonstrate application of linked list.
C202.4	Explore the applications of trees and graphs to model and solve the real world problem.
C202.5	Make use of Hashing techniques and resolve collisions during mapping of key value pairs.

SUB: Analog and Digital Electronics   **Sub Code: 21CS33**

After successful completion of this course, the students will be able to:

CO	Description
C203.1	Design and analyze application of analog circuits using photo devices, timer IC, power supply regulator IC and OPAMP.
C203.2	Explain the basic principles of A/D and D/A conversion circuits and develop the same.
C203.3	Simplify digital circuits using Karnaugh Map , and Quine-McClusky Methods
C203.4	Explain Gates and flip flops and make us in designing different data processing circuits, registers and counters and compare the types.
C203.5	Develop simple HDL programs.
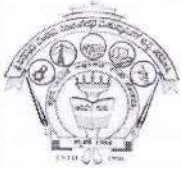
SUB: Computer Organization and Architecture   Sub Code: 21CS34

After successful completion of this course, the students will be able to:

CO	Description
C204.1	Explain the organization and architecture of computer systems with machine instructions and programs
C204.2	Analyze the input/output devices communicating with computer system
C204.3	Demonstrate the functions of different types of memory devices
C204.4	Apply different data types on simple arithmetic and logical unit
C204.5	Analyze the functions of basic processing unit, Parallel processing and pipelining.

SUB: Object Oriented Programming Lab with Java   Sub Code: 21CSL35

After successful completion of this course, the students will be able to:

CO	Description
C205.1	Use Eclipse/NetBeans IDE to design, develop, debug Java Projects.
C205.2	Analyze the necessity for Object Oriented Programming paradigm over structured programming and become familiar with the fundamental concepts in OOP.
C205.3	Demonstrate the ability to design and develop java programs, analyze, and interpret object-oriented data and document results.
C205.4	Apply the concepts of multiprogramming, exception/event handling, abstraction to develop robust programs.
C205.5	Develop user friendly applications using File I/O and GUI concepts.

SUB: Programming in C++   Sub Code: 21CS382

After successful completion of this course, the students will be able to:

CO	Description
C210.1	Explain the object oriented programming concepts, terminologies in object oriented programming and difference between C and C++ language.
C210.2	Understand and define different types of functions inside the class and out side the class definition
C210.3	Design and implement inheritance and polymorphism in C++ programming language.
C210.4	Design and Develop programs using text as well as binary file handling concepts.
C210.5	Design and implement exception handling code to handle run time errors in the program.

SUB: Social Connect and Responsibility   Sub Code: 21SCR36

After successful completion of this course, the students will be able to:

CO	Description
C206.1	Develop an eco-friendly relationship for saving the natural resources and

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	preservation of nature.
C206.2	Develop multicultural awareness and appreciation for Music and Drama by exposing learners to various forms of Art.
C206.3	Understand the concept of agricultural operations.
C206.4	Develop an eco-friendly relationship for saving the natural resources and preservation of nature.
C206.5	Describe the regional culinary practices and its importance in day-to-day life.

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	CSE
	NBA
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IV SEMESTER

SUB: Mathematical Foundations for Computing Probability and Statistics

Sub Code: 21MATCS41

After successful completion of this course, the students will be able to:

CO	Description
C211.1	Apply the concepts of logic for effective computation and relating problems in the Engineering domain.
C211.2	Analyze the concepts of functions and relations to various fields of Engineering. Comprehend the concepts of Graph Theory for various applications of Computational Sciences.
C211.3	Apply discrete and continuous probability distributions in analyzing the probability models arising in engineering field.
C211.4	Make use of the correlation and regression analysis to fit a suitable mathematical model for the Statistical data.
C211.5	Construct joint probability distributions and demonstrate the validity of testing the hypothesis.

SUB: Design and Analysis of Algorithms

Sub Code: 21CS42

After successful completion of this course, the students will be able to:

CO	Description
C212.1	Analyze the performance of the algorithms, state the efficiency using asymptotic notations and analyze mathematically the complexity of the algorithm.
C212.2	Apply divide and conquer approaches and decrease and conquer approaches in solving the problems analyze the same
C212.3	Apply the appropriate algorithmic design technique like greedy method, transform and conquer approaches and compare the efficiency of algorithms to solve the given problem.
C212.4	Apply and analyze dynamic programming approaches to solve some problems. and improve an algorithm time efficiency by sacrificing space.
C212.5	Apply and analyze backtracking, branch and bound methods and to describe P, NP and NP-Complete problems.

SUB: Microcontrollers and Embedded Systems

Sub Code: 21CS43

After successful completion of this course, the students will be able to:

CO	Description
C213.1	Explain C-Compilers and optimization
C213.2	Describe the ARM microcontroller's architectural features and program module.
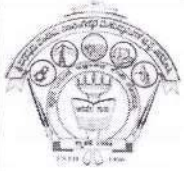
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| CSE |
| NBA |
| Course Outcomes |
| 2021 Scheme |

C213.3	Apply the knowledge gained from programming on ARM to different applications
C213.4	Program the basic hardware components and their application selection method.
C213.5	Demonstrate the need for a real-time operating system for embedded system applications.

SUB: Operating Systems   Sub Code: 21CS44

After successful completion of this course, the students will be able to:

CO	Description
C214.1	Demonstrate need for Operating System and its types.
C214.2	Explain the multithreaded systems and scheduling algorithms.
C214.3	Illustrate the concept of process synchronization and Deadlock.
C214.4	Explain the concept of memory management and File System.
C214.5	Illustrate the different concepts of disk management, Protection and Linux System case studies.

SUB: Biology for Engineers   Sub Code: 21BE45

After successful completion of this course, the students will be able to:

CO	Description
C215.1	Elucidate the basic biological concepts via relevant industrial applications and case studies.
C215.2	Evaluate the principles of design and development, for exploring novel bioengineering projects.
C215.3	Corroborate the concepts of biometrics for specific requirements.
C215.4	Think critically towards exploring innovative bio based solutions for socially relevant problems.
C215.5	Future Trends in Bioengineering

SUB: Python Programming Laboratory   Sub Code: 21CSL46

After successful completion of this course, the students will be able to:

CO	Description
C216.1	Demonstrate proficiency in handling of loops and creation of functions.
C216.2	Identify the methods to create and manipulate lists, tuples and dictionaries.
C216.3	Discover the commonly used operations involving regular expressions and file system.
C216.4	Interpret the concepts of Object-Oriented Programming as used in Python.
C216.5	Determine the need for scraping websites and working with PDF, JSON and other file formats.

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	Programmes Accredited by NBA: CSE, ECE	

SUB: Constitution of India, Professional Ethics   Sub Code: 21CIP47

After successful completion of this course, the students will be able to:

CO	Description
C217.1	Analyse the basic structure of Indian Constitution
C217.2	Remember their Fundamental Rights, DPSP's and Fundamental Duties (FD's) of our constitution.
C217.3	Know about our Union Government, political structure & codes, procedures.
C217.4	Understand our State Executive & Elections system of India.
C217.5	Remember the Amendments and Emergency Provisions, other important provisions given by the constitution.

SUB: Web Programming   Sub Code: 21CSL481

After successful completion of this course, the students will be able to:

CO	Description
C218.1	Describe the fundamentals of web and concept of HTML.
C218.2	Use the concepts of HTML, XHTML to construct the web pages.
C218.3	Interpret CSS for dynamic documents
C218.4	Evaluate different concepts of JavaScript & Construct dynamic documents.
C218.5	Design a small project with JavaScript and XHTML.

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V SEMESTER

SUB: Automata Theory and compiler Design   Sub Code: 21CS51

After successful completion of this course, the students will be able to:

CO	Description
C301.1	Acquire fundamental understanding of the core concepts in automata theory and Theory of Computation.
C301.2	Design and develop lexical analyzers, parsers and code generators.
C301.3	Design Grammars and Automata (recognizers) for different language classes and become knowledgeable about restricted models of Computation (Regular, Context Free) and their relative powers.
C301.4	Acquire fundamental understanding of the structure of a Compiler and Apply concepts automata theory and Theory of Computation to design Compilers
C301.5	Design computations models for problems in Automata theory and adaptation of such model in the field of compilers

SUB: Computer Networks   Sub Code: 21CS52

After successful completion of this course, the students will be able to:

CO	Description
C302.1	Learn the basic needs of communication system.
C302.2	Interpret the communication challenges and its solution.
C302.3	Identify and organize the communication system network components.
C302.4	Design communication networks for user requirements.

SUB: Database Management Systems   Sub Code: 21CS53

After successful completion of this course, the students will be able to:

CO	Description
C303.1	Identify, analyze and define database objects, enforce integrity constraints on a database using RDBMS
C303.2	Use Structured Query Language (SQL) for database manipulation and also demonstrate the basic of query evaluation.
C303.3	Design and build simple database systems and relate the concept of transaction, concurrency control and recovery in database
C303.4	Develop application to interact with databases, relational algebra expression.
C303.5	Develop applications using tuple and domain relation expression from queries.

SUB: Artificial Intelligence and Machine Learning   Sub Code: 21CS54

After successful completion of this course, the students will be able to:

CO	Description
C304.1	Apply the knowledge of searching and reasoning techniques for different applications.
C304.2	Have a good understanding of machine leaning in relation to other fields and fundamental issues and challenges of machine learning.
C304.3	Apply the knowledge of classification algorithms on various dataset and compare results
C304.4	Model the neuron and Neural Network, and to analyze ANN learning and its applications.
C304.5	Identifying the suitable clustering algorithm for different pattern

SUB: Database Management Systems Laboratory with Mini Project   Sub Code: 21CSL55
After successful completion of this course, the students will be able to:

CO	Description
C305.1	Demonstrate the working of Create, Update and query on the database.
C305.2	Demonstrate the working of different concepts of DBMS
C305.3	Implement, analyze and evaluate the project developed for an application.

SUB: Research Methodology & Intellectual Property Rights   Sub Code: 21RMI56
After successful completion of this course, the students will be able to:

CO	Description
C306.1	To know the meaning of engineering research
C306.2	To know the procedure of Literature Review and Technical Reading.
C306.3	To know the fundamentals of patent law sand drafting procedure.
C306.4	Understanding the copyright laws and subject matters of copyrights and designs
C306.5	Understanding the basic principles of design rights.

SUB: Environmental Studies   Sub Code: 21CIV57
After successful completion of this course, the students will be able to:

CO	Description
C307.1	Understand the principles of ecology and environmental issues that apply to air, land, and water issues on a global scale.
C307.2	Develop critical thinking and/or observation skills, and apply them to the analysis of a problem or question related to the environment.
C307.3	Demonstrate ecology knowledge of a complex relationship between biotic and abiotic components.
C307.4	Apply their ecological knowledge to illustrate and graph a problem and describe the

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	realities that managers face when dealing with complex issues.
C307.5	Understand the principles of ecology and environmental issues that apply to air, land, and water issues on a global scale.

SUB: Angular JS and Node JS Sub Code: 21CSL581

After successful completion of this course, the students will be able to:

CO	Description
C308.1	Describe the features of Angular JS.
C308.2	Recognize the form validations and controls.
C308.3	Implement Directives and Controllers.
C308.4	Evaluate and create database for simple application.
C308.5	Plan and build webservers with node using Node .JS.

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Course Outcomes of 3rd Semester to 5th Semester Courses -2021 scheme

Subject: **Transform Calculus, Fourier Series and Numerical Techniques** Sub Code: 21MAT31

After successful completion of this course, the students will be able to;

CO	Description
C201.1	Use Laplace transform and inverse Laplace transform in solving differential/ integral equation arising in network analysis, control systems and other fields of engineering.
C201.2	Demonstrate the Fourier series to study the behavior of periodic functions and their applications in system communications, digital signal processing and field theory.
C201.3	To use Fourier transforms to analyze problems involving continuous-time signals and to apply Z-Transform techniques to solve difference equations
C201.4	To solve mathematical models represented by initial or boundary value problems involving partial differential equations
C201.5	Determine the externals of functional using calculus of variations and solve problems arising in dynamics of rigid bodies and vibration analysis.

Subject:**Digital System Design Using Verilog** Sub Code: 21EC32

After successful completion of this course, the students will be able to;

CO	Description
C202.1	Simplify Boolean functions using K-map & Quine-McCluskey minimization technique.
C202.2	Analyze and design MSI Components.
C202.3	Analyze the concepts of Flip Flops (SR, D, T & JK) and design the synchronous sequential circuits using flip flops.
C202.4	Understand the concept of verilog data flow description.
C202.5	Describe the verilog behavioral & structural description.

Subject:**Basic Signal Processing** Sub Code: 21EC33

After successful completion of this course, the students will be able to;

CO	Description
C203.1	Understand the basics of Linear Algebra
C203.2	Analyze different types of signals and systems
C203.3	Analyze the properties of discrete time signals & systems
C203.4	Analyze discrete time signals & systems using Z transforms

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Subject:**Analog Electronic Circuits**   Sub Code: 21EC34

After successful completion of this course, the students will be able to;

CO	Description
C204.1	Understand the characteristics of BJT sand FETs for switching and amplifier circuits.
C204.2	Design and analyze FET amplifiers and oscillators with different circuit configurations and biasing conditions.
C204.3	Understand the feedback topologies and approximations in the design of amplifiers and oscillators
C204.4	Design of circuits using linear ICs for wide range applications such as ADC, DAC, filters and timers.
C204.5	Understand the power electronic device components and its functions for basic power electronic circuits.

Subject:**Analog and Digital Electronics Lab**   Sub Code: 21EC35

After successful completion of this course, the students will be able to;

CO	Description
C205.1	Design and analyze the BJT/FET amplifier and oscillator circuits.
C205.2	Design and test Op-amp circuits to realize the mathematical computations, DAC and precision rectifiers.
C205.3	Design and test the combinational logic circuits for the given specifications.
C205.4	Test the sequential logic circuits for the given functionality.
C205.5	Demonstrate the basic circuit experiments using 555 timers.

Subject:**Linear Integrated Circuits Lab using Pspice/MultiSIM**   Sub Code: 21EC383

After successful completion of this course, the students will be able to;

CO	Description
C206.1	Sketch/draw circuit schematics, construct circuits, analyze and troubleshoot circuits containing op-amps, resistors, diodes, capacitors and independent sources.
C206.2	Relate to the manufacturer's data sheets of IC 555 timer and IC μa741 op-amp.
C206.3	Realize and verify the operation of analog integrated circuits like Amplifiers, Precision Rectifiers, Comparators and Waveform generators.
C206.4	Design and implement analog integrated circuits like Oscillators, Active filters, Timer circuits, Data converters and compare the experimental results with theoretical values.

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Subject: **Complex Analysis, Probability and Statistical Methods**   Sub code:21MAT41

After successful completion of this course, the students will be able to;

CO	Description
C207.1	Use the concepts of an analytic function and complex potentials to solve the problems arising in electromagnetic field theory. Utilize conformal transformation and complex integral arising in aerofoil theory, fluid flow visualization and image processing.
C207.2	Obtain Series Solutions of Ordinary Differential Equation.
C207.3	Make use of the correlation and regression analysis to fit a suitable mathematical model for the statistical data.
C207.4	Apply discrete and continuous probability distributions in analyzing the probability models arising in the engineering field.
C207.5	Construct joint probability distributions and demonstrate the validity of testing the hypothesis.

Subject:**Digital Signal Processing**   Sub Code: 21EC42

After successful completion of this course, the students will be able to;

CO	Description
C208.1	Determine response of LTI systems using time domain and DFT techniques
C208.2	Compute DFT of real and complex discrete time signals.
C208.3	Compute DFT using FFT algorithms.
C208.4	Design FIR and IIR Digital Filters.
C208.5	Computation of signal processing operations using DSP processor.

Subject:**Circuits and Controls**   Sub Code: 21EC43

After successful completion of this course, the students will be able to;

CO	Description
C209.1	Analyze and solve Electric circuit, by applying, loop analysis, Nodal analysis and by applying network Theorems.
C209.2	Evaluate two port parameters of a network and Apply Laplace transforms to solve electric networks.
C209.3	Deduce transfer function of a given physical system, from differential equation representation or Block Diagram representation and SFG representation.
C209.4	Calculate time response specifications and analyze the stability of the system.
C209.5	Draw and analyze the effect of gain on system behavior using time response, frequency response methods And time response of system by state model approach.

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Subject: **Communication Theory**   Sub Code: 21EC44

After successful completion of this course, the students will be able to;

CO	Description
C210.1	Understand the amplitude & frequency modulation techniques and perform time and frequency domain transformations.
C210.2	Identify the schemes for amplitude and frequency modulation & demodulation of analog signals and compare the performance.
C210.3	Characterize the influence of channel noise on analog modulated signals.
C210.4	Understand the characteristics of pulse amplitude modulation, pulse position modulation and pulse code modulation systems.
C210.5	IllustrationofdigitalformattingrepresentationsusedforMultiplexers,Vocoders and Video transmission.

Subject: **Biology for Engineers**   Sub Code: 21BE45

After successful completion of this course, the students will be able to;

CO	Description
C211.1	Elucidate the basic biological concepts via relevant industrial applications and case studies.
C211.2	Evaluate the principles of design and development, for exploring novel bioengineering projects.
C211.3	Corroborate the concepts of biomimetics for specific requirements.
C211.4	Think critically towards exploring innovative biobased solutions for socially relevant problems.

Subject: **Communication Laboratory**   Sub Code: 21EC46

After successful completion of this course, the students will be able to;

CO	Description
C212.1	Demonstrate the AM and FM modulation and demodulation by representing the signals in time and frequency domain.
C212.2	Design and test the sampling, Multiplexing and PAM with relevant circuits.
C212.3	Demonstrate the basic circuitry and operations used in AM and FM receivers.
C212.4	Illustrate the operation of PCM and delta modulations for different input conditions
C212.5	Demonstrate the AM and FM modulation and demodulation by representing the signals in time and frequency domain.

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Subject: **Constitution Of India, Professional Ethics**   Sub Code: 21CIP47

After successful completion of this course, the students will be able to;

CO	Description
C213.1	Analyze the basic structure of Indian Constitution
C213.2	Remember their Fundamental Rights, DPSP's and Fundamental Duties (FD's) of our constitution.
C213.3	know about our Union Government, political structure & codes, procedures.
C213.4	Understand our State Executive & Elections system of India.
C213.5	Remember the Amendments and Emergency Provisions, other important provisions given by the constitution.

Subject: **Embedded C Basics Lab**   Sub Code: 21EC481

After successful completion of this course, the students will be able to;

CO	Description
C214.1	Write C programs in 8051 for solving simple problems that manipulate input data using different instructions of 8051 C
C214.2	Develop testing and experimental procedures on 8051 Microcontroller, analyze their operation under different cases.
C214.3	Develop programs for 8051 Microcontroller to implement real world problems
C214.4	Design and Develop Mini projects
C214.5	Write C programs in 8051 for solving simple problems that manipulate input data using different instructions of 8051C

Subject: **Universal Human Values**   Sub Code: 21ECL47

After successful completion of this course, the students will be able to;

CO	Description
C215.1	Holistic vision of life
C215.2	Socially responsible behavior
C215.3	Environmentally responsible work
C215.4	Ethical human conduct
C215.5	Having Competence and Capabilities for Maintaining Health and Hygiene

Subject: **Digital Communication**   Sub Code: 21EC51

After successful completion of this course, the students will be able to;

CO	Description
C301.1	Analyze different digital modulation techniques and choose the appropriate modulation technique for the given specifications.
C301.2	Test and validate symbol processing and performance parameters at the receiver under ideal and corrupted bandlimited channels.
C301.3	Differentiate various spread spectrum schemes and compute the performance

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	parameters of communication system
C301.4	Apply the fundamentals of information theory and perform source coding for given message
C301.5	Apply different encoding and decoding techniques with error Detection and Correction.

Subject: **Computer Organization & ARM Microcontrollers**   Sub Code: 21EC52

After successful completion of this course, the students will be able to;

CO	Description
C302.1	Explain the basic organization of a computer system.
C302.2	Demonstrate functioning of different sub systems, such as processor, Input/output, and memory.
C302.3	Describe the architectural features and instructions of 32-bit microcontroller ARM Cortex M3.
C302.4	Apply the knowledge gained for Programming ARM Cortex M3 for different applications

Subject: **Computer Communication Networks**   Sub Code: 21EC53

After successful completion of this course, the students will be able to;

CO	Description
C303.1	Understand the concepts of networking thoroughly.
C303.2	Identify the protocols and services of different layers
C303.3	Distinguish the basic network configurations and standards associated with each network
C303.4	Discuss and analyze the various applications that can be implemented on networks

Subject: **Electromagnetic Waves**   Sub Code: 21EC54

After successful completion of this course, the students will be able to;

CO	Description
C304.1	Evaluate problems on electrostatic force, electric field due to point, linear, volume charges by applying conventional methods and charge in a volume.
C304.2	Apply Gauss law to evaluate Electric fields due to different charge distributions and Volume Charge distribution by using Divergence Theorem
C304.3	Determine potential and energy with respect to point charge and capacitance using Laplace equation and Apply Biot-Savart's and Ampere's laws for evaluating Magnetic field for different current configurations
C304.4	Calculate magnetic force, potential energy and Magnetization with respect to magnetic

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	materials and voltage induced in electric circuits
C304.5	Apply Maxwell's equations for time varying fields, EM waves in free space and conductors and Evaluate power associated with EM waves using Poynting theorem

Subject: **Communication Lab II**   Sub Code: 21ECL55

After successful completion of this course, the students will be able to;

CO	Description
C305.1	Design and test the digital modulation circuits and display the waveforms.
C305.2	To Implement the source coding algorithm using C/C++/ MATLAB code
C305.3	To Implement the Error Control coding algorithms using C/C++/ MATLAB code
C305.4	Illustrate the operations of networking concepts and protocols using C programming and networksimulators

Subject: **IoT (Internet of Things) Lab**   Sub Code: 21EC581

After successful completion of this course, the students will be able to;

CO	Description
C306.1	Understand internet of Things and its hardware and software components
C306.2	Interface I/O devices, sensors & communication modules
C306.3	Remotely monitor data and control devices
C306.4	Develop real life IoT based projects

Subject: IPR   Sub Code: 21EC56

After successful completion of this course, the students will be able to;

CO	Description
C307.1	To know the meaning of engineering research
C307.2	To know the procedure of Literature Review and Technical Reading.
C307.3	To know the fundamentals of patent laws and drafting procedure .
C307.4	Understanding the copyright laws and subject matters of copyrights and designs
C307.5	Understanding the basic principles of design rights .

Subject: Environmental Study   Sub Code: 21CIV57

After successful completion of this course, the students will be able to;

CO	Description
C308.1	Understand the principles of ecology and environmental issues that apply to air, land, and water issues on a global scale.

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C308.2	Develop critical thinking and/or observation skills, and apply them to the analysis of a problem or question related to the environment.
C308.3	Demonstrate ecology knowledge of a complex relationship between biotic and abiotic components.
C308.4	Apply their ecological knowledge to illustrate and graph a problem and describe the realities that managers face when dealing with complex issues.
C308.5	Understand the principles of ecology and environmental issues that apply to air, land, and water issues on a global scale.

Subject: IoT (Internet of Things) Lab   Sub Code: 21EC581

After successful completion of this course, the students will be able to;

CO	Description
C309.1	Understand internet of Things and its hardware and software components
C309.2	Interface I/O devices, sensors & communication modules
C309.3	Remotely monitor data and control devices
C309.4	Develop real life IoT based projects

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DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

Course Outcomes for 5th Semester

Sub: Transmission and Distribution   **Sub. Code:** 21EE51

After successful completion of the course, the student will be able to:

CO	Description
C301.1	Explain transmission and distribution scheme, identify the importance of different transmission systems and types of insulators.
C301.2	Analyze and compute the parameters of the transmission line for different configurations.
C301.3	Evaluate the performance of the overhead line.
C301.4	Explain the phenomenon of Corona, advantages & disadvantages of Corona. Explain the construction & use of underground cables, explain the grading of cables.
C301.5	Explain various types of distribution systems, reliability and quality of distribution system.

Sub: Control Systems   **Sub. Code:** 21EE52

After successful completion of the course, the student will be able to:

CO	Description
C302.1	Demonstrate the mathematical modelling of electrical, mechanical & analogous systems and Determine the performance characteristics of AC/DC servomotors & synchro-transmitter receiver pair used in control systems.
C302.2	Apply block diagram and signal flow graph methods to obtain transfer function of systems.
C302.3	Determine transient and steady state time response of a simple control system & evaluate the performance of a given system in time and frequency domains using software package and discrete components.
C302.4	Determine the stability of the system by using Routh criterion, root locus, bode plot and Nyquist plot methods and using software package.
C302.5	Design, analyze and experiment with different types of compensators and controllers using software package and discrete components.

Sub: Power System Analysis-1   **Sub. Code:** 21EE53

After successful completion of the course, the student will be able to:

CO	Description
C303.1	Model the power system components & construct per unit impedance diagram of power system.
C303.2	Analyze three phase symmetrical faults on power system.
C303.3	Compute unbalanced phasors in terms of sequence components and vice versa, also develop sequence networks.
C303.4	Analyze various unsymmetrical faults on power system.
C303.5	Examine dynamics of synchronous machine and determine the power system stability.

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EEE

Course Outcome

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DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

Sub: Power Electronics   **Sub. Code:** 21EE54

After successful completion of the course, the student will be able to:

CO	Description
C304.1	Explain application areas of power electronics, types of power electronic circuits and switches, their characteristics and specifications.
C304.2	Explain different types of power diodes, its effects on RL circuits and operation and analysis of single phase diode rectifier circuits.
C304.3	Explain steady state, switching characteristics and gate /base drive requirements of different power transistors and their comparison.
C304.4	Discuss different types of thyristors, their operation, characteristics and firing circuits.
C304.5	Discuss the principle of operation and analysis of controlled rectifiers, AC voltage controllers, DC – DC and DC –AC converters

Sub: Power Electronics Laboratory   **Sub. Code:** 21EEL55

After successful completion of the course, the student will be able to:

CO	Description
C305.1	Analyze the static characteristics of semiconductor devices to discuss their performance.
C305.2	Experiment with different methods of triggering the SCR.
C305.3	Analyze the performance of single phase controlled full wave rectifier and AC voltage controller with different types of load conditions.
C305.4	Determine the speed control of a stepper motor, universal motor and DC motors using different types of converter.
C305.5	Experiment with single phase MOSFET/IGBT based PWM inverter.

Sub: Research Methodology & Intellectual Property Rights   **Sub. Code:** 21RMI56

After successful completion of the course, the student will be able to:

CO	Description
C306.1	To know the meaning of engineering research
C306.2	To know the procedure of Literature Review and Technical Reading.
C306.3	To know the fundamentals of patent laws and drafting procedure
C306.4	Understanding the copyright laws and subject matters of copyrights and designs.
C306.5	Understanding the basic principles of design rights.

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DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

Sub: Environmental Studies   **Sub. Code:** 21CIV57

After successful completion of the course, the student will be able to:

CO	Description
C307.1	Understand the principles of ecology and environmental issues that apply to air, land, and water issues on a global scale.
C307.2	Develop critical thinking and/or observation skills, and apply them to the analysis of a problem or question related to the environment.
C307.3	Demonstrate ecology knowledge of a complex relationship between biotic and abiotic components.
C307.4	Apply their ecological knowledge to illustrate and graph a problem and describe the realities that managers face when dealing with complex issues.
C307.5	Understand the principles of ecology and environmental issues that apply to air, land, and water issues on a global scale.

Sub: Renewable Energy Projects   **Sub. Code:** 21EEP584

After successful completion of the course, the student will be able to:

CO	Description
C311.1	Analyze in a systematic way, think better, and perform better.

29.2.24

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	Hirasugar Institute of Technology, Nidasoshi.	
	Inculcating Values, Promoting Prosperity	**Course Outcome**
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DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

Course Outcomes for 4th Semester

Sub: Complex Analysis, Probability and Statistical Methods   **Sub. Code:** 21MAT41

After successful completion of the course, the student will be able to:

CO	Description
C215.1	Use the concepts of an analytic function and complex potentials to solve the problems arising in electromagnetic field theory. Utilize conformal transformation and complex integral arising in aerofoil theory, fluid flow visualization and image processing.
C215.2	Obtain Series Solutions of Ordinary Differential Equation.
C215.3	Make use of the correlation and regression analysis to fit a suitable mathematical model for the statistical data.
C215.4	Apply discrete and continuous probability distributions in analyzing the probability models arising in the engineering field.
C215.5	Construct joint probability distributions and demonstrate the validity of testing the hypothesis.

Sub: Digital System Design   **Sub. Code:** 21EE42

After successful completion of the course, the student will be able to:

CO	Description
C216.1	Develop simplified switching equation using Karnaugh Maps and Quine McClusky techniques.
C216.2	Design Multiplexer, Encoder, Decoder, Adder, Subtractors and Comparator as digital combinational control circuits.
C216.3	Design flip flops, counters, shift registers as sequential control.
C216.4	Develop Mealy/Moore Models and state diagrams for the given clocked sequential circuits
C216.5	Explain the functioning of Read only and Read/Write Memories, Programmable ROM, EPROM and Flash memory.

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EEE
Course Outcome
2021 Scheme

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

Sub: Microcontroller **Sub. Code:** 21EE43

After successful completion of the course, the student will be able to:

CO	Description
C217.1	Outline the 8051 architecture, registers, internal memory organization, addressing modes.
C217.2	Discuss 8051 addressing modes, instruction set of 8051, accessing data and I/O port programming.
C217.3	Develop 8051 C programs for time delay, I/O operations, I/O bit manipulation, logic and arithmetic operations, data conversion and timer/counter programming.
C217.4	Summarize the basics of serial communication and interrupts, also develop 8051 programs for serial data communication and interrupt programming.
C217.5	Program 8051 to work with external devices for ADC, DAC, Stepper motor control, DC motor control.

Sub: Electric Motors **Sub. Code:** 21EE44

After successful completion of the course, the student will be able to:

CO	Description
C218.1	Explain the characteristics, applications, losses and efficiency of different DC motors.
C218.2	Describe the testing methods of DC motors and performance characteristics of three phase Induction motors.
C218.3	Determine the performance parameters of three Induction motor using test data and circle diagram.
C218.4	Explain starting and speed control of three phase Induction motor and construction and working of different types of single phase Induction motors.
C218.5	Explain principle of operation of synchronous and other motors.

Sub: Biology for Engineers **Sub. Code:** 21BE45

After successful completion of the course, the student will be able to:

CO	Description
C219.1	Elucidate the basic biological concepts via relevant industrial applications and case studies.
C219.2	Evaluate the principles of design and development, for exploring novel bioengineering projects.
C219.3	Corroborate the concepts of biomimetics for specific requirements.
C219.4	Think critically towards exploring innovative bio based solutions for socially relevant problems.
C219.5	Future Trends in Bioengineering.

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DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

Sub: Electrical Machines Laboratory - II   **Sub. Code:** 21EEL46

After successful completion of the course, the student will be able to:

CO	Description
C220.1	Test dc machines to determine their characteristics.
C220.2	Change the speed of dc motor by selecting suitable method.
C220.3	Pre-determine the performance characteristics of dc machines by conducting suitable tests.
C220.4	Assess the performance of single phase and three phase induction motor by conducting load test.
C220.5	Experiment with induction motor to pre-determine the performance characteristics.
C220.6	Test on synchronous motor to draw the performance curves.

Sub: Simulation of Op-Amp Circuits   **Sub. Code:** 21EEL484

After successful completion of the course, the student will be able to:

CO	Description
C227.1	Conduct experiment to determine the characteristic parameters of OP-Amp
C227.2	Design test the OP-Amp as Amplifier, adder, subtractor, differentiator and integrator
C227.3	Design test the OP-Amp as oscillators and filters.
C227.4	Design and study of Linear IC's as multivibrator power supplies.
C227.5	Realization of R-2R ladder DAC and Two bit Flash ADC.

Sub: Universal Human Values-II: Understanding Harmony and Ethical Human Conduct   **Sub. Code:** 21UHV49

By the end of the course, students are expected to positively impact common graduate attributes like:

CO	Description
C228.1	Holistic vision of life.
C228.2	Socially responsible behavior.
C228.3	Environmentally responsible work.
C228.4	Ethical human conduct.
C228.5	Having Competence and Capabilities for Maintaining Health and Hygiene.
C228.6	Appreciation and aspiration for excellence (merit) and gratitude for all.

29.2.24

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EEE

Course Outcome

2021 Scheme

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

Course Outcomes for 2021 Scheme Syllabus

Course Outcomes for 3rd Semester

Sub: Transform Calculus, Fourier Series and Numerical Techniques   **Sub. Code:** 21MAT31

After successful completion of the course, the student will be able to:

CO	Description
C201.1	Use Laplace transform and inverse Laplace transform in solving differential/ integral equation arising in network analysis, control systems and other fields of engineering.
C201.2	Demonstrate the Fourier series to study the behavior of periodic functions and their applications in system communications, digital signal processing and field theory.
C201.3	To use Fourier transforms to analyze problems involving continuous-time signals and to apply Z-Transform techniques to solve difference equations.
C201.4	To solve mathematical models represented by initial or boundary value problems involving partial differential equations.
C201.5	Determine the externals of functional using calculus of variations and solve problems arising in dynamics of rigid bodies and vibration analysis.

Sub: Analog Electronic Circuits and Op - Amps   **Sub. Code:** 21EE32

After successful completion of the course, the student will be able to:

CO	Description
C202.1	Obtain characteristics of clipper and clamper circuits, design voltage divider biasing circuits and analyze transistor circuit using h- parameter.
C202.2	Design and analyze multistage amplifiers and feedback circuits.
C202.3	Design and analyze different power amplifier circuits and explain the construction, working and characteristics of JFET and MOSFET.
C202.4	Explain concepts of Op-amp, active filters and DC voltage regulators.
C202.5	Demonstrate the application of Op-amps.

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EEE

Course Outcome

2021 Scheme

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

Sub: Electric Circuit Analysis   **Sub. Code:** 21EE33

After successful completion of the course, the student will be able to:

CO	Description
C203.1	Apply the basic concepts, basic laws and methods of analysis of DC and AC networks and reduce the complexity of network using source shifting, source transformation and network reduction using transformations.
C203.2	Analyze complex electric circuits using network theorems.
C203.3	Discuss resonance in series and parallel circuits and also the importance of initial conditions and their evaluation.
C203.4	Analyze typical waveforms using Laplace transformation.
C203.5	Discuss unbalanced three phase systems and also evaluate the performance of two port networks.

Sub: Transformers and Generators   **Sub. Code:** 21EE34

After successful completion of the course, the student will be able to:

CO	Description
C204.1	Discuss the principle of operation, construction and performance evaluation of 1-phase, 3-Phase transformers and Autotransformer.
C204.2	Explain the parallel operation of transformer and discuss about autotransformer and tap changing transformer.
C204.3	Describe the fundamental concepts of DC and Synchronous Generator.
C204.4	Determine the regulation of Synchronous Generator by EMF, MMF and ZPF Methods.
C204.5	Analyze the performance of Synchronous Generator.

Sub: Electrical Machines Laboratory - 1   **Sub. Code:** 21EEL35

After successful completion of the course, the student will be able to:

CO	Description
C205.1	Evaluate the performance of transformers from the test data obtained.
C205.2	Explain the operation of two single phase transformers of different KVA rating connected parallel fashion.
C205.3	Explain the operation of three single phase transformers for three phase operation and phase conversion.
C205.4	Determine the voltage regulation of synchronous generator using the test data obtained in the laboratory.
C205.5	Evaluate the performance of synchronous generators from the test data and assess the performance of synchronous generator connected to infinite bus.

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| EEE |
| Course Outcome |
| 2021 Scheme |

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

Sub: Social Connect & Responsibility   **Sub. Code:** 21SCR36

After successful completion of the course, the student will be able to:

CO	Description
C206.1	Develop an eco-friendly relationship for saving the natural resources and preservation of nature.
C206.2	Develop multicultural awareness and appreciation for Music and Drama by exposing learners to various forms of Art.
C206.3	Understand the concept of agricultural operations.
C206.4	Develop an eco-friendly relationship for saving the natural resources and preservation of nature.
C206.5	Describe the regional culinary practices and its importance in day-to-day life.

Sub: Constitution of India & Professional Ethics   **Sub. Code:** 21CIP37

After successful completion of the course, the student will be able to:

CO	Description
C209.1	Have general knowledge and legal literacy and thereby to take up competitive Examinations.
C209.2	Understand state and central policies, fundamental duties.
C209.3	Understand Electoral Process, special provisions.
C209.4	Understand powers and functions of Municipalities, Panchayats and Co-operative Societies.
C209.5	Understand Engineering ethics and responsibilities of Engineers. Have an awareness about cyber law.

Sub: 555 IC Laboratory   **Sub. Code:** 21EEL383

After successful completion of the course, the student will be able to:

CO	Description
C212.1	Analyse in an intelligent manner, think better, and perform better.

29.2.24

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Course Outcomes of all the courses of 3rd semester to 5th semester
CBCS 2021 Scheme
III-SEM

Subject: Transform calculus, Fourier series and Numerical techniques　　**Sub. Code: BSC-21MAT31**

After successful completion of this course, the students will be able to;

CO	Description
C201.1	Use Laplace transform and inverse Laplace transform in solving differential/ integral equation arising in network analysis, control systems and other fields of engineering.
C201.2	Demonstrate Fourier series to study the behavior of periodic functions and their applications in system communications, digital signal processing and field theory.
C201.3	Make use of Fourier transform and Z-transform to illustrate discrete/continuous function arising in wave and heat propagation, signals and systems
C201.4	Solve first and second order ordinary differential equations arising in engineering problems using single step and multistep numerical methods.
C201.5	Determine the externals of functional using calculus of variations and solve problems arising in dynamics of rigid bodies and vibration analysis.

Subject: Metal casting, Forming and Joining Processes　　**Subject Code: IPCC- 21ME32**

After successful completion of this course, the students will be able to;

CO	Description
C202.1	Classify manufacturing process and elaborate the parts of casting process.
C202.2	Summarize the different casting process and select the melting furnace based on ferrous and non-ferrous alloys.
C202.3	Understand the classification of various forming process like forging, rolling, extrusion, wire drawing and sheet metal processes.
C202.4	List and explain different types of conventional welding processes like Arc and Gas welding processes.
C202.5	Explain different special types of advance welding processes, soldering, brazing and adhesive bonding.

Subject: Material Science and Engineering　　**Subject Code: IPCC-21ME33**

After successful completion of this course, the students will be able to;

CO	Description
C203.1	Understand the atomic arrangement in crystalline materials and describe the periodic arrangement of atoms in terms of unit cell parameters.
C203.2	Understand the importance of phase diagrams and the phase transformations.
C203.3	Know various heat treatment methods for controlling the microstructure.
C203.4	Correlate between material properties with component design and identify various kinds of defects.
C203.5	Apply the method of materials selection, material data and knowledge sources for computer-aided selection of materials.

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Subject: Thermodynamics   **Subject Code: PCC-21ME34**

After successful completion of this course, the students will be able to;

CO	Description
C204.1	Understand basic biological principles and organizational structure of living systems at molecular level.
C204.2	Elucidate the basic biological concepts via relevant industrial applications and case studies.
C204.3	Cause, symptoms, diagnosis and treatment of common diseases and evaluate the principles of design and development, for exploring novel bioengineering projects.
C204.4	Corroborate the concepts of biomimetics for specific requirements and biological problems that requires engineering expertise to solve them.
C204.5	Think critically towards exploring innovative bio based solutions for socially relevant problems.

Subject: Machine Drawing and GD & T   **Subject Code: PCC-21MEL35**

After successful completion of this course, the students will be able to;

CO	Description
C205.1	Interpret the Machining and surface finish symbols on the component drawings.
C205.2	Draw true shape of sections of polyhedrons.
C205.3	Visualize and draw orthographic views of simple machine components, thread forms, fasteners, riveted, cotter, knuckle joints and couplings as per BIS.
C205.4	Visualize and prepare models of given detailed parts of machine component and its assembly with bill of materials and specifications.

Subject: Introduction to PYTHON   **Subject Code: AEC-21ME381**

After successful completion of this course, the students will be able to;

CO	Description
C210.1	Demonstrate proficiency in handling of loops and creation of functions
C210.2	Identify the methods to create and manipulate lists, tuples and dictionaries
C210.3	Discover the commonly used operations involving regular expressions and file system
C210.4	Examine working of PDF and word file formats

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IV-SEM

Subject: Complex Analysis, Probability and Linear Programming.   Subject Code: BSC-21ME41

After successful completion of this course, the students will be able to;

CO	Description
C213.1	Use the concepts of an analytic function and complex potentials to solve the problems arising in fluid flow.
C213.2	Utilize conformal transformation and complex integral arising in aerofoil theory, fluid flow visualization and image processing.
C213.3	Apply discrete and continuous probability distributions in analyzing the probability models arising in the engineering field.
C213.4	Analyze and solve Linear Programming models of real life situations and solve LPP by the simplex method
C213.5	Learn techniques to solve Transportation and Assignment Problems

Subject: Machining Science and Jigs & Fixtures   Subject Code: IPCC-21ME42

After successful completion of this course, the students will be able to;

CO	Description
C214.1	Explain the construction & specification of various machine tools.
C214.2	Discuss different cutting tool materials, tool nomenclature & surface finish.
C214.3	Apply mechanics of machining process to evaluate machining time.
C214.4	Understand the concepts of different advanced machining processes
C214.4	Discuss the importance of Jigs and Fixtures

Subject: Fluid Mechanics   Subject Code: IPCC-21ME43

After successful completion of this course, the students will be able to;

CO	Description
C215.1	Understand the basic principles of fluid mechanics and fluid kinematics
C215.2	Acquire the basic knowledge of fluid dynamics and flow measuring instruments
C215.3	Understand the nature of flow and flow over bodies and the dimensionless analysis
C215.4	Acquire the compressible flow fundamental and basics of CFD packages and the need for CFD analysis
C215.5	Conduct basic experiments of fluid mechanics and understand the experimental uncertainties

Subject: Mechanics of Materials   Subject Code: PCC-21ME44

After successful completion of this course, the students will be able to;

CO	Description
C216.1	Understand simple, compound, thermal stresses and strains their relations and strain energy.
C216.2	Analyze structural members for stresses, strains and deformations.
C216.3	Analyze the structural members subjected to bending and shear loads
C216.4	Analyze shafts subjected to twisting loads.
C216.5	Analyze the short columns for stability.

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Subject: Biology For Engineers   **Subject Code: AEC-21BE45**

After successful completion of this course, the students will be able to;

CO	Description
C217.1	Understand basic biological principles and organizational structure of living systems at molecular level.
C217.2	Elucidate the basic biological concepts via relevant industrial applications and case studies.
C217.3	Cause, symptoms, diagnosis and treatment of common diseases and evaluate the principles of design and development, for exploring novel bioengineering projects.
C217.4	Corroborate the concepts of biomimetics for specific requirements and biological problems that requires engineering expertise to solve them.
C217.5	Think critically towards exploring innovative biobased solutions for socially relevant problems.

Subject: Mechanical Measurements and Metrology Lab   **Subject Code: PCC -21MEL46**

After successful completion of this course, the students will be able to;

CO	Description
C218.1	To calibrate pressure gauge, thermocouple, LVDT, load cell, micrometer.
C218.2	To measure angle using Sine Center/ Sine Bar/ Bevel Protractor, alignment using Autocollimator/ Roller set.
C218.3	To demonstrate measurements using Optical Projector/Tool maker microscope, Optical flats.
C218.4	To measure cutting tool forces using Lathe/Drill tool dynamometer.
C218.5	To measure Screw thread parameters using 2-Wire or 3-Wire method, gear tooth profile using gear tooth vernier/Gear tooth micrometer
C218.6	To measure surface roughness using Tally Surf/ Mechanical Comparator

Subject: Introduction to AI and ML   **Subject Code: AEC-21ME482**

After successful completion of this course, the students will be able to;

CO	Description
C220.1	To familiarize basic principles, and applications of AI
C220.2	To guide the students on generalization as a means to capturing patterns in the data
C220.3	To demonstrate the reasoning to internal representations of knowledge.
C220.4	To make to understand the of challenges in Artificial Intelligence domain
C220.5	To acquaint with the future trends of Artificial Intelligence.

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V-SEM

Subject: Theory of Machines   **Subject Code: BSC -21ME51**

After successful completion of this course, the students will be able to;

CO	Description
C301.1	Knowledge of mechanisms and their motion and the inversions of mechanisms
C301.2	Analyse the velocity, acceleration of links and joints of mechanisms..
C301.3	Analyse the mechanisms for static and dynamic equilibrium.
C301.4	Carry out the balancing of rotating and reciprocating masses and also analyse different types of governors used in real life situation.
C301.5	Analyze the free and forced vibration phenomenon.

Subject: Thermo-fluids Engineering   **Subject Code: IPCC -21ME52**

After successful completion of this course, the students will be able to;

CO	Description
C302.1	Apply the concepts of testing of I. C. Engines and evaluate their performance, and evaluate the performance of Reciprocating compressor.
C302.2	Apply and analyse the concepts related to Refrigeration and Air conditioning, and get conversant with Psychrometric Charts, Psychrometric processes, human comfort conditions.
C302.3	Explain the construction, classification and working principle of the Turbo machines and apply of Euler's turbine equation to evaluate the energy transfer and other related parameters. Compare and evaluate the performance of positive displacement pumps.
C302.4	Classify, explain and analyse the various types of hydraulic turbines and centrifugal pumps.
C302.5	Classify, explain and analyse various types of steam turbines and centrifugal compressor.

Subject: Finite Element Analysis   **Subject Code: IPCC -21ME53**

After successful completion of this course, the students will be able to;

CO	Description
C303.1	Understand the concepts behind formulation methods in FEM and Choose interpolation polynomial equation for simplex elements
C303.2	Develop element characteristic equation and solve the global equation of FEA elements such as bars and trusses.
C303.3	Develop element characteristic equation and solve the global equation of FEA for beams and circular shafts
C303.4	Develop element characteristic equation and solve the global equation of FEA for 1D heat transfer and fluid flow
C303.5	Develop element characteristic equation and solve the global equation of FEA for axi symmetric and dynamic problems

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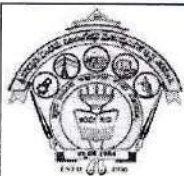
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Subject: Modern Mobility and Automotive Mechanics   **Subject Code: PCC -21ME54**

After successful completion of this course, the students will be able to;

CO	Description
C304.1	To identify the different parts of an automobile and it's working
C304.2	Understand the working of different systems employed in automobile
C304.3	Analyse the limitation of present day automobiles
C304.4	Evaluate the energy sources suitability
C304.5	Apply the knowledge for selection of automobiles based on their suitability

Subject: Design lab   **Subject Code: PCC -21MEL55**

After successful completion of this course, the students will be able to;

CO	Description
C305.1	Compute the natural frequency of the free and forced vibration of single degree freedom systems, criticalspeed of shafts.
C305.2	Carry out balancing of rotating masses.
C305.3	Analyse the governor characteristics.
C305.4	Study the effect of gyroscopic couple on plane disc
C305.5	Determine stresses in disk, beams, plates and hook using photo elastic bench
C305.6	Determination of Pressure distribution in Journal bearing
C305.7	Analyze the stress and strains using strain gauges in compression and bending test and stress distribution in curved beams.
C305.8	To realize different mechanisms and cam motions

Subject: Research Methodology & Intellectual Property Rights   **Subject Code: AEC -21RMI56**

After successful completion of this course, the students will be able to;

CO	Description
C306.1	To know the meaning of engineering research.
C306.2	To know the procedure of Literature Review and Technical Reading.
C306.3	To know the fundamentals of patent laws and drafting procedure.
C306.4	Understanding the copyright laws and subject matters of copyrights and designs.
C306.5	Understanding the basic principles of design rights.

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	Hirasugar Institute of Technology, Nidasoshi.	**Academic**
	Inculcating Values, Promoting Prosperity Approved by AICTE, New Delhi, Permanently Affiliated to VTU, Belagavi	**Course Outcome**
	Recognized under 2(f) &12B of UGC Act, 1956.	
	Accredited at 'A' Grade by NAAC & Programmes Accredited by NBA: CSE &ECE	**AY: 2022-23**

Subject: Environmental Studies   **Subject Code: HSMC -21CIV57**

After successful completion of this course, the students will be able to;

CO	Description
C307.1	Understand the principles of ecology and environmental issues that apply to air, land, and water issues on a global scale.
C307.2	Develop critical thinking and/or observation skills, and apply them to the analysis of a problem or question related to the environment.
C307.3	Demonstrate ecology knowledge of a complex relationship between biotic and abiotic components.
C307.4	Apply their ecological knowledge to illustrate and graph a problem and describe the realities that managers face when dealing with complex issues.
C307.5	Understand the principles of ecology and environmental issues that apply to air, land, and water issues on a global scale.

Subject: Basics of MATLAB   **Subject Code: AEC -21ME581**

After successful completion of this course, the students will be able to;

CO	Description
C308.1	Able to implement loops, branching, control instruction and functions in MATLAB programming environment.
C308.2	Able to program curve fitting, numerical differentiation and integration, solution of linear equations in MATLAB and solve electrical engineering problems.
C308.3	Able to understand implementation of ODE using ode 45 and execute Solutions of nonlinear equations and DFT in MATLAB.
C308.4	Able to simulate MATLAB Simulink examples

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List of Course Outcomes for All Courses

Course Outcomes for 1st Semester

Sub: Calculus and Linear Algebra   **Sub. Code:** 21MAT11

After successful completion of the course, the student will be able to:

CO	Description
C101.1	Apply the knowledge of calculus to solve problems related to polar curves and its applications in determining the bentness of a curve.
C101.2	Learn the notion of partial differentiation to calculate rate of change of multivariate functions and solve problems related to composite functions and Jacobian.
C101.3	Solve first-order linear/nonlinear ordinary differential equations analytically through standard methods.
C101.4	Demonstrate various models through higher order differential equations and solve such linear ordinary differential equations.
C101.5	Test the consistency of a system of linear equations and to solve them by direct and iterative methods.

Sub: Engineering Physics   **Sub. Code:** 21PHY12/22

After successful completion of the course, the student will be able to:

CO	Description
C102.1	Interpret the types of mechanical vibrations and their applications, the role of Shock waves in various fields.
C102.2	Demonstrate the quantization of energy for microscopic system.
C102.3	Apply LASER and Optical fibers in optoelectronic system.
C102.4	Illustrate merits of quantum free electron theory and applications of Hall effect.
C102.5	Analyse the importance of XRD and Electron Microscopy in Nano material characterization.

Sub: Basic Electrical Engineering   **Sub. Code:** 21ELE13/23

After successful completion of the course, the student will be able to:

CO	Description
C103.1	Analyze DC circuits and explain the generation of sinusoidal voltage and AC fundamentals
C103.2	Analyze DC circuits and explain the generation of sinusoidal voltage and AC fundamentals
C103.3	Discuss the construction and operation of DC machines
C103.4	Discuss the construction and operation of three phase induction motors and synchronous generators.
C103.5	Explain the concepts of electric power transmission and distribution, electricity billing, circuit protective devices and personal safety measures.

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	S J P N Trust's	**FIRST YEAR**
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Sub: Elements of Civil Engineering & Engineering Mechanics   **Sub. Code:** 21CIV14/24

After successful completion of the course, the student will be able to:

CO	Description
C104.1	Describing the basics of civil engineering, its scope of study, knowledge about roads, bridges and dams. Understanding the action of forces, moments and other loads on systems of rigid bodies.
C104.2	Understanding the concept of equilibrium and friction- Static and Dynamic.
C104.3	Analyzing and Interpreting the reactive forces and the effects those develop as a result of external loads on beams and trusses.
C104.4	Finding the centroid and moment of inertia of composite plane and curved figures.
C104.5	Describing the basics of kinematics and kinetics, different types of motions. Analyzing the motion of the body

Sub: Engineering Visualization   **Sub. Code:** 21EVLN15/25

After successful completion of the course, the student will be able to:

CO	Description
C105.1	Understand and visualize the objects with definite shape and dimensions
C105.2	Analyze the shape and size of objects through different views
C105.3	Develop the lateral surfaces of the object
C105.4	Create a 3D view using CAD software.
C105.5	Identify the interdisciplinary engineering components or systems through its graphical representation.

Sub: Engineering Physics Laboratory   **Sub. Code:** 21PHYL16/26

After successful completion of the course, the student will be able to:

CO	Description
C106.1	Develop skills to impart practical knowledge in real time solution.
C106.2	Explain principle, concept, working and application of new technology and comparison of results with theoretical calculations.
C106.3	Gain knowledge of new concept in the solution of practical oriented problems and to understand more deep knowledge about the solution to theoretical problems.

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Sub: Basic Electrical Engineering Laboratory   **Sub. Code:** 21ELEL17/27

After successful completion of the course, the student will be able to:

CO	Description
C107.1	Verify KCL and KVL and maximum power transfer theorem for DC circuits.
C107.2	Compare power factors of different types of lamps.
C107.3	Demonstrate the measurement of the impedance of an Electrical circuit and power consumed by three phase load.
C107.4	Analyze two way and three way control of lamps.
C107.5	Explain the effect of open and short circuits in simple circuits.
107.6	Interpret the stability of earth resistance measured.

Sub: Communicative English   **Sub. Code:** 21EGH18

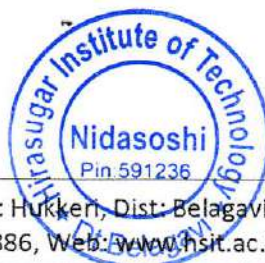After successful completion of the course, the student will be able to:

CO	Description
C108.1	Understand and apply the Fundamentals of Communication Skills in their communication skills.
C108.2	Identify the nuances of phonetics, intonation and enhance pronunciation skills.
C108.3	To impart basic English grammar and essentials of language skills as per present requirement.
C108.4	Understand and use all types of English vocabulary and language proficiency.
C108.5	Adopt the Techniques of Information Transfer through presentation.

Sub: Innovation & Design Thinking   **Sub. Code:** 21IDT19

After successful completion of the course, the student will be able to:

CO	Description
C109.1	To understand Health and wellness (and its Beliefs)
C109.2	To acquire Good Health & It's balance for positive mindset
C1O9.3	To inculcate and develop the healthy lifestyle habits for good health.
C1O9.4	To Create of Healthy and caring relationships to meet the requirements of MNC and LPG world
C1O9.5	Adopt the innovative & positive methods to avoid risks from harmful habits in their campus & outside the campus
C109.6	To positively fight against harmful diseases for good health through positive mindset.

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Course Outcomes for 1st Semester

Sub: Advanced Calculus and Numerical Methods **Sub. Code:** 21MAT21

After successful completion of the course, the student will be able to:

CO	Description
C110.1	Apply the knowledge of calculus to solve problems related to polar curves and its applications in determining the bentness of a curve.
C110.2	Learn the notion of partial differentiation to calculate rate of change of multivariate functions and solve problems related to composite functions and Jacobian.
C110.3	Solve first-order linear/nonlinear ordinary differential equations analytically through standard methods.
C110.4	Demonstrate various models through higher order differential equations and solve such linear ordinary differential equations.
C110.5	Test the consistency of a system of linear equations and to solve them by direct and iterative methods.

Sub: Engineering Chemistry **Sub. Code:** 21CHE12/22

After successful completion of the course, the student will be able to:

CO	Description
C111.1	The course able to impart the basic knowledge of chemistry and its principles involved in electrochemistry, energy storage devices using thermodynamic considerations and its commercial applications.
C111.2	The course has able to understand the basic principles of corrosion and its prevention by modifying the surface properties of metals to develop resistance to corrosion and metal finishing, and its technological importance by wear, tear impact etc. by electroplating and electroless plating processes.
C111.3	The course has able to master in the knowledge of synthesis, properties, and utilization of engineering materials and applications of polymer, lubricants, and refractories in various fields of engineering and science.
C111.4	The course has able to Apply the knowledge of Green Chemistry principles for the production of chemical compounds. Understanding the concepts of synthesis and characterization of nanomaterials.
C111.5	The course has able to illustrate the sources, causes and water analysis and Understanding the theory, basic principle, and applications of volumetric analysis and analytical instruments.

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Sub: Problem-Solving through Programming   **Sub. Code:** 21PSP13/23

After successful completion of the course, the student will be able to:

CO	Description
C112.1	Explain the basic architecture and functionalities of a Computer and familiar with elements of C-Program.
C112.2	Understand and Apply Programming constructs of C language to solve the real-world problems.
C112.3	Explore user-defined data structures like arrays in implementing solution to searching, sorting and other problems.
C112.4	Design and Develop Solutions to problems using modular programming constructs using functions.
C112.5	Explore user-Defined data structures like structures, unions and pointers in implementing solution to the problems.

Sub: Basic Electronics & Communication Engineering   **Sub. Code:** 21ELN14/24

After successful completion of the course, the student will be able to:

CO	Description
C113.1	Describe the concepts of electronic circuits encompassing power supplies, amplifiers and oscillators.
C113.2	Present the basics of digital logic engineering including data representation, circuits and the microcontroller system with associated sensors and actuators.
C113.3	Discuss the characteristics and technological advances of embedded systems.
C113.4	Relate to the fundamentals of communication engineering spanning from the frequency spectrum to the various circuits involved including antennas.
C113.5	Explain the different modes of communications from wired to ireless and the computing involved.

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| FIRST YEAR |
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Sub: Elements of Mechanical Engineering   **Sub. Code:** 21ME15/25

After successful completion of the course, the student will be able to:

CO	Description
C114.1	Understanding the role & contribution of Mechanical Engineering for society, industry and GDP. Interpret the concepts of energy, its sources and conversionsand comprehend the basic concepts of thermodynamics& its properties during the steam formation. Understand and differentiate the working principle of hydraulic turbines and pumps.
C114.2	Understanding the compositions, properties & applications of common engineering materials, metal joining processes and modes of heat transfer and its applications.
C114.3	Differentiate the working principle of internal combustion engines and understand the applications of engines and future mobility technologies such as electrical and hybrid vehicles. Understanding the refrigeration and air conditioning systems and their applications.
C114.4	Understand themechanical power transmission systems and linkages and their applications. Understanding the basics of robotics and its applications & usage.
C114.5	Understand the conventional metal removing principles, processes and advanced manufacturing systems and their machines. Understanding the basics of mechatronics

Sub: Engineering Chemistry Laboratory   **Sub. Code:** 21CHEL16/26

After successful completion of the course, the student will be able to:

CO	Description
C115.1	The course able to Determine the pKa and coefficient of Viscosity of a given organic liquid.
C115.2	The course able to Estimate the amount of substance present in the given solution using Potentiometer Conductometric and Colorimetric.
C115.3	The course able to Determine the total hardness and chemical oxygen demand in the given solution by volumetric analysis method.
C115.4	The course able to Estimate the percentage of Nickel, copper and Iron in the given analytical solution by titration method.
C115.5	The course able to Demonstrate flame photometric estimation of sodium & potassium and the synthesis of nonmaterial's by Precipitation method.

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Sub: Computer Programming Laboratory   **Sub. Code:** 21CPL17/27

After successful completion of the course, the student will be able to:

CO	Description
C116.1	Define the problem statement and identify the need for computer programming
C116.2	Make use of C compiler, IDE for programming, identify and correct the syntax and syntactic errors in programming
C116.3	Develop algorithm, flowchart and write programs to solve the given problem
C116.4	Demonstrate use of functions, recursive functions, arrays, strings, structures and pointers in problem solving.
C116.5	Document the inference and observations made from the implementation.

Sub: Professional writing skills in English   **Sub. Code:** 21EGH28

After successful completion of the course, the student will be able to:

CO	Description
C117.1	Understand and apply the Fundamentals of Communication Skills in their communication skills.
C117.2	Identify the nuances of phonetics, intonation and enhance pronunciation skills.
C117.3	To impart basic English grammar and essentials of language skills as per present requirement.
C117.4	Understand and use all types of English vocabulary and language proficiency.
C117.5	Adopt the Techniques of Information Transfer through presentation.

Scientific Foundation of Health   **Sub. Code:** 21SFH29

After successful completion of the course, the student will be able to:

CO	Description
C118.1	Appreciate various design process procedure
C118.2	Generate and develop design ideas through different technique
C118.3	Identify the significance of reverse Engineering to Understand products
C118.4	Draw technical drawing for design ideas
C118.5	Empathizing prototyping & testing

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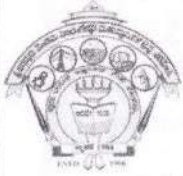
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	Programmes Accredited by NBA: CSE, ECE	

III SEMESTER

SUB: Mathematics for Computer Science   Sub Code: BCS301

After successful completion of this course, the students will be able to:

CO	Description
C201.1	Explain the basic concepts of probability, random variables, probability distribution
C201.2	Apply suitable probability distribution models for the given scenario.
C201.3	Apply the notion of a discrete-time Markov chain and n-step transition probabilities to solve the given problem
C201.4	Use statistical methodology and tools in the engineering problem-solving process. Compute the confidence intervals for the mean of the population.
C201.5	Apply the ANOVA test related to engineering problems.

SUB: Digital Design and Computer Organization   Sub Code: BCS302

After successful completion of this course, the students will be able to:

CO	Description
C202.1	Apply the K–Map techniques to simplify various Boolean expressions.
C202.2	Design different types of combinational and sequential circuits along with Verilog programs.
C202.3	Describe the fundamentals of machine instructions, addressing modes and Processor performance.
C202.4	Explain the approaches involved in achieving communication between processor and I/O devices.
C202.5	Analyze internal Organization of Memory and Impact of cache/Pipelining on Processor Performance.

SUB: Operating Systems   Sub Code: BCS303

After successful completion of this course, the students will be able to:

CO	Description
C203.1	Explain the structure and functionality of operating system
C203.2	Apply appropriate CPU scheduling algorithms for the given problem.
C203.3	Analyze the various techniques for process synchronization and deadlock handling
C203.4	Apply the various techniques for memory management
C203.5	Explain file and secondary storage management strategies.
C203.6	Describe the need for information protection mechanisms

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	Programmes Accredited by NBA: CSE, ECE	**2022 Scheme**

SUB: Data Structures and Applications　　　　　　　　　Sub Code: BCS304

After successful completion of this course, the students will be able to:

CO	Description
C204.1	Explain different data structures and their applications.
C204.2	Apply Arrays, Stacks and Queue data structures to solve the given problems.
C204.3	Use the concept of linked list in problem solving.
C204.4	Develop solutions using trees and graphs to model the real-world problem.
C204.5	Explain the advanced Data Structures concepts such as Hashing Techniques and Optimal Binary Search Trees.

SUB: Data Structures Laboratory　　　　　　　　　Sub Code: BCSL305

After successful completion of this course, the students will be able to:

CO	Description
C205.1	Analyze various linear and non-linear data structures
C205.2	Demonstrate the working nature of different types of data structures and their applications
C205.3	Use appropriate searching and sorting algorithms for the given scenario.
C205.4	Apply the appropriate data structure for solving real world problems
C205.5	Analyze various linear and non-linear data structures

SUB: Object Oriented Programming with Java　　　　　　Sub Code: BCS306A

After successful completion of this course, the students will be able to:

CO	Description
C206.1	Demonstrate proficiency in writing simple programs involving branching and looping structures.
C206.2	Design a class involving data members and methods for the given scenario.
C206.3	Apply the concepts of inheritance and interfaces in solving real world problems.
C206.4	Use the concept of packages and exception handling in solving complex problem.
C206.5	Apply concepts of multithreading, autoboxing and enumerations in program development.

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| CSE |
| NBA |
| Course Outcomes |
| 2022 Scheme |

SUB: Social Connect & Responsibility   Sub Code: BSCK307

After successful completion of this course, the students will be able to:

CO	Description
C208.1	Communicate and connect to the surrounding.
C208.2	Create a responsible connection with the society.
C208.3	Involve in the community in general in which they work.
C208.4	Notice the needs and problems of the community and involve them in problem – solving.
C208.5	Develop among themselves a sense of social & civic responsibility & utilize their knowledge in finding practical solutions to individual and community problems.
C208.6	Develop competence required for group-living and sharing of responsibilities & gain skills in mobilizing community participation to acquire leadership qualities and democratic attitudes.

SUB: Data Visualization with Python   Sub Code: BCS358D

After successful completion of this course, the students will be able to:

CO	Description
C212.1	Demonstrate the use of IDLE or PyCharm IDE to create Python Applications
C212.2	Use Python programming constructs to develop programs for solving real-world problems
C212.3	Use Matplotlib for drawing different Plots
C212.4	Demonstrate working with Seaborn, Bokeh for visualization.
C212.5	Use Plotly for drawing Time Series and Maps.

H.O.D
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Course Outcomes of all third Semester courses of 2022 scheme

Subject: **AV Mathematics-III for EC Engineering**   Sub Code: BMATEC301

After successful completion of this course, the students will be able to;

CO	Description
C201.1	Demonstrate the Fourier series to study the behavior of periodic functions and their applications in system communications, digital signal processing, and field theory.
C201.2	To use Fourier transforms to analyze problems involving continuous-time signals
C201.3	To apply Z-Transform techniques to solve difference equations
C201.4	Understand that physical systems can be described by differential equations and solve such equations
C201.5	Make use of correlation and regression analysis to fit a suitable mathematical model for statistical data

Subject: **Digital System Design Using Verilog**   Sub Code: BEC302

After successful completion of this course, the students will be able to;

CO	Description
C202.1	Simplify Boolean functions using K-map & Quine-McCluskey minimization technique.
C202.2	Analyze and design MSI Components.
C202.3	Analyze the concepts of Flip Flops (SR, D, T & JK) and design the synchronous sequential circuits using flip flops.
C202.4	Understand the concept of verilog data flow description.
C202.5	Describe the verilog behavioral & structural description.

Subject: **Electronic Principles and Circuits**   Sub Code: BEC303

After successful completion of this course, the students will be able to;

CO	Description
C203.1	Understand the characteristics of BJTs and FETs for switching and amplifier circuits.
C203.2	Design and analyze amplifiers and oscillators with different circuit configurations and biasing conditions.
C203.3	Understand the feedback topologies and approximations in the design of amplifiers and oscillators.
C203.4	Design of circuits using linear ICs for wide range applications such as ADC, DAC, filters and timers.
C203.5	Understand the power electronic device components and its functions for basic power electronic circuits.

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Subject: **Network Analysis**   Sub Code: BEC304

After successful completion of this course, the students will be able to;

CO	Description
C204.1	Determine currents and voltages using source transformation/source shifting/mesh/nodal analysis and reduce given network using star delta transformation/source transformation / source shifting.
C204.2	Solve network problems by applying superposition/Reciprocity/Thevenin's Norton's/Maximum power transfer/Milliman's network theorems and electrical laws to reduce circuit complexities and to arrive at feasible solutions.
C204.3	Calculate current and voltage for the given circuit under transient conditions.
C204.4	Apply Laplace transform to solve the given network.
C204.5	Evaluate for RLC elements/frequency response related parameters like resonant frequency, quality factor, half power frequencies, voltage across inductor and capacitor, current through RLC elements in resonant circuits.

Subject: **Analog and Digital Electronics Lab**   Sub Code: BECL305

After successful completion of this course, the students will be able to;

CO	Description
C205.1	Design and analyze the BJT/FET amplifier and oscillator circuits.
C205.2	Design and test Op-amp circuits to realize the mathematical computations, DAC and precision rectifiers.
C205.3	Design and test the combinational logic circuits for the given specifications.
C205.4	Test the sequential logic circuits for the given functionality.
C205.5	Demonstrate the basic circuit experiments using 555 timers.

Subject: **Sensors and Instrumentation**   Sub Code: BEC306B

After successful completion of this course, the students will be able to;

CO	Description
C207.1	Understand the material properties required to make sensors.
C207.2	Describe the manufacturing process of sensors
C207.3	Analyze the instrument characteristics and errors.
C207.4	Describe the principle of operation and develop circuits for multirange Ammeters, Voltmeters and Bridges to measure passive component values and frequency.
C207.5	Understand the principle of transducers for measuring physical parameters.

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	Inculcating Values, Promoting Prosperity	Course_Outcomes
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Subject: **MATLAB Programming**   Sub Code: BEC358B

After successful completion of this course, the students will be able to;

CO	Description
C212.1	Understand the syntax of MATLAB for arithmetic computations, arrays, matrices. for the given specifications
C212.2	Understand the built in function, saving and loading data, and create plots corrupted bandlimited channels.
C212.3	Create program using symbolic computations, Importing and exporting data and files
C212.4	Create program using character strings, Command line functions and Built-in functions.

Criteria Coordinator   **Programme Coordinator**   **HOD**

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EEE

Course Outcome

2022 Scheme

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

Course Outcomes for 2022 Scheme Syllabus

Course Outcomes for 3ʳᵈ Semester

Sub: Engineering Mathematics for EEE   **Sub. Code:** BMATE301

After successful completion of the course, the student will be able to:

CO	Description
C201.1	Understand that physical systems can be described by differential equations and solve such equations.
C201.2	Make use of correlation and regression analysis to fit a suitable mathematical model for statistical data
C201.3	Demonstrate the Fourier series to study the behavior of periodic functions and their Applications in system communications, digital signal processing, and field theory.
C201.4	To use Fourier transforms to analyze problems involving continuous-time signals and to apply Z-Transform techniques to solve difference equations.
C201.5	Apply discrete and continuous probability distributions in analyzing the probability models arising in the engineering field. Demonstrate the validity of testing the hypothesis

Sub: Electric Circuit Analysis   **Sub. Code:** BEE302

After successful completion of the course, the student will be able to:

CO	Description
C202.1	Apply the basic concepts, basic laws and methods of analysis of DC and AC networks and reduce the complexity of network reduction using source shifting, source transformation and network reduction using transformations.
C202.2	Analyze complex electric circuits using network theorems.
C202.3	Discuss resonance in series and parallel circuits and also the importance of initial conditions and their evaluation.
C202.4	Develop solutions of electrical network using Laplace transformation.
C202.5	Discuss unbalanced three phase systems and also evaluate the performance of two port networks.

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| EEE |
| Course Outcome |
| 2022 Scheme |

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

Sub: Analog Electronic Circuits   **Sub. Code:** BEE303

After successful completion of the course, the student will be able to:

CO	Description
C203.1	Obtain characteristics of clipper and clamper circuits, design transistor biasing circuits and analyze bias stabilization and stability factors.
C203.2	Analyze transistor amplifier and its frequency response with low frequency signals.
C203.3	Explain concepts of multistage amplifiers and feedback amplifiers.
C203.4	Design and analyze different power amplifier circuits and oscillators.
C203.5	Explain the construction, working, characteristics and biasing of JFET and MOSFET.

Sub: Transformers and Generators   **Sub. Code:** BEE304

After successful completion of the course, the student will be able to:

CO	Description
C204.1	Explain the construction, working and evaluate the performance of single phase Transformer.
C204.2	Explain the construction, working, connection types and parallel operation of three phase Transformer and discuss about Autotransformer and Tap changing transformer.
C204.3	Explain the construction, working and analysis of Synchronous Generator and also evaluate the performance of Salient Pole Synchronous Generator.
C204.4	Explain the construction, working and types of wind and solar power generators.

Sub: Transformers and Generators Lab   **Sub. Code:** BEEL305

After successful completion of the course, the student will be able to:

CO	Description
C205.1	Conduct suitable test on single phase step up or step down transformer and predetermine efficiency and regulation and equivalent circuit parameters.
C205.2	Conduct various tests on transformers and synchronous machines and evaluate their performance.
C205.3	Calculate the voltage regulation of an alternator using different methods for comparison.
C205.4	Model the transformer for automatic voltage regulation and simulate power angle curve of synchronous generator using MATLAB.

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DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

Sub: Digital Logic Circuit   **Sub. Code:** BEE306A

After successful completion of the course, the student will be able to:

CO	Description
C206.1	Explain the concept of combinational and sequential logic circuits.
C206.2	Analyze and design combinational circuits.
C206.3	Describe and characterize flip flops and its applications.
C206.4	Design the sequential circuits using SR, JK, D and T flip-flops and Melay and Moore applications.
C206.5	Design applications of combinational and Sequential circuits also employ the digital circuits for different applications.

Sub: 555 IC Laboratory   **Sub. Code:** BEEL358B

After successful completion of the course, the student will be able to:

CO	Description
C212.1	Analyze in an intelligent manner, think better, and perform better.

29.2.24

Dr. B. V. Mediggond

Prof. & Head   BE,ME,Ph.D
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Course Outcomes of all the courses of 3rd semester
CBCS 2022 Scheme
III-SEM

Subject: Mechanics of Materials   **Sub. Code: PCC - BME301**

After successful completion of this course, the students will be able to;

CO	Description
C201.1	Understand the concepts of stress and strain in simple and compound bars.
C201.2	Explain the importance of principal stresses and principal planes & analyze cylindrical pressure vessels under various loadings
C201.3	Apply the knowledge to understand the load transferring mechanism in beams and stress distribution due to shearing force and bending moment.
C201.4	Evaluate stresses induced in different cross-sectional members subjected to shear loads.
C201.5	Apply basic equation of simple torsion in designing of circular shafts & Columns

Subject: Manufacturing Process   **Subject Code: IPCC- BME302**

After successful completion of this course, the students will be able to;

CO	Description
C202.1	Classify manufacturing process and elaborate the parts of casting process.
C202.2	Summarize the different casting process and select the melting furnace based on ferrous and non-ferrous alloys.
C202.3	Understand the classification of various forming process like forging, rolling, extrusion, wire drawing and sheet metal processes.
C202.4	List and explain different types of conventional welding processes like Arc and Gas welding processes
C202.5	Explain different special types of advance welding processes, soldering, brazing and adhesive bonding.

Subject: Material Science and Engineering   **Subject Code: IPCC- BME303**

After successful completion of this course, the students will be able to;

CO	Description
C203.1	Understand the atomic arrangement in crystalline materials and describe the periodic arrangement of atoms in terms of unit cell parameters.
C203.2	Understand the importance of phase diagrams and the phase transformations.
C203.3	Explain various heat treatment methods for controlling the microstructure.
C203.4	Correlate between material properties with component design and identify various kinds of defects.
C203.5	Apply the method of materials selection, material data and knowledge sources for computer-aided selection of materials.

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Subject: Basic Thermodynamics   **Subject Code: PCC- BME304**

After successful completion of this course, the students will be able to;

CO	Description
C204.1	Explain fundamentals of thermodynamics and evaluate energy interactions across the boundary of thermodynamic systems.
C204.2	Apply 1st law of thermodynamics to closed and open systems and determine quantity of energy transfers.
C204.3	Evaluate the feasibility of cyclic and non-cyclic processes using 2nd law of thermodynamics
C204.4	Apply the knowledge of entropy, reversibility and irreversibility to solve numerical problems and Interpret the behaviour of pure substances and its application in practical problems.
C204.5	Recognize differences between ideal and real gases and evaluate thermodynamic properties of ideal and real gas mixtures using various relations.

Subject: Introduction to Modelling and Design for Manufacturing   **Subject Code: PCCL - BMEL305**

After successful completion of this course, the students will be able to;

CO	Description
C205.1	Create and modify a form-based design.
C205.2	Use design tools for moulded parts.
C205.3	Demonstrate proficiency in the setup and creation of a design.
C205.4	Simulate the assembly of machine components in 3D environment.

Subject: Smart Materials & Systems   **Subject Code: ESC - BME306B**

After successful completion of this course, the students will be able to;

CO	Description
C207.1	Understand, and apply the smart materials structure, components, stimuli-response for various applications and select and justify appropriate materials for specific applications
C207.2	Understand and analyze the basic principles, properties and classifications of various electrically activated materials and their applications and evaluate based on the stimuli and actuation
C207.3	Understand and analyze the basic principles, properties and classifications of various thermally activated materials and their applications and evaluate based on the stimuli and actuation
C207.4	Understand and analyze the basic principles, properties and classifications of various smart polymers and their applications and evaluate based on the stimuli and actuation
C207.5	Understand and analyze the basic principles, properties and classifications of various chemically activated materials and their applications and evaluate based on the stimuli and actuation

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Mech. Engg. Dept.
Academic
Course Outcome
AY: 2022-23

Subject: Social Connect and Responsibility   **Subject Code: UHV - BSCK307**

After successful completion of this course, the students will be able to;

CO	Description
C210.1	Develop an eco-friendly relationship for saving the natural resources and preservation of nature.
C210.2	Develop multicultural awareness and appreciation for Music and Drama by exposing learners to various forms of Art.
C210.3	Understand the concept of agricultural operations.
C210.4	Develop an eco-friendly relationship for saving the natural resources and preservation of nature.
C210.5	Describe the regional culinary practices and its importance in day-to-day life

Subject: Advanced Python Programming   **Subject Code: AEC/ SEC - BME358A**

After successful completion of this course, the students will be able to;

CO	Description
C211.1	Develop algorithmic solutions to simple computational problems
C211.2	Develop and execute simple Python programs.
C211.3	Use functions to decompose a Python program.
C211.4	Process compound data using Python data structures
C211.5	Utilize Python packages in developing software applications

Head of the Dept.
Mechanical Engg.
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List of Course Outcomes for All Courses

Course Outcomes for 1ˢᵗ Semester

Subject: Mathematics- I for CSE Stream   Sub Code: BMATS101

After successful completion of this course, the students will be able to;

CO	Description
C101.1	Apply the knowledge of calculus to solve problems related to polar curves and learn the notion of partial differentiation to compute rate of change of multivariate functions.
C101.2	Analyze the solution of linear and nonlinear ordinary differential equations.
C101.3	Apply to get acquainted and to apply modular arithmetic to computer algorithms.
C101.4	Make use of matrix theory for solving for system of linear equations and compute eigenvalues and eigenvectors
C101.5	Familiarize with modern mathematical tools namely MATHEMATICA/MATLAB/ PYTHON/ SCILAB

Subject: Mathematics-I for EEE Stream   Sub Code: BMATE101

After successful completion of this course, the students will be able to;

CO	Description
C102.1	Apply the knowledge of calculus to solve problems related to polar curves and learn the notion of partial differentiation to compute rate of change of multivariate functions.
C102.2	Learn the notion of partial differentiation to calculate rate of change of multivariate functions and solve problems related to composite functions and Jacobian.
C102.3	Solve first-order linear/nonlinear ordinary differential equations analytically through standard methods.
C102.4	Apply the concept of change of order of integration and variables to evaluate multiple integrals and their usage in computing area and volume
C102.5	Make use of matrix theory for solving for system of linear equations and compute eigenvalues and eigenvectors

Subject: Mathematics-I for ME Stream   Sub Code: BMATM101

After successful completion of this course, the students will be able to;

CO	Description
C103.1	Apply the knowledge of calculus to solve problems related to polar curves and learn the notion of partial differentiation to compute rate of change of multivariate functions
C103.2	Learn the notion of partial differentiation to calculate rate of change of multivariate functions and solve problems related to composite functions and Jacobian.
C103.3	Solve first-order linear/nonlinear ordinary differential equations analytically through standard methods.
C103.4	Demonstrate various models through higher order differential equations and solve such linear ordinary differential equations.
C103.5	Make use of matrix theory for solving for system of linear equations and compute Eigen values and eigenvectors

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Subject: Mathematics-I for Civil Stream   Sub Code: BMATC101

After successful completion of this course, the students will be able to;

CO	Description
C104.1	Apply the knowledge of calculus to solve problems related to polar curves and learn the notion of partial differentiation to compute rate of change of multivariate functions
C104.2	Learn the notion of partial differentiation to calculate rate of change of multivariate functions and solve problems related to composite functions and Jacobian.
C104.3	Solve first-order linear/nonlinear ordinary differential equations analytically through standard methods.
C104.4	Demonstrate various models through higher order differential equations and solve such linear ordinary differential equations.
C104.5	Make use of matrix theory for solving for system of linear equations and compute Eigen values and eigenvectors

Subject: Applied Physics for CSE Stream   Sub Code: BPHYS102

After successful completion of this course, the students will be able to;

CO	Description
C105.1	Describe the principles of LASERS and Optical fibers and theirrelevant applications.
C105.2	Discuss the basic principles of the Quantum Mechanics and its application in Quantum Computing.
C105.3	Summarize the essential properties of superconductorsand its applications in qubits.
C105.4	Illustrate the application of physics in design and data analysis.
C105.5	Practice working in groups to conduct experiments in physics and perform precise and honest measurements.

Subject: Applied Physics for EEE Stream   Sub Code: BPHYE102

After successful completion of this course, the students will be able to;

CO	Description
C106.1	Describe the principles of LASERS and Optical fibers and their relevant applications.
C106.2	Discuss the basic principles of the Quantum Mechanics and its application in Quantum Computing.
C106.3	Summarize the essential properties of superconductors and its applications in qubits.
C106.4	Illustrate the application of physics in design and data analysis.
C106.5	Practice working in groups to conduct experiments in physics and perform precise and honest measurements.

Subject: Applied Physics for ME Stream   Sub Code: BPHYM102

After successful completion of this course, the students will be able to;

CO	Description
C107.1	Describe the types of oscillations and applications of shock waves.
C107.2	Discuss the advanced elastic materials, beams with number of advantages.
C107.3	Illustrate the application of thermoelectric materials.
C107.4	Illustrate the application Cryogenics, in Aerospace and Food process
C107.5	Practice working in groups to conduct experiments in physics and perform precise and honest measurements.

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Subject: Applied Physics for CV Stream   Sub Code: BPHYC102

After successful completion of this course, the students will be able to;

CO	Description
C108.1	Describe the types of oscillations and applications of shock waves.
C108.2	Discuss the advanced elastic materials, beams with number of advantages.
C108.3	Impact of Noise in Multi-storied buildings.
C108.4	Describe the principle of laser and optical fibers and their relevant applications
C108.5	Practice working in groups to conduct experiments in physics and perform precise and honest measurements.

Subject: Applied Chemistry for Civil Stream   Sub Code: BCHEC102

After successful completion of this course, the students will be able to;

CO	Description
C109.1	Describe the types of oscillations and applications of shock waves.
C109.2	Discuss the advanced elastic materials, beams with number of advantages.
C109.3	Impact of Noise in Multi-storied buildings.
C109.4	Describe the principle of laser and optical fibers and their relevant applications
C109.5	Practice working in groups to conduct experiments in physics and perform precise and honest measurements.

Subject: Applied Chemistry for CSE Stream   Sub Code: BCHES102

After successful completion of this course, the students will be able to;

CO	Description
C110.1	Identify the terms and processes involved in scientific and engineering applications
C110.2	Explain the phenomena of chemistry to describe the methods of engineering processes
C110.3	Solve for the problems in chemistry that are pertinent in engineering applications
C110.4	Apply the basic concepts of chemistry to explain the chemical properties and processes
C110.5	Analyze properties and processes associated with chemical substances in multidisciplinary situations

Subject: Applied Chemistry for EEE Stream   Sub Code: BCHEE102

After successful completion of this course, the students will be able to;

CO	Description
C111.1	Identify the terms and processes involved in scientific and engineering applications
C111.2	Explain the phenomena of chemistry to describe the methods of engineering processes
C111.3	Solve for the problems in chemistry that are pertinent in engineering applications
C111.4	Apply the basic concepts of chemistry to explain the chemical properties and processes
C111.5	Analyze properties and processes associated with chemical substances in multidisciplinary situations

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Subject: Applied Chemistry for ME Stream   Sub Code: BCHEM102

After successful completion of this course, the students will be able to;

CO	Description
C112.1	Identify the terms and processes involved in scientific and engineering applications
C112.2	Explain the phenomena of chemistry to describe the methods of engineering processes
C112.3	Solve for the problems in chemistry that are pertinent in engineering applications
C112.4	Apply the basic concepts of chemistry to explain the chemical properties and processes
C112.5	Analyze properties and processes associated with chemical substances in multidisciplinary situations

Subject: Principle of Programming using C   Sub Code: BPOPS103

After successful completion of this course, the students will be able to;

CO	Description
C117.1	Elucidate the basic architecture and functionalities of a computer and alsorecognize
C117.2	Apply programming constructs of C language to solve the real worldproblem
C117.3	Explore user-defined data structures like arrays in implementing solutionsto problems like searching and sorting
C117.4	Explore user-defined data structures like structures, unions and pointers inimplementing solutions
C117.5	Design and Develop Solutions to problems using modular programmingconstructs using functions

Subject: Elements of Electrical Engineering   Sub Code: BEEE103

After successful completion of this course, the students will be able to;

CO	Description
C118.1	Understand the concepts of DC circuits and Electromagnetism.
C118.2	Understand the concepts of single phase AC circuits.
C118.3	Analyze the concepts of Three phase AC circuits.
C118.4	Understand the concepts of measurements and measuring Instruments
C118.5	Explain the concepts of domestic wiring, electricity billing, circuitprotective devices and personal safety measures.

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Subject: Elements Of Civil Engineering & Mechanics   Sub Code: BEMEM103

After successful completion of this course, the students will be able to;

CO	Description
C121.1	Describing the basics of civil engineering, its scope of study, knowledge about roads, bridges and dams. Understanding the action of forces, moments and other loads on systems of rigid bodies.
C121.2	Understanding the concept of equilibrium and friction- Static and Dynamic.
C121.3	Analyzing and Interpreting the reactive forces and the effects those develop as a result of external loads on beams and trusses.
C121.4	Finding the centroid and moment of inertia of composite, plane and curved figures.
C121.5	Describing the basics of kinematics and kinetics, different types of motions. Analyzing the motion of the body

Subject: Elements of Mechanical Engineering   Sub Code: BEMEM103

After successful completion of this course, the students will be able to;

CO	Description
C120.1	Explain the role of mechanical engineering in industry and society, fundamentals of steam and non-conventional energy sources
C120.2	Describe different conventional and advanced machining processes, IC engines, propulsive devices, air-conditioning, and refrigeration.
C120.3	Explain different gear drives, gear trains, aspects of future mobility and fundamentals of robotics
C120.4	Determine the condition of steam and its energy, performance parameters of IC engines, velocity ratio and power transmitted through power transmission systems.
C120.5	Apply the skills in developing simple mechanical elements and processes

Subject: Computer-Aided Engineering Drawing   Sub Code: BCEDK103

After successful completion of this course, the students will be able to;

CO	Description
C122.1	Draw and communicate the objects with definite shape and dimensions
C122.2	Recognize and Draw the shape and size of objects through different views
C122.3	Develop the lateral surfaces of the object
C122.4	Create a 3D views using CAD software
C122.5	Identify the interdisciplinary engineering components or systems through its graphical representation

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Subject: Communicative English   Sub Code: BENGK106

After successful completion of this course, the students will be able to;

CO	Description
C123.1	Understand and apply the Fundamentals of Communication Skills in their communication skills.
C123.2	Identify the nuances of phonetics, intonation and enhance pronunciation skills.
C123.3	To impart basic English grammar and essentials of language skills as per present requirement.
C123.4	Understand and use all types of English vocabulary and language proficiency.
C123.5	Adopt the Techniques of Information Transfer through presentation.

Subject: Professional Writing Skills in English   Sub Code: BPWSK206

After successful completion of this course, the students will be able to;

CO	Description
C124.1	To understand and identify the Common Errors in Writing and Speaking.
C124.2	To Achieve better Technical writing and Presentation skills.
C124.3	To read Technical proposals properly and make them to Write good technical reports.
C124.4	Acquire Employment and Workplace communication skills.
C124.5	To learn about Techniques of Information Transfer through presentation in different level.

Subject: Samskrutika Kannada   Sub Code: BKSKK107

After successful completion of this course, the students will be able to;

CO	Description
C125.1	ವೃತ್ತಿಪರ ಪದವಿ ವಿದ್ಯಾರ್ಥಿಗಳಾಗಿರುವುದರಿಂದ ಕನ್ನಡ ಭಾಷೆ, ಸಾಹಿತ್ಯ ಮತ್ತು ಕನ್ನಡದ ಸಂಸ್ಕೃತಿಯ ಪರಿಚಯ ಮಾಡಿಕೊಡುವುದು
C125.2	ಕನ್ನಡ ಸಾಹಿತ್ಯದ ಪ್ರಧಾನ ಭಾಗವಾದ ಆಧುನಿಕ ಪೂರ್ವ ಮತ್ತು ಆಧುನಿಕ ಕಾವ್ಯಗಳನ್ನು ಸಾಂಕೇತಿಕವಾಗಿ ಪರಿಚಯಿಸಿ ವಿದ್ಯಾರ್ಥಿಗಳಲ್ಲಿ ಸಾಹಿತ್ಯ ಮತ್ತು ಸಂಸ್ಕೃತಿಯ ಬಗ್ಗೆ ಅರಿವು ಹಾಗೂ ಆಸಕ್ತಿಯನ್ನು ಮೂಡಿಸುವುದು
C125.3	ತಾಂತ್ರಿಕ ವ್ಯಕ್ತಿಗಳ ಪರಿಚಯವನ್ನು ಹಾಗೂ ಅವರುಗಳ ಸಾಧಿಸಿದ ವಿಷಯಗಳನ್ನು ಪರಿಚಯಿಸುವುದು
C125.4	ಕನ್ನಡ ಶಬ್ದಸಂಪತ್ತಿನ ಪರಿಚಯ ಮತ್ತು ಕನ್ನಡ ಭಾಷೆಯ ಬಳಕೆ ಹಾಗೂ ಕನ್ನಡದಲ್ಲಿ ಪತ್ರ ವ್ಯವಹಾರವನ್ನು ತಿಳಿಸಿಕೊಡುವುದು
C125.5	ಕನ್ನಡ ಸಾಹಿತ್ಯದ ಆಧುನಿಕ ಪೂರ್ವ ಮತ್ತು ಆಧುನಿಕ ಕಾವ್ಯಗಳು ಮತ್ತು ಸಂಸ್ಕೃತಿಯ ಬಗ್ಗೆ ಆಸಕ್ತಿಯು ಮೂಡುತ್ತದೆ

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Subject: Balake Kannada   Sub Code: BKBKK107

After successful completion of this course, the students will be able to;

CO	Description
C126.1	To understand the necessity of learning of local language for comfortable life
C126.2	To Listen and understand the Kannada language properly
C126.3	To speak, read and write Kannada language as per requirement
C126.4	To communicate (converse) in Kannada language in their daily life with kannada speakers
C126.5	To speak in polite conservation.

Subject: Indian Constitution   Sub Code: BICOK107

After successful completion of this course, the students will be able to;

CO	Description
C127.1	Analyse the basic structure of Indian Constitution.
C127.2	Remember their Fundamental Rights, DPSP's and Fundamental Duties(FD's) of our constitution.
C127.3	Know about our Union Government, political structure & codes,procedures.
C127.4	Understand our State Executive & Elections system of India.
C127.5	Remember the Amendments and Emergency Provisions, other importantprovisions given by the constitution

Subject: Innovation and Design Thinking   Sub Code: BIDTK158

After successful completion of this course, the students will be able to;

CO	Description
C128.1	Appreciate various design process procedure
C128.2	Generate and develop design ideas through differenttechnique
C128.3	Identify the significance of reverse Engineering to Understand products
C128.4	Draw technical drawing for design ideas
C128.5	Empathizing prototyping & testing

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Subject: Scientific Foundation of Health   Sub Code: BSFHK158

After successful completion of this course, the students will be able to;

CO	Description
C129.1	To know about Health and wellness (and its Beliefs) & It's balance for positive mindset.
C129.2	To Build the healthy lifestyles for good health for their better future.
C129.3	To Create a Healthy and caring relationships to meet the requirements ofgood/social/ positive life.
C129.4	To learn about Avoiding risks and harmful habits in their campus and outsidethe campus for their bright future
C129.5	To Prevent and fight against harmful diseases for good health through positivemindset

Subject: Introduction to Electrical Engineering   Sub Code: BESCK104B

After successful completion of this course, the students will be able to;

CO	Description
C131.1	Understand the concepts of various energy sources and Electric circuits.
C131.2	Apply the basic Electrical laws to solve circuits.
C131.3	Discuss the construction and operation of various Electrical Machines.
C131.4	Identify suitable Electrical machine for practical implementation.
C131.5	Explain the concepts of electric power transmission and distribution, electricity billing, circuit protective devices and personal safety measures.

Subject: Introduction to Electronics Engineering   Sub Code: BESCK104C

After successful completion of this course, the students will be able to;

	Description
C132.1	Describe the concepts of electronic circuits encompassing power supplies and amplifiers.
C132.2	Explain different types oscillators and operational amplifiers.
C132.3	Present the basics of boolean algebra and digital logic circuits including combinational logic circuits design.
C132.4	Discuss the characteristics and technological advances of embedded systems.
C132.5	Describe the characteristics and technological advances of embedded systems

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Subject: Introduction to C Programming   Sub Code: BESCK104E

After successful completion of this course, the students will be able to;

CO	Description
C134.1	Elucidate the basic architecture and functionalities of a computer and also recognize the hardware parts
C134.2	Apply programming constructs of C language to solve the real world problem
C134.3	Explore user-defined data structures like arrays in implementing solutions to problems like searching and sorting.
C134.4	Explore user-defined data structures like arrays in implementing solutions to problems like searching and sorting
C134.5	Design and Develop Solutions to problems using modular programming constructs using functions

Subject: Renewable Energy Sources   Sub Code: BETCK105E

After successful completion of this course, the students will be able to;

CO	Description
C139.1	Describe the environmental aspects of renewable energy resources. In comparison with various conventional energy systems, their prospectus and limitations
C139.2	Describe the use of solar energy and various components used in the energy production with respect to applications like heating cooling, desalination, power generation.
C139.3	Understand the conversion principles of wind and tidal energy
C139.4	Understand the concept of biomass energy resources and green energy
C139.5	Acquire the basic knowledge of ocean thermal energy conversion and hydrogen energy

Subject: Introduction to Internet of Things (IOT)   Sub Code: BETCK105H

After successful completion of this course, the students will be able to;

CO	Description
C142.1	Describe the evolution of IoT, IoT networking components.
C142.2	Classify various sensing devices and actuator types.
C142.3	Demonstrate the processing in IoT.
C142.4	Explain Associated IOT Technologies
C142.5	Illustrate architecture of IOT Applications

Subject: Introduction to Cyber Security   Sub Code: BETCK205I

After successful completion of this course, the students will be able to;

CO	Description
C143.1	Explain the cybercrime terminologies
C143.2	Describe Cyber offenses and Botnets
C143.3	Illustrate Tools and Methods used on Cybercrime
C143.4	Explain Phishing and Identity Theft
C143.5	Justify the need of computer forensics

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Subject: Introduction to Python Programming   Sub Code: BPLCK105B

After successful completion of this course, the students will be able to;

CO	Description
C145.1	Demonstrate proficiency in handling loops and creation of functions.
C145.2	Identify the methods to create and manipulate lists, tuples and dictionaries.
C145.3	Develop programs for string processing and file organization.
C145.4	Interpret the concepts of Object-Oriented Programming as used in Python
C145.5	Implement the Object Oriented Programming concepts in Python

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	S J P N Trust's	First Year
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Course Outcomes for 2nd Semester

Subject: Mathematics- II for CSE Stream   Sub Code: BMATS201

After successful completion of this course, the students will be able to;

CO	Description
C113.1	Apply the concept of change of order of integration and variables to evaluate multiple integrals and their usage in computing area and volume
C113.2	Understand the applications of vector calculus refer to solenoidal, irrotational vectors, line integral and surface integral.
C113.3	Demonstrate the idea of Linear dependence and independence of sets in the vector space, and linear transformation
C113.4	Apply the knowledge of numerical methods in solving physical and engineering phenomena.
C113.5	Get familiarize with modern mathematical tools namely SCILAB/PYTHON/MATLAB

Subject: Mathematics-II for EEE Stream   Sub Code: BMATE201

After successful completion of this course, the students will be able to;

CO	Description
C114.1	Understand the applications of vector calculus refer to Solenoidal, irrotational vectors, line integral and surface integral.
C114.2	Demonstrate the idea of Linear dependence and independence of sets in the vector space, and linear transformation
C114.3	To understand the concept of Laplace transform and to solve initial value problems.
C114.4	Apply the knowledge of numerical methods in solving physical and engineering phenomena.
C114.5	Get familiarize with modern mathematical tools namely SCILAB/PYTHON/MATLAB

Subject: Mathematics-II for ME Stream   Sub Code: BMATM201

After successful completion of this course, the students will be able to;

CO	Description
C115.1	Apply the concept of change of order of integration and variables to evaluate multiple integrals and their usage in computing area and volume
C115.2	Understand the applications of vector calculus refer to Solenoidal, irrotational vectors, line integral and surface integral.
C115.3	Solve partial differential equations of fluid mechanics, electromagnetic theory and heat transfer.
C115.4	Apply the knowledge of numerical methods in solving physical and engineering phenomena.
C115.5	Get familiarize with modern mathematical tools namely SCILAB/PYTHON/MATLAB

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Subject: Mathematics-II for Civil Stream   Sub Code: BMATC201

After successful completion of this course, the students will be able to;

CO	Description
C116.1	Apply the concept of change of order of integration and variables to evaluate multiple integrals and their usage in computing area and volume
C116.2	Understand the applications of vector calculus refer to Solenoidal, irrotational vectors, line integral and surface integral.
C116.3	Solve partial differential equations of fluid mechanics, electromagnetic theory and heat transfer.
C116.4	Apply the knowledge of numerical methods in solving physical and engineering phenomena.
C116.5	Get familiarize with modern mathematical tools namely SCILAB/PYTHON/MATLAB

Subject: Applied Physics for CSE Stream   Sub Code: BPHYS202

After successful completion of this course, the students will be able to;

CO	Description
C105.1	Describe the principles of LASERS and Optical fibers and theirrelevant applications.
C105.2	Discuss the basic principles of the Quantum Mechanics and its application in Quantum Computing.
C105.3	Summarize the essential properties of superconductorsand its applications in qubits.
C105.4	Illustrate the application of physics in design and data analysis.
C105.5	Practice working in groups to conduct experiments in physics and perform precise and honest measurements.

Subject: Applied Physics for EEE Stream   Sub Code: BPHYE202

After successful completion of this course, the students will be able to;

CO	Description
C106.1	Describe the principles of LASERS and Optical fibers and their relevant applications.
C106.2	Discuss the basic principles of the Quantum Mechanics and its application in Quantum Computing.
C106.3	Summarize the essential properties of superconductors and its applications in qubits.
C106.4	Illustrate the application of physics in design and data analysis.
C106.5	Practice working in groups to conduct experiments in physics and perform precise and honest measurements.

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	S J P N Trust's	First Year
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Subject: Applied Physics for ME Stream   Sub Code: BPHYM202

After successful completion of this course, the students will be able to;

CO	Description
C107.1	Describe the types of oscillations and applications of shock waves.
C107.2	Discuss the advanced elastic materials, beams with number of advantages.
C107.3	Illustrate the application of thermoelectric materials.
C107.4	Illustrate the application Cryogenics, in Aerospace and Food process
C107.5	Practice working in groups to conduct experiments in physics and perform precise and honest measurements.

Subject: Applied Physics for CV Stream   Sub Code: BPHYC202

After successful completion of this course, the students will be able to;

CO	Description
C108.1	Describe the types of oscillations and applications of shock waves.
C108.2	Discuss the advanced elastic materials, beams with number of advantages.
C108.3	Impact of Noise in Multi-storied buildings.
C108.4	Describe the principle of laser and optical fibers and their relevant applications
C108.5	Practice working in groups to conduct experiments in physics and perform precise and honest measurements.

Subject: Applied Chemistry for Civil Stream   Sub Code: BCHEC202

After successful completion of this course, the students will be able to;

CO	Description
C109.1	Describe the types of oscillations and applications of shock waves.
C109.2	Discuss the advanced elastic materials, beams with number of advantages.
C109.3	Impact of Noise in Multi-storied buildings.
C109.4	Describe the principle of laser and optical fibers and their relevant applications
C109.5	Practice working in groups to conduct experiments in physics and perform precise and honest measurements.

Subject: Applied Chemistry for CSE Stream   Sub Code: BCHES202

After successful completion of this course, the students will be able to;

CO	Description
C110.1	Identify the terms and processes involved in scientific and engineering applications
C110.2	Explain the phenomena of chemistry to describe the methods of engineering processes
C110.3	Solve for the problems in chemistry that are pertinent in engineering applications
C110.4	Apply the basic concepts of chemistry to explain the chemical properties and processes
C110.5	Analyze properties and processes associated with chemical substances in multidisciplinary situations

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Subject: Applied Chemistry for EEE Stream   Sub Code: BCHEE202

After successful completion of this course, the students will be able to;

CO	Description
C111.1	Identify the terms and processes involved in scientific and engineering applications
C111.2	Explain the phenomena of chemistry to describe the methods of engineering processes
C111.3	Solve for the problems in chemistry that are pertinent in engineering applications
C111.4	Apply the basic concepts of chemistry to explain the chemical properties and processes
C111.5	Analyze properties and processes associated with chemical substances in multidisciplinary situations

Subject: Applied Chemistry for ME Stream   Sub Code: BCHEM202

After successful completion of this course, the students will be able to;

CO	Description
C112.1	Identify the terms and processes involved in scientific and engineering applications
C112.2	Explain the phenomena of chemistry to describe the methods of engineering processes
C112.3	Solve for the problems in chemistry that are pertinent in engineering applications
C112.4	Apply the basic concepts of chemistry to explain the chemical properties and processes
C112.5	Analyze properties and processes associated with chemical substances in multidisciplinary situations

Subject: Principle of Programming using C   Sub Code: BPOPS203

After successful completion of this course, the students will be able to;

CO	Description
C117.1	Elucidate the basic architecture and functionalities of a computer and alsorecognize
C117.2	Apply programming constructs of C language to solve the real worldproblem
C117.3	Explore user-defined data structures like arrays in implementing solutionsto problems like searching and sorting
C117.4	Explore user-defined data structures like structures, unions and pointers inimplementing solutions
C117.5	Design and Develop Solutions to problems using modular programmingconstructs using functions

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Subject: Elements of Electrical Engineering   Sub Code: BEEE203

After successful completion of this course, the students will be able to;

CO	Description
C118.1	Understand the concepts of DC circuits and Electromagnetism.
C118.2	Understand the concepts of single phase AC circuits.
C118.3	Analyze the concepts of Three phase AC circuits.
C118.4	Understand the concepts of measurements and measuring Instruments
C118.5	Explain the concepts of domestic wiring, electricity billing, circuitprotective devices and personal safety measures.

Subject: Elements Of Civil Engineering & Mechanics   Sub Code: BEMEM203

After successful completion of this course, the students will be able to;

CO	Description
C121.1	Describing the basics of civil engineering, its scope of study, knowledge about roads, bridges and dams. Understanding the action of forces, moments and other loads on systems of rigid bodies.
C121.2	Understanding the concept of equilibrium and friction- Static and Dynamic.
C121.3	Analyzing and Interpreting the reactive forces and the effects those develop as a result of external loads on beams and trusses.
C121.4	Finding the centroid and moment of inertia of composite, plane and curved figures.
C121.5	Describing the basics of kinematics and kinetics, different types of motions. Analyzing the motion of the body

Subject: Elements of Mechanical Engineering   Sub Code: BEMEM203

After successful completion of this course, the students will be able to;

CO	Description
C120.1	Explain the role of mechanical engineering in industry and society, fundamentals of steam and non-conventional energy sources
C120.2	Describe different conventional and advanced machining processes, IC engines, propulsive devices, air-conditioning, and refrigeration.
C120.3	Explain different gear drives, gear trains, aspects of future mobility and fundamentals of robotics
C120.4	Determine the condition of steam and its energy, performance parameters of IC engines, velocity ratio and power transmitted through power transmission systems.
C120.5	Apply the skills in developing simple mechanical elements and processes

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Subject: Computer-Aided Engineering Drawing   Sub Code: BCEDK203

After successful completion of this course, the students will be able to;

CO	Description
C122.1	Draw and communicate the objects with definite shape and dimensions
C122.2	Recognize and Draw the shape and size of objects through different views
C122.3	Develop the lateral surfaces of the object
C122.4	Create a 3D views using CAD software
C122.5	Identify the interdisciplinary engineering components or systems through its graphical representation

Subject: Communicative English   Sub Code: BENGK206

After successful completion of this course, the students will be able to;

CO	Description
C123.1	Understand and apply the Fundamentals of Communication Skills in their communication skills.
C123.2	Identify the nuances of phonetics, intonation and enhance pronunciation skills.
C123.3	To impart basic English grammar and essentials of language skills as per present requirement.
C123.4	Understand and use all types of English vocabulary and language proficiency.
C123.5	Adopt the Techniques of Information Transfer through presentation.

Subject: Professional Writing Skills in English   Sub Code: BPWSK206

After successful completion of this course, the students will be able to;

CO	Description
C124.1	To understand and identify the Common Errors in Writing and Speaking.
C124.2	To Achieve better Technical writing and Presentation skills.
C124.3	To read Technical proposals properly and make them to Write good technical reports.
C124.4	Acquire Employment and Workplace communication skills.
C124.5	To learn about Techniques of Information Transfer through presentation in different level.

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Subject: Samskrutika Kannada   Sub Code: BKSKK207

After successful completion of this course, the students will be able to;

CO	Description
C125.1	ವೃತ್ತಿಪರ ಪದವಿ ವಿದ್ಯಾರ್ಥಿಗಳಾಗಿರುವುದರಿಂದ ಕನ್ನಡ ಭಾಷೆ, ಸಾಹಿತ್ಯ ಮತ್ತು ಕನ್ನಡದ ಸಂಸ್ಕೃತಿಯ ಪರಿಚಯ ಮಾಡಿಕೊಡುವುದು
C125.2	ಕನ್ನಡ ಸಾಹಿತ್ಯದ ಪ್ರಧಾನ ಭಾಗವಾದ ಆಧುನಿಕ ಪೂರ್ವ ಮತ್ತು ಆಧುನಿಕ ಕಾವ್ಯಗಳನ್ನು ಸಾಂಕೇತಿಕವಾಗಿ ಪರಿಚಯಿಸಿ ವಿದ್ಯಾರ್ಥಿಗಳಲ್ಲಿ ಸಾಹಿತ್ಯ ಮತ್ತು ಸಂಸ್ಕೃತಿಯ ಬಗ್ಗೆ ಅರಿವು ಹಾಗೂ ಆಸಕ್ತಿಯನ್ನು ಮೂಡಿಸುವುದು
C125.3	ತಾಂತ್ರಿಕ ವ್ಯಕ್ತಿಗಳ ಪರಿಚಯವನ್ನು ಹಾಗೂ ಅವರುಗಳ ಸಾಧಿಸಿದ ವಿಷಯಗಳನ್ನು ಪರಿಚಯಿಸುವುದು
C125.4	ಕನ್ನಡ ಶಬ್ದಸಂಪತ್ತಿನ ಪರಿಚಯ ಮತ್ತು ಕನ್ನಡ ಭಾಷೆಯ ಬಳಕೆ ಹಾಗೂ ಕನ್ನಡದಲ್ಲಿ ಪತ್ರ ವ್ಯವಹಾರವನ್ನು ತಿಳಿಸಿಕೊಡುವುದು
C125.5	ಕನ್ನಡ ಸಾಹಿತ್ಯದ ಆಧುನಿಕ ಪೂರ್ವ ಮತ್ತು ಆಧುನಿಕ ಕಾವ್ಯಗಳು ಮತ್ತು ಸಂಸ್ಕೃತಿಯ ಬಗ್ಗೆ ಆಸಕ್ತಿಯು ಮೂಡುತ್ತದೆ

Subject: Balake Kannada   Sub Code: BKBKK207

After successful completion of this course, the students will be able to;

CO	Description
C126.1	To understand the necessity of learning of local language for comfortable life
C126.2	To Listen and understand the Kannada language properly
C126.3	To speak, read and write Kannada language as per requirement
C126.4	To communicate (converse) in Kannada language in their daily life with kannada speakers
C126.5	To speak in polite conservation.

Subject: Indian Constitution   Sub Code:

BICOK207

After successful completion of this course, the students will be able to;

CO	Description
C127.1	Analyse the basic structure of Indian Constitution.
C127.2	Remember their Fundamental Rights, DPSP's and Fundamental Duties(FD's) of our constitution.
C127.3	Know about our Union Government, political structure & codes,procedures.
C127.4	Understand our State Executive & Elections system of India.
C127.5	Remember the Amendments and Emergency Provisions, other importantprovisions given by the constitution

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	S J P N Trust's	First Year
	Hirasugar Institute of Technology, Nidasoshi	NAAC
	Approved by AICTE, New Delhi, Permanently Affiliated to VTU, Belagavi	Course Outcome
	Recognized under 2(f) &12B of UGC Act, 1956	2022-23
	Accredited at 'A' Grade by NAAC & Programmes Accredited by NBA: CSE &	

Subject: Innovation and Design Thinking   Sub Code: BIDTK258

After successful completion of this course, the students will be able to;

CO	Description
C128.1	Appreciate various design process procedure
C128.2	Generate and develop design ideas through different technique
C128.3	Identify the significance of reverse Engineering to Understand products
C128.4	Draw technical drawing for design ideas
C128.5	Empathizing prototyping & testing

Subject: Scientific Foundation of Health   Sub Code: BSFHK258

After successful completion of this course, the students will be able to;

CO	Description
C129.1	To know about Health and wellness (and its Beliefs) & its balance for positivemindset.
C129.2	To Build the healthy lifestyles for good health for their better future.
C129.3	To Create a Healthy and caring relationships to meet the requirements ofgood/ social/ positive life.
C129.4	To learn about Avoiding risks and harmful habits in their campus and outsidethe campus for their bright future
C129.5	To Prevent and fight against harmful diseases for good health through positivemindset

Subject: Introduction to Electrical Engineering   Sub Code: BESCK204B

After successful completion of this course, the students will be able to;

CO	Description
C131.1	Understand the concepts of various energy sources and Electric circuits.
C131.2	Apply the basic Electrical laws to solve circuits.
C131.3	Discuss the construction and operation of various Electrical Machines.
C131.4	Identify suitable Electrical machine for practical implementation.
C131.5	Explain the concepts of electric power transmission and distribution, electricity billing, circuit protective devices and personal safety measures.

Subject: Introduction to Electronics Engineering   Sub Code: BESCK204C

After successful completion of this course, the students will be able to;

	Description
C132.1	Describe the concepts of electronic circuits encompassing power supplies and amplifiers.
C132.2	Explain different types oscillators and operational amplifiers.
C132.3	Present the basics of boolean algebra and digital logic circuits including combinational

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	S J P N Trust's	First Year
	Hirasugar Institute of Technology, Nidasoshi	NAAC
	Approved by AICTE, New Delhi, Permanently Affiliated to VTU, Belagavi	Course Outcome
	Recognized under 2(f) &12B of UGC Act, 1956	2022-23
	Accredited at 'A' Grade by NAAC & Programmes Accredited by NBA: CSE & ECE	

	logic circuits design.
C132.4	Discuss the characteristics and technological advances of embedded systems.
C132.5	Describe the characteristics and technological advances of embedded systems

Subject: Introduction to C Programming   Sub Code: BESCK204E

After successful completion of this course, the students will be able to;

CO	Description
C134.1	Elucidate the basic architecture and functionalities of a computer and also recognize the hardware parts
C134.2	Apply programming constructs of C language to solve the real world problem
C134.3	Explore user-defined data structures like arrays in implementing solutions to problems like searching and sorting.
C134.4	Explore user-defined data structures like arrays in implementing solutions to problems like searching and sorting
C134.5	Design and Develop Solutions to problems using modular programming constructs using functions

Subject: Renewable Energy Sources   Sub Code: BETCK205E

After successful completion of this course, the students will be able to;

CO	Description
C139.1	Describe the environmental aspects of renewable energy resources. In comparison with various conventional energy systems, their prospectus and limitations
C139.2	Describe the use of solar energy and various components used in the energy production with respect to applications like heating cooling, desalination, power generation.
C139.3	Understand the conversion principles of wind and tidal energy
C139.4	Understand the concept of biomass energy resources and green energy
C139.5	Acquire the basic knowledge of ocean thermal energy conversion and hydrogen energy

Subject: Introduction to Internet of Things (IOT)   Sub Code: BETCK205H

After successful completion of this course, the students will be able to;

CO	Description
C142.1	Describe the evolution of IoT, IoT networking components.
C142.2	Classify various sensing devices and actuator types.
C142.3	Demonstrate the processing in IoT.
C142.4	Explain Associated IOT Technologies
C142.5	Illustrate architecture of IOT Applications

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	S J P N Trust's	First Year
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	Approved by AICTE, New Delhi, Permanently Affiliated to VTU, Belagavi	Course Outcome
	Recognized under 2(f) & 12B of UGC Act, 1956	
	Accredited at 'A' Grade by NAAC & Programmes Accredited by NBA: CSE &	2022-23

Subject: Introduction to Cyber Security   Sub Code: BETCK205I

After successful completion of this course, the students will be able to;

CO	Description
C143.1	Explain the cybercrime terminologies
C143.2	Describe Cyber offenses and Botnets
C143.3	Illustrate Tools and Methods used on Cybercrime
C143.4	Explain Phishing and Identity Theft
C143.5	Justify the need of computer forensics

Subject: Introduction to Python Programming   Sub Code: BPLCK205B

After successful completion of this course, the students will be able to;

CO	Description
C145.1	Demonstrate proficiency in handling loops and creation of functions.
C145.2	Identify the methods to create and manipulate lists, tuples and dictionaries.
C145.3	Develop programs for string processing and file organization.
C145.4	Interpret the concepts of Object-Oriented Programming as used in Python
C145.5	Implement the Object Oriented Programming concepts in Python

CO-ORDINATOR
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