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SRI RAMAKRISHNA COLLEGE OF ENGINEERING

Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai
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2.6.1 Course Outcome (COs)

**B.E COMPUTER SCIENCE AND ENGINEERING(Regulation-21)
SEMESTER-I**

Course Name: HS8151-COMMUNICATIVE ENGLISH-C101		BT Level
C 101.1	Read articles of a general kind in magazines and newspapers.	K2
C 101.2	Participate effectively in informal conversations; introduce themselves and their friends and express opinions in English.	K3
C 101.3	Comprehend conversations and short talks delivered in English	K2
C 101.4	Write short essays of a general kind and personal letters and emails in English.	K3

Course Name:MA8151-ENGINEERING MATHEMATICS-C102		BT Level
C 102.1	Use both the limit definition and rules of differentiation to differentiate functions.	K1
C 102.2	Apply differentiation to solve maxima and minima problems.	K3
C 102.3	Evaluate integrals both by using Riemann sums and by using the Fundamental Theorem of Calculus.	K5
C 102.4	Apply integration to compute multiple integrals, area, volume, integrals in polar coordinates, in addition to change of order and change of variables.	K3
C 102.5	Evaluate integrals using techniques of integration, such as substitution, partial fractions and integration by parts.	K5
C 102.6	Determine convergence/divergence of improper integrals and evaluate convergent improper integrals.	k2
C 102.7	Apply various techniques in solving differential equations.	k4

Course Name:PH8151-ENGINEERING PHYSICS-C103		BT Level
C 103.1	The students will gain knowledge on the basics of properties of matter and its applications	K2
C 103.2	The students will acquire knowledge on the concepts of waves and optical devices and their applications in fibre optics,	K2
C 103.3	The students will have adequate knowledge on the concepts of thermal properties of materials and their applications in expa	K2
C 103.4	The students will get knowledge on advanced physics concepts of quantum theory and its applications in tunneling microsc	K3
C 103.5	The students will understand the basics of crystals, their structures and different crystal growth techniques	K2

Course Name: CY8151-ENGINEERING CHEMISTRY-C104		BT Level
C 104.1	The knowledge gained on engineering materials, fuels, energy sources and water treatment techniques will facilitate better understanding of engineering processes and applications for further learning.	K2

Course Name: GE8151-PROBLEM SOLVING AND PYTHON PROGRAMMING-C105		BT Level
C 105.1	Develop algorithmic solutions to simple computational problems	K4
C 105.2	Read, write, execute by hand simple Python programs.	K2
C 105.3	Structure simple Python programs for solving problems.	K3
C 105.4	Decompose a Python program into functions.	K4
C 105.5	Represent compound data using Python lists, tuples, dictionaries.	K3
C 105.6	Read and write data from/to files in Python Programs.	K3

Course Name: GE8152-ENGINEERING GRAPHICS-C106		BT Level
C 106.1	Familiarize with the fundamentals and standards of Engineering graphics	K1
C 106.2	Perform freehand sketching of basic geometrical constructions and multiple views of objects.	K3
C 106.3	Project orthographic projections of lines and plane surfaces.	K3
C 106.4	Drawprojections and solids and development of surfaces.	K3
C 106.5	Visualize and to project isometric and perspective sections of simple solids.	K4

Course Name: GE8161-PROBLEM SOLVING AND PYTHON PROGRAMMING LABORATORY-C107		BT Level
C 107.1	Write, test, and debug simple Python programs.	K3
C 107.2	Implement Python programs with conditionals and loops.	K3
C 107.3	Develop Python programs step-wise by defining functions and calling them.	K4
C 107.4	Use Python lists, tuples, dictionaries for representing compound data.	K3
C 107.5	Read and write data from/to files in Python.	K3

Course Name: BS8161-PHYSICS AND CHEMISTRY LABORATORY-C108		BT Level
C 108.1	The students will be outfitted with hands-on knowledge in the quantitative chemical analysis of water quality related parameters.	K3

Course Name: HS8251-TECHNICAL ENGLISH-C109		BT Level
C 109.1	Read technical texts and write area-specific texts effortlessly.	K3
C 109.2	Listen and comprehend lectures and talks in their area of specialisation successfully.	K2
C 109.3	Speak appropriately and effectively in varied formal and informal contexts.	K3
C 109.4	Write reports and winning job applications.	K3

Course Name: MA8251-ENGINEERING MATHEMATICS- II-C110		BT Level
C 110.1	Eigen values and eigenvectors, diagonalization of a matrix, Symmetric matrices, Positive definite matrices and similar matrices.	K2
C 110.2	Gradient, divergence and curl of a vector point function and related identities.	K2
C 110.3	Evaluation of line, surface and volume integrals using Gauss, Stokes and Green's theorems and their verification.	K3
C 110.4	Analytic functions, conformal mapping and complex integration.	K2
C 110.5	Laplace transform and inverse transform of simple functions, properties, various related theorems and application to differential equations with constant coefficients.	K3

Course Name:PH8252-PHYSICS FOR INFORMATION SCIENCE-C111		BT Level
C 111.1	Gain knowledge on classical and quantum electron theories, and energy band structures,	K2
C 111.2	Acquire knowledge on basics of semiconductor physics and its applications in various devices,	K2
C 111.3	Get knowledge on magnetic properties of materials and their applications in data storage,	K2
C 111.4	Have the necessary understanding on the functioning of optical materials for optoelectronics,	K2
C 111.5	Understand the basics of quantum structures and their applications in carbon electronics	K2

Course Name:BE8252-BASIC ELECTRICAL ELECTRONICS AND INSTRUMENTATION ENGINEERING-C112		BT Level
C 112.1	Discuss the essentials of electric circuits and analysis.	K2
C 112.2	Discuss the basic operation of electric machines and transformers	K2
C 112.3	Introduction of renewable sources and common domestic loads.	K1
C 112.4	Introduction to measurement and metering for electric circuits.	K2

Course Name:GE8291-ENVIRONMENTAL SCIENCE AND ENGINEERING-C 113		BT Level
C 113.1	Environmental Pollution or problems cannot be solved by mere laws. Public participation is an important aspect which serves the environmental Protection. One will obtain knowledge on the following after completing the course.	K2
C 113.2	Public awareness of environmental is at infant stage.	K2
C 113.3	Ignorance and incomplete knowledge has lead to misconceptions	K2
C 113.4	Development and improvement in std. of living has lead to serious environmental disasters	K2

Course Name: CS8251-PROGRAMMING IN C-C 114		BT Level
C 114.1	Develop simple applications in C using basic constructs	K3
C 114.2	Design and implement applications using arrays and strings	K3
C 114.3	Develop and implement applications in C using functions and pointers.	K4
C 114.4	Develop applications in C using structures.	K3
C 114.5	Design applications using sequential and random access file processing.	K4

Course Name:GE8261-ENGINEERING PRACTICES LABORATORY- C 115		BT Level
C 115.1	Fabricate carpentry components and pipe connections including plumbing works.	K3
C 115.2	Use welding equipments to join the structures.	K3
C 115.3	Carry out the basic machining operations	K3
C 115.4	Make the models using sheet metal works	K3
C 115.5	Illustrate on centrifugal pump, Air conditioner, operations of smithy, foundry and fittings	K2
C 115.6	Carry out basic home electrical works and appliances	K3
C 115.7	Measure the electrical quantities	K3
C 115.8	Elaborate on the components, gates, soldering practices.	K2

COURSE NAME:CS8261-C PROGRAMMING LABORATORY-C116		BT Level
C 116.1	Develop C programs for simple applications making use of basic constructs, arrays and strings.	K3
C 116.2	Develop C programs involving functions, recursion, pointers, and structures.	K4
C 116.3	Design applications using sequential and random access file processing.	K4

Course Name: MA8351-DISCRETE MATHEMATICS- C201		BT Level
C 201.1	Have knowledge of the concepts needed to test the logic of a program.	K2
C 201.2	Have an understanding in identifying structures on many levels.	K2
C 201.3	Be aware of a class of functions which transform a finite set into another finite set which relates to input and output functions in computer science.	K1
C 201.4	Be aware of the counting principles.	K1
C 201.5	Be exposed to concepts and properties of algebraic structures such as groups, rings and fields.	K2

Course Name: BE8351-Digital Principles and Design-C202		BT Level
C 202.1	Simplify Boolean functions using KMap	K3
C 202.2	Design and Analyze Combinational and Sequential Circuits	K4
C 202.3	Implement designs using Programmable Logic Devices	K3
C 202.4	Write HDL code for combinational and Sequential Circuits	K4

Course Name:CS8391-DATA STRUCTURES- C203		BT Level
C 203.1	Apply mathematical knowledge to predict the properties and characteristics of a fluid.	K3
C 203.2	Can analyse and calculate major and minor losses associated with pipe flow in piping networks.	K4
C 203.3	Can mathematically predict the nature of physical quantities	K3
C 203.4	Can critically analyse the performance of pumps	K4
C 203.5	Can analyse and calculate major and minor losses associated with pipe flow in piping networks.	K4

Course Name: CS8392-OBJECT ORIENTED PROGRAMMING-C204		BT Level
C 204.1	Develop Java programs using OOP principles	K3
C 204.2	Develop Java programs with the concepts inheritance and interfaces	K4
C 204.3	Build Java applications using exceptions and I/O streams	K3
C 204.4	Develop Java applications with threads and generics classes	K4
C 204.5	Develop interactive Java programs using swings	K3

Course Name: EC8395-COMMUNICATION ENGINEERING-C205		BT Level
C 205.1	Ability to comprehend and appreciate the significance and role of this course in the present contemporary world	K2
C 205.2	Apply analog and digital communication techniques.	K3
C 205.3	Use data and pulse communication techniques.	K3
C 205.4	Analyze Source and Error control coding.	K4

Course Name: CS8381-DATA STRUCTURES LABORATORY-C206		BT Level
C 206.1	Write functions to implement linear and non-linear data structure operations	K3

C 206.2	Suggest appropriate linear / non-linear data structure operations for solving a given problem	K4
C 206.3	Appropriately use the linear / non-linear data structure operations for a given problem	K3
C 206.4	Apply appropriate hash functions that result in a collision free scenario for data storage and retrieval	K3

Course Name: CS8383-OBJECT ORIENTED PROGRAMMING LABORATORY-C207		BT Level
C 207.1	Develop and implement Java programs for simple applications that make use of class, packages and interfaces.	K3
C 207.2	Develop and implement Java programs with arraylist, exception handling and multithreading .	K3
C 207.3	Design applications using file processing, generic programming and event handling.	K4

Course Name:CS8382- DIGITAL SYSTEMS LABORATORY -C208		BT Level
C 208.1	Implement simplified combinational circuits using basic logic gates	K3
C 208.2	Implement combinational circuits using MSI devices	K3
C 208.3	Implement sequential circuits like registers and counters	K3
C 208.4	Simulate combinational and sequential circuits using HDL	K4

Course Name:HS8381 Interpersonal Skills/Listening &Speaking-C209		BT Level
C 209.1	Listen and respond appropriately.	K2
C 209.2	Participate in group discussions	K3
C 209.3	Make effective presentations	K3
C 209.4	Participate confidently and appropriately in conversations both formal and informal	K3

SEMESTER IV

Course Name: MA8402-PROBABILITY AND QUEUEING THEORY-C210		BT Level
C 210.1	Understand the fundamental knowledge of the concepts of probability and have knowledge of standard distributions which can describe real life phenomenon	K2
C 210.2	Understand the basic concepts of one and two dimensional random variables and apply in engineering applications	K3
C 210.3	Apply the concept of random processes in engineering disciplines.	K3
C 210.4	Acquire skills in analyzing queueing models.	K4
C 210.5	Understand and characterize phenomenon which evolve with respect to time in a probabilistic manner	K2

Course Name:CS8491-COMPUTER ARCHITECTURE-C211		BT Level
C 211.1	Understand the basics structure of computers, operations and instructions.	K2
C 211.2	Design arithmetic and logic unit.	K4
C 211.3	Understand pipelined execution and design control unit.	K3
C 211.4	Understand parallel processing architectures.	K2
C 211.5	Understand the various memory systems and I/O communication.	K2

Course Name:CS8492- DATABASE MANAGEMENT SYSTEM- C212		BT Level
C 212.1	Classify the modern and futuristic database applications based on size and complexity	K2
C 212.2	Map ER model to Relational model to perform database design effectively	K3
C 212.3	Write queries using normalization criteria and optimize queries	K4
C 212.4	Compare and contrast various indexing strategies in different database systems	K4
C 212.5	Appraise how advanced databases differ from traditional databases.	K5

Course Name: CS8451-DESIGN AND ANALYSIS OF ALGORITHMS-C213		BT Level
C 213.1	Design algorithms for various computing problems.	K4
C 213.2	Analyze the time and space complexity of algorithms.	K4
C 213.3	Critically analyze the different algorithm design techniques for a given problem.	K5
C 213.4	Modify existing algorithms to improve efficiency	K4

Course Name:CS8493-OPERATING SYSTEMS-C214		BT Level
C 214.1	Analyze various scheduling algorithms.	K4

C 214.2	Understand deadlock, prevention and avoidance algorithms.	K2
C 214.3	Compare and contrast various memory management schemes.	K4
C 214.4	Understand the functionality of file systems.	K2
C 214.5	Perform administrative tasks on Linux Servers.	K3
C 214.6	Compare iOS and Android Operating Systems.	K4

Course Name: CS8494-SOFTWARE ENGINEERING-C215		BT Level
C 215.1	Identify the key activities in managing a software project.	K1
C 215.2	Compare different process models.	K4
C 215.3	Concepts of requirements engineering and Analysis Modeling.	K2
C 215.4	Apply systematic procedure for software design and deployment.	K3
C 215.5	Compare and contrast the various testing and maintenance.	K4
C 215.6	Manage project schedule, estimate project cost and effort required.	K3

Course Name:CS8481-DATABASE MANAGEMENT SYSTEM LABORATORY-C216		BT Level
C 216.1	Use typical data definitions and manipulation commands.	K3
C 216.2	Design applications to test Nested and Join Queries	K4
C 216.3	Implement simple applications that use Views	K3
C 216.4	Implement applications that require a Front-end Tool	K3
C 216.5	Critically analyze the use of Tables, Views, Functions and Procedures	K5

Course Name:CS8461-OPERATING SYSTEMS LABORATORY-C217		BT Level
C 217.1	Compare the performance of various CPU Scheduling Algorithms	K4
C 217.2	Implement Deadlock avoidance and Detection Algorithms	K3
C 217.3	Implement Semaphores	K3
C 217.4	Create processes and implement IPC	K3
C 217.5	Analyze the performance of the various Page Replacement Algorithms	K4
C 217.6	Implement File Organization and File Allocation Strategies	K3

Course Name: HS8461-ADVANCED READING AND WRITING - C218		BT Level
C 218.1	Write different types of essays.	K3
C 218.2	Write winning job applications.	K3
C 218.3	Read and evaluate texts critically.	K4
C 218.4	Display critical thinking in various professional contexts.	K5

SEMESTER V

Course Name:MA8551 ALGEBRA AND NUMBER THEORY-C301		BT Level
C 301.1	Apply the basic notions of groups, rings, fields which will then be used to solve related problems.	K3
C 301.2	Explain the fundamental concepts of advanced algebra and their role in modern mathematics and applied contexts.	K2
C 301.3	Demonstrate accurate and efficient use of advanced algebraic techniques.	K3
C 301.4	Demonstrate their mastery by solving non - trivial problems related to the concepts, and by proving simple theorems about the, statements proven by the text.	K4
C 301.5	Apply integrated approach to number theory and abstract algebra, and provide a firm basis for further reading and study in the subject.	K3

Course Name:CS8591-COMPUTER NETWORKS-C302		BT Level
C 302.1	Understand the basic layers and its functions in computer networks.	K2
C 302.2	Evaluate the performance of a network.	K5
C 302.3	Understand the basics of how data flows from one node to another.	K2
C 302.4	Analyze and design routing algorithms.	K4
C 302.5	Design protocols for various functions in the network.	K4
C 302.6	Understand the working of various application layer protocols	K2

Course Name: EC8691-MICROPROCESSOR AND MICROCONTROLLER-C303		BT Level
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C 303.1	Understand and execute programs based on 8086 microprocessor.	K2
C 303.2	Design Memory Interfacing circuits.	K4
C 303.3	Design and interface I/O circuits.	K4
C 303.4	Design and implement 8051 microcontroller based systems.	K4

Course Name:CS8501-THEORY OF COMPUTATION-C304		BT Level
C 304.1	Construct automata, regular expression for any pattern.	K4
C 304.2	Write Context free grammar for any construct.	K4
C 304.3	Design Turing machines for any language.	K4
C 304.4	Propose computation solutions using Turing machines.	K5
C 304.5	Derive whether a problem is decidable or not	K5

Course Name: CS8582- OBJECT ORIENTED ANALYSIS AND DESIGN-C305		BT Level
C 305.1	Perform OO analysis and design for a given problem specification.	K4
C 305.2	Identify and map basic software requirements in UML mapping.	K3

Course Name:OCE552- GEOGRAPHIC INFORMATION SYSTEM-C306		BT Level
C 306.1	Describe what a Geographic Information System (GIS) is	K2
C 306.2	operate ArcGIS Pro and QGIS software packages	K3
C 306.3	work with spatial data	K3
C 306.4	differential between .shp, .gdb, and raster files	K4

Course Name: EC8681 MICROPROCESSOR AND MICROCONTROLLER LABORATORY-C307		BT Level
C 307.1	Write ALP Programmes for fixed and Floating Point and Arithmetic operations	K3
C 307.2	Interface different I/Os with processor	K4
C 307.3	Generate waveforms using Microprocessors	K3
C 307.4	Execute Programs in 8051	K3
C 307.5	Explain the difference between simulator and Emulator	K2

Course Name: EC8681 OBJECT ORIENTED ANALYSIS AND DESIGN LABORATORY-C308		BT Level
C 308.1	Develop and implement Java programs for simple applications that make use of classes, packages and interfaces.	K3
C 308.2	Develop and implement Java programs with arraylist, exception handling and multithreading .	K4
C 308.3	Design applications using file processing, generic programming and event handling.	K3

Course Name: CS8581-NETWORKS LABORATORY-C309		BT Level
C309.1	Implement various protocols using TCP and UDP.	K3
C309.2	Compare the performance of different transport layer protocols.	K4
C309.3	Use simulation tools to analyze the performance of various network protocols.	K3
C309.4	Analyze various routing algorithms.	K4
C309.5	Implement error correction codes	K3

SEMESTER VI

Course Name: CS8651-INTERNET PROGRAMMING- C310		BT Level
C310.1	Construct a basic website using HTML and Cascading Style Sheets.	K3
C310.2	Build dynamic web page with validation using Java Script objects & by applying different event handling mechanisms.	K3
C310.3	Develop server side programs using Servlets and JSP.	K3
C310.4	Construct simple web pages in PHP and to represent data in XML format.	K3
C310.5	Use AJAX and web services to develop interactive web applications	K3

Course Name:CS8691-ARTIFICIAL INTELLIGENCE-C311		BT Level
C 311.1	Use appropriate search algorithms for any AI problem	K3
C 311.2	Represent a problem using first order and predicate logic	K4

C 311.3	Provide the apt agent strategy to solve a given problem	K4
C 311.4	Design software agents to solve a problem	K4
C 311.5	Design applications for NLP that use Artificial Intelligence.	K4

Course Name:CS8601-MOBILE COMPUTING-C312		BT Level
C 312.1	Explain the basics of mobile telecommunication systems	K2
C 312.2	Illustrate the generations of telecommunication systems in wireless networks	K2
C 312.3	Determine the functionality of MAC, network layer and Identify a routing protocol for a given Ad hoc network	K4
C 312.4	Explain the functionality of Transport and Application layers	K3
C 312.5	Develop a mobile application using android/blackberry/ios/Windows SDK	K2

Course Name:CS8602-COMPILER DESIGN-C313		BT Level
C 313.1	Understand the different phases of compiler.	K2
C 313.2	Design a lexical analyzer for a sample language.	K4
C 313.3	Apply different parsing algorithms to develop the parsers for a given grammar.	K3
C 313.4	Understand syntax-directed translation and run-time environment.	K2
C 313.5	Learn to implement code optimization techniques and a simple code generator.	K3
C 313.6	Design and implement a scanner and a parser using LEX and YACC tools.	K4

Course Name:CS8603-DISTRIBUTED SYSTEMS-C314		BT Level
C 314.1	Elucidate the foundations and issues of distributed systems	K2
C 314.2	Understand the various synchronization issues and global state for distributed systems.	K2
C 314.3	Understand the Mutual Exclusion and Deadlock detection algorithms in distributed systems	K2
C 314.4	Describe the agreement protocols and fault tolerance mechanisms in distributed systems.	K2
C 314.5	Describe the features of peer-to-peer and distributed shared memory systems	K2

Course Name:IT8076- SOFTWARE TESTING-C315		BT Level
C 315.1	Design test cases suitable for a software development for different domains.	K4
C 315.2	Identify suitable tests to be carried out.	K3
C 315.3	Prepare test planning based on the document.	K4
C 315.4	Document test plans and test cases designed.	K3
C 315.5	Develop and validate a test plan	K5

Course Name: CS8661-INTERNET PROGRAMMING LABORATORY-C316		BT Level
C 316.1	Construct Web pages using HTML/XML and style sheets.	K3
C 316.2	Build dynamic web pages with validation using Java Script objects and by applying different event handling mechanisms.	K3
C 316.3	Develop dynamic web pages using server side scripting.	K3
C 316.4	Use PHP programming to develop web applications.	K3
C 316.5	Construct web applications using AJAX and web services.	K3

Course Name: CS8662-MOBILE APPLICATION DEVELOPMENT LABORATORY-C317		BT Level
C 317.1	Develop mobile applications using GUI and Layouts.	K3
C 317.2	Develop mobile applications using Event Listener.	K3
C 317.3	Develop mobile applications using Databases.	K3
C 317.4	Develop mobile applications using RSS Feed, Internal/External Storage, SMS, Multi- threading and GPS.	K3
C 317.5	Analyze and discover own mobile app for simple needs.	K4

Course Name: CS8611-MINI PROJECT-C318		BT Level
C 318.1	Develop C programs for simple applications making use of basic constructs, arrays and strings.	K3
C 318.2	Develop C programs involving functions, recursion, pointers, and structures.	K3
C 318.3	Design applications using sequential and random access file processing	K4

Course Name:HS8151-PROFESSIONAL COMMUNICATION-C319		BT Level
C 319.1	Make effective presentations	K1
C 319.2	Participate confidently in Group Discussions.	K4
C 319.3	Attend job interviews and be successful in them.	K5
C 319.4	Develop adequate Soft Skills required for the workplace	K4

SEMESTER VII

Course Name: MG8591-PRINCIPLES OF MANAGEMENT-C401		BT Level
C 401.1	Upon completion of the course, students will be able to have clear understanding of managerial functions like planning, organizing, staffing, leading & controlling and have same basic knowledge on international aspect of management	K2

Course Name:CS8792-CRYPTOGRAPHY AND NETWORK SECURITY-C402		BT Level
C 402.1	Understand the fundamentals of networks security, security architecture, threats and vulnerabilities	K2
C 402.2	Apply the different cryptographic operations of symmetric cryptographic algorithms	K3
C 402.3	Apply the different cryptographic operations of public key cryptography	K3
C 402.4	Apply the various Authentication schemes to simulate different applications.	K3
C 402.5	Understand various Security practices and System security standards	K2

Course Name:CS8791-CLOUD COMPUTING-C403		BT Level
C 403.1	Articulate the main concepts, key technologies, strengths and limitations of cloud computing.	K2
C 403.2	Learn the key and enabling technologies that help in the development of cloud.	K2
C 403.3	Develop the ability to understand and use the architecture of compute and storage cloud, service and delivery models.	K3
C 403.4	Explain the core issues of cloud computing such as resource management and security.	K2
C 403.5	Be able to install and use current cloud technologies.	K3
C 403.6	Evaluate and choose the appropriate technologies, algorithms and approaches for implementation and use of cloud.	K5

Course Name:IT8074- SERVICE ORIENTED ARCHITECTURE-C404		BT Level
C 404.1	Understand XML technologies	K2
C 404.2	Understand service orientation, benefits of SOA	K2
C 404.3	Understand web services and WS standards	K2
C 404.4	Use web services extensions to develop solutions	K3
C 404.5	Understand and apply service modeling, service oriented analysis and design for application development	K3

Course Name: CS8494- SOFTWARE ENGINEERING-C405		BT Level
C 405.1	Identify the key activities in managing a software project.	K2
C 405.2	Compare different process models.	K4
C 405.3	Concepts of requirements engineering and Analysis Modeling.	K2
C 405.4	Apply systematic procedure for software design and deployment.	K3
C 405.5	Compare and contrast the various testing and maintenance.	K4
C 405.6	Manage project schedule, estimate project cost and effort required.	K3

Course Name:CS8711-CLOUD COMPUTING LABORATORY-C406		BT Level
C 406.1	Configure various virtualization tools such as Virtual Box, VMware workstation.	K3
C 406.2	Design and deploy a web application in a PaaS environment.	K4
C 406.3	Learn how to simulate a cloud environment to implement new schedulers.	K2
C 406.4	Install and use a generic cloud environment that can be used as a private cloud.	K3
C 406.5	Manipulate large data sets in a parallel environment.	K3

Course Name:IT8761- SECURITY LABORATORY-C407		BT Level
C 407.1	Develop code for classical Encryption Techniques to solve the problems.	K3
C 407.2	Build cryptosystems by applying symmetric and public key encryption algorithms.	K4

C 407.3	Construct code for authentication algorithms.	K3
C 407.4	Develop a signature scheme using Digital signature standard.	K4
C 407.5	Demonstrate the network security system using open source tools	K3

SEMESTER VIII

Course Name: GE8076 - PROFESSIONAL ETHICS IN ENGINEERING-C408		BT Level
C 408.1	Discuss the ethical issues related to engineering and realize the responsibilities and rights in the society	K4

Course Name: CS8076-GPU ARCHITECTURE AND PROGRAMMING-C409		BT Level
C 409.1	Describe GPU Architecture	K2
C 409.2	Write programs using CUDA, identify issues and debug them	K3
C 409.3	Implement efficient algorithms in GPUs for common application kernels, such as matrix multiplication	K4
C 409.4	Write simple programs using OpenCL	K3
C 409.5	Identify efficient parallel programming patterns to solve problems	K4

Course Name: CS8811-PROJECT WORK-C410		BT Level
C 410.1	On Completion of the project work students will be in a position to take up any challenging practical problems and find solution by formulating proper methodology	K6



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2.6.1 Course Outcome (COs)

Course Name: COMMUNICATIVE ENGLISH-I		C 101	BT Level
C 101.1	Read articles of a general kind in magazines and newspapers.		K1
C 101.2	Participate effectively in informal conversations; introduce themselves and their friends and express opinions in English.		K1
C 101.3	Comprehend conversations and short talks delivered in English		K2
C 101.4	Write short essays of a general kind and personal letters and emails in English		K6

Course Name: ENGINEERING MATHEMATICS- I		C 102	BT Level
C 102.1	Use both the limit definition and rules of differentiation to differentiate functions.		K3
C 102.2	Apply differentiation to solve maxima and minima problems.		K3
C 102.3	Evaluate integrals both by using Riemann sums and by using the Fundamental Theorem of Calculus.		K5
C 102.4	Apply integration to compute multiple integrals, area, volume, integrals in polar coordinates, in addition to change of order and change of variables.		K3
C 102.5	Evaluate integrals using techniques of integration, such as substitution, partial fractions and integration by parts.		K5
C 102.6	Determine convergence/divergence of improper integrals and evaluate convergent improper integrals.		
C 102.7	Apply various techniques in solving differential equations.		K3

Course Name: ENGINEERING PHYSICS		C 103	BT Level
C 103.1	The students will gain knowledge on the basics of properties of matter and its applications,		K1
C 103.2	The students will acquire knowledge on the concepts of waves and optical devices and their applications in fibre		K1
C 103.3	The students will have adequate knowledge on the concepts of thermal properties of materials and their applications in expansion joints and heat exchangers,		K1
C 103.4	The students will get knowledge on advanced physics concepts of quantum theory and its application in tunneling		K1
C 103.5	The students will understand the basics of crystals, their structures and different crystal growth techniques.		K1

Course Name: ENGINEERING CHEMISTRY		C 104	BT Level
C 104.1	The knowledge gained on engineering materials, fuels, energy sources and water treatment techniques will facilitate better understanding of engineering processes and applications for further learning.		K2

Course Name: PROBLEM SOLVING AND PYTHON PROGRAMMING		C 105	BT Level
C 105.1	Develop algorithmic solutions to simple computational problems		K3
C 105.2	Read, write, execute by hand simple Python programs.		K1
C 105.3	Structure simple Python programs for solving problems.		K2
C 105.4	Decompose a Python program into functions.		K2
C 105.5	Represent compound data using Python lists, tuples, dictionaries.		K3
C 105.6	Read and write data from/to files in Python Programs.		K1

Course Name: ENGINEERING GRAPHICS		C 106	BT Level
C 106.1	Familiarize with the fundamentals and standards of Engineering graphics		K2
C 106.2	Perform freehand sketching of basic geometrical constructions and multiple views of objects.		K1
C 106.3	Project orthographic projections of lines and plane surfaces.		K2
C 106.4	Draw projections and solids and development of surfaces.		K2
C 106.5	visualize and to project isometric and perspective sections of simple solids.		

Course Name: PROBLEM SOLVING AND PYTHON PROGRAMMING LABORATORY		C 107	BT Level
C 107.1	Write, test, and debug simple Python programs.		K1

C 107.2	Implement Python programs with conditionals and loops.	K1
C 107.3	Develop Python programs step-wise by defining functions and calling them.	K3
C 107.4	Use Python lists, tuples, dictionaries for representing compound data.	K2
C 107.5	Read and write data from/to files in Python.	K1

Course Name: PHYSICS AND CHEMISTRY LABORATORY C 108		BT Level
C 108.1	Apply principles of elasticity, optics and thermal properties for engineering applications.	K3

Course Name: TECHNICAL ENGLISH C 109		BT Level
C 109.1	Read technical texts and write area- specific texts effortlessly.	K2
C 109.2	Listen and comprehend lectures and talks in their area of specialisation successfully.	K1
C 109.3	Speak appropriately and effectively in varied formal and informal contexts.	K2
C 109.4	Write reports and winning job applications.	K6

Course Name: ENGINEERING MATHEMATICS– II C 110		BT Level
C 110.1	Eigen values and eigenvectors, diagonalization of a matrix, Symmetric matrices, Positive definite matrices and similar	K2
C 110.2	Gradient, divergence and curl of a vector point function and related identities.	K1
C 110.3	Evaluation of line, surface and volume integrals using Gauss, Stokes and Green’s theorems and their verification.	K5
C 110.4	Analytic functions, conformal mapping and complex integration.	K4
C 110.5	Laplace transform and inverse transform of simple functions, properties, various related theorems and application to differential equations with constant coefficients.	K3

Course Name: MATERIALS SCIENCE C 111		BT Level
C 111.1	The students will have knowledge on the various phase diagrams and their applications	K2
C 111.2	He students will acquire knowledge on Fe-Fe ₃ C phase diagram, various microstructures and alloys	K1
C 111.3	The students will get knowledge on mechanical properties of materials and their measurement	K2
C 111.4	The students will gain knowledge on magnetic, dielectric and superconducting properties of materials	K2
C 111.5	The students will understand the basics of ceramics, composites and nanomaterials.	K2

Course Name: BASIC ELECTRICAL, ELECTRONICS AND INSTRUMENTATION ENGINEERING C 112		BT Level
C 112.1	Understand electric circuits and working principles of electrical machines	K2
C 112.2	Understand the concepts of various electronic devices	K2
C 112.3	Choose appropriate instruments for electrical measurement for a specific application	K2

Course Name: ENVIRONMENTALSCIENCE AND ENGINEERING C 113		BT Level
C 113.1	Environmental Pollution or problems cannot be solved by mere laws. Public participation is an important aspect which serves the environmental Protection. One will obtain knowledge on the following after completing the course.	K2
C 113.2	Public awareness of environmental is at infant stage.	K1
C 113.3	Ignorance and incomplete knowledge has lead to misconceptions	K2
C 113.4	Development and improvement in std. of living has lead to serious environmental disasters	K6

Course Name: ENGINEERING MECHANICS C 114		BT Level
C 114.1	Illustrate the vectorial and scalar representation of forces and moments	K3
C 114.2	Analyse the rigid body in equilibrium	K4
C 114.3	Evaluate the properties of surfaces and solids	K3
C 114.4	Calculate dynamic forces exerted in rigid body	K3
C 114.5	Determine the friction and the effects by the laws of friction	K1

Course Name: ENGINEERING PRACTICES LABORATORY C 115		BT Level
C 115.1	Fabricate carpentry components and pipe connections including plumbing works.	K2
C 115.2	Use welding equipments to join the structures.	K1
C 115.3	Carry out the basic machining operations	K2
C 115.4	Makethe models using sheet metal works	K2
C 115.5	Illustrate on centrifugal pump, Air conditioner, operations of smithy, foundary and fittings	K3

C 115.6	Carry out basic home electrical works and appliances	K2
C 115.7	Measure the electrical quantities	K5
C 115.8	Elaborate on the components, gates, soldering practices.	K2

Course Name: BASIC ELECTRICAL, ELECTRONICS AND INSTRUMENTATION ENGINEERING LABORATORY		BT Level
C 116.1	Ability to determine the speed characteristic of different electrical machines	K2
C 116.2	Ability to design simple circuits involving diodes and transistors	K1
C 116.3	Ability to use operational amplifiers	K2

SEMESTER-III

Course Name: TRANSFORMS AND PARTIAL DIFFERENTIAL EQUATIONS C201		BT Level
C 201.1	Understand how to solve the given standard partial differential equations	K2
C 201.2	Solve differential equations using Fourier series analysis which plays a vital role in engineering applications.	K3
C 201.3	Appreciate the physical significance of Fourier series techniques in solving one and two dimensional heat flow problems and one dimensional wave equations	K2
C 201.4	Understand the mathematical principles on transforms and partial differential equations would provide them the ability to formulate and solve some of the physical problems of engineering.	K2
C 201.5	Use the effective mathematical tools for the solutions of partial differential equations by using Z transform techniques for discrete time systems.	K3

Course Name: ENGINEERING THERMODYNAMICS C202		BT Level
C 202.1	Apply the first law of thermodynamics for simple open and closed systems under steady and unsteady conditions.	K3
C 202.2	Apply second law of thermodynamics to open and closed systems and calculate entropy and availability	K3
C 202.3	Apply Rankine cycle to steam power plant and compare few cycle improvement methods	K3
C 202.4	Derive simple thermodynamic relations of ideal and real gases	K2
C 202.5	Calculate the properties of gas mixtures and moist air and its use in psychometric processes	K4

Course Name: FLUID MECHANICS AND MACHINERY C203		BT Level
C 203.1	Apply mathematical knowledge to predict the properties and characteristics of a fluid.	K3
C 203.2	Can analyse and calculate major and minor losses associated with pipe flow in piping networks.	K4
C 203.3	Can mathematically predict the nature of physical quantities	K2
C 203.4	Can critically analyse the performance of pumps	K4
C 203.5	Can analyse and calculate major and minor losses associated with pipe flow in piping networks.	K4

Course Name: MANUFACTURING TECHNOLOGY-I C204		BT Level
C 204.1	Explain different metal casting processes, associated defects, merits and demerits	K2
C 204.2	Compare different metal joining processes.	K1
C 204.3	Summarize various hot working and cold working methods of metals.	K2
C 204.4	Explain various sheet metal making processes.	K2
C 204.5	Distinguish various methods of manufacturing plastic components.	K2

Course Name: ELECTRICAL DRIVES AND CONTROLS C205		BT Level
C 205.1	Upon Completion of this subject, the students can able to explain different types of electrical machines and their	K2

Course Name: MANUFACTURING TECHNOLOGY-I C206		BT Level
C 206.1	Demonstrate the safety precautions exercised in the mechanical workshop.	K2
C 206.2	Make the workpiece as per given shape and size using Lathe.	K1
C 206.3	Join two metals using arc welding.	K2
C 206.4	Use sheet metal fabrication tools and make simple tray and funnel.	K3
C 206.5	Use different moulding tools, patterns and prepare sand moulds.	K3

Course Name: COMPUTER AIDED MACHINE DRAWING C207		BT Level
C 207.1	To make the students understand and interpret drawings of machine components	K2
C 207.2	To prepare assembly drawings both manually and using standard CAD packages	K6
C 207.3	To familiarize the students with Indian Standards on drawing practices and standard components	K2
C 207.4	To gain practical experience in handling 2D drafting and 3D modeling software systems.	K2

Course Name: ELECTRICAL ENGINEERING LABORATORY C208		BT Level
C 208.1	Ability to perform speed characteristic of different electrical machine	K2

Course Name: INTERPERSONAL SKILLS/LISTENING & SPEAKING C209		BT Level
C 209.1	Listen and respond appropriately.	K2
C 209.2	Participate in group discussions	K1
C 209.3	Make effective presentations	K2
C 209.4	Participate confidently and appropriately in conversations both formal and informal	K2

SEMESTER IV

Course Name: STATISTICS AND NUMERICAL METHODS C210		BT Level
C 210.1	Apply the concept of testing of hypothesis for small and large samples in real life problems.	K3
C 210.2	Apply the basic concepts of classifications of design of experiments in the field of agriculture.	K3
C 210.3	Appreciate the numerical techniques of interpolation in various intervals and apply the numerical techniques of differentiation and integration for engineering problems.	K2
C 210.4	Understand the knowledge of various techniques and methods for solving first and second order ordinary differential	K2
C 210.5	techniques with engineering applications	K3

Course Name: KINEMATICS OF MACHINERY C211		BT Level
C 211.1	Discuss the basics of mechanism	K2
C 211.2	Calculate velocity and acceleration in simple mechanisms	K1
C 211.3	Develop CAM profiles	K2
C 211.4	Solve problems on gears and gear trains	K2
C 211.5	Examine friction in machine elements	

Course Name: MANUFACTURING TECHNOLOGY-II C212		BT Level
C 212.1	Explain the mechanism of material removal processes.	K2
C 212.2	Describe the constructional and operational features of centre lathe and other special purpose lathes.	K1
C 212.3	Describe the constructional and operational features of shaper, planner, milling, drilling, sawing and broaching	K2
C 212.4	Explain the types of grinding and other super finishing processes apart from gear manufacturing processes.	K2
C 212.5	Summarize numerical control of machine tools and write a part program.	K5

Course Name: ENGINEERING METALLURGY C213		BT Level
C 213.1	Explain alloys and phase diagram, Iron-Iron carbon diagram and steel classification	K2
C 213.2	Explain isothermal transformation, continuous cooling diagrams and different heat treatment processes.	K1
C 213.3	Clarify the effect of alloying elements on ferrous and non-ferrous metals	K2
C 213.4	Summarize the properties and applications of non metallic materials.	K2
C 213.5	Explain the testing of mechanical properties. .	K2

Course Name: STRENGTH OF MATERIALS FOR MECHANICAL ENGINEERS C214		BT Level
C 214.1	Understand the concepts of stress and strain in simple and compound bars, the importance of principal stresses and principal planes.	K2
C 214.2	Understand the load transferring mechanism in beams and stress distribution due to shearing force and bending	K1
C 214.3	Apply basic equation of simple torsion in designing of shafts and helical spring	K2
C 214.4	Calculate the slope and deflection in beams using different methods.	K2
C 214.5	Analyze and design thin and thick shells for the applied internal and external pressures.	K4

Course Name: THERMAL ENGINEERING-I C215		BT Level
C 215.1	Apply thermodynamic concepts to different air standard cycles and solve problems.	K3
C 215.2	Solve problems in single stage and multistage air compressors	K1
C 215.3	Explain the functioning and features of IC engines, components and auxiliaries	K2
C 215.4	Calculate performance parameters of IC Engines.	K2
C 215.5	Explain the flow in Gas turbines and solve problems	K2

Course Name: MANUFACTURING TECHNOLOGY LABORATORY–II C216		BT Level
C 216.1	use different machine tools to manufacturing gears	K2
C 216.2	Ability to use different machine tools to manufacturing gears.	K1
C 216.3	Ability to use different machine tools for finishing operations	K2
C 216.4	Ability to manufacture tools using cutter grinder	K2
C 216.5	Develop CNC part programming	K6

Course Name: STRENGTH OF MATERIALS AND FLUID MECHANICS AND MACHINERY LABORATORY C21		BT Level
C 217.1	Ability to perform Tension, Torsion, Hardness, Compression, and Deformation test on Solid materials. L	K2

Course Name: ADVANCED READING AND WRITING C218		BT Level
C 218.1	Write different types of essays.	K2
C 218.2	Write winning job applications.	K1
C 218.3	Read and evaluate texts critically.	K2
C 218.4	Display critical thinking in various professional contexts.	K2

SEMESTER V

Course Name: THERMAL ENGINEERING– II C301		BT Level
C 301.1	Solve problems in Steam Nozzle	K2
C 301.2	Explain the functioning and features of different types of Boilers and auxiliaries and calculate performance	K1
C 301.3	Explain the flow in steam turbines, draw velocity diagrams for steam turbines and solve problems.	K2
C 301.4	Summarize the concept of Cogeneration, Working features of Heat pumps and Heat exchangers	K2
C 301.5	Solve problems using refrigerant table / charts and psychrometric charts	K3

Course Name: DESIGN OF MACHINE ELEMENTS C302		BT Level
C 302.1	Explain the influence of steady and variable stresses in machine component design	K2
C 302.2	Apply the concepts of design to shafts, keys and couplings.	K3
C 302.3	Apply the concepts of design to temporary and permanent joints.	K3
C 302.4	Apply the concepts of design to energy absorbing members, connecting rod and crank shaft.	K3
C 302.5	Apply the concepts of design to bearings.	K3

Course Name: METROLOGY AND MEASUREMENTS C303		BT Level
C 303.1	Describe the concepts of measurements to apply in various metrological instruments	K2
C 303.2	Outline the principles of linear and angular measurement tools used for industrial applications	K1
C 303.3	Explain the procedure for conducting computer aided inspection	K2
C 303.4	Demonstrate the techniques of form measurement used for industrial components	K2
C 303.5	Discuss various measuring techniques of mechanical properties in industrial applications	K2

Course Name: DYNAMICS OF MACHINES C304		BT Level
C 304.1	Calculate static and dynamic forces of mechanisms.	K2
C 304.2	Calculate the balancing masses and their locations of reciprocating and rotating masses	K1
C 304.3	Compute the frequency of free vibration	K2
C 304.4	Compute the frequency of forced vibration and damping coefficient	K2
C 304.5	Calculate the speed and lift of the governor and estimate the gyroscopic effect on automobiles, ships and airplanes.	K3

Course Name: AUTOMOBILE ENGINEERING C305		BT Level
C 305.1	Recognize the various parts of the automobile and their functions and materials.	K2
C 305.2	Discuss the engine auxiliary systems and engine emission control.	K1
C 305.3	Distinguish the working of different types of transmission systems.	K2
C 305.4	Explain the Steering, Brakes and Suspension Systems.	K2
C 305.5	Predict possible alternate sources of energy for IC Engines.	K3

Course Name: KINEMATICS AND DYNAMICS LABORATORY C306		BT Level
C 306.1	Explain gear parameters, kinematics of mechanisms, gyroscopic effect and working of lab equipments.	K2
C 306.2	Determine mass moment of inertia of mechanical element, governor effort and ranged sensitivity, natural frequency and damping coefficient, torsional frequency, critical speeds of shafts, balancing mass of rotating and reciprocating masses, and transmissibility ratio.	K1

Course Name: THERMAL ENGINEERING LABORATORY C307		BT Level
C 307.1	conduct tests on heat conduction apparatus and evaluate thermal conductivity of materials.	K2
C 307.2	conduct tests on natural and forced convective heat transfer apparatus and evaluate heat transfer coefficient.	K1
C 307.3	conduct tests on radiative heat transfer apparatus and evaluate Stefan Boltzmann constant and emissivity.	K5
C 307.4	compressor.	K5
C 307.5	conduct tests to evaluate the performance of refrigeration and airconditioning test rigs.	K5

Course Name: METROLOGY AND MEASUREMENTS LABORATORY C308		BT Level
C 308.1	Measure the gear tooth dimensions, angle using sine bar, straightness and flatness, thread parameters, temperature using thermocouple, force, displacement, torque and vibration.	K2
C 308.2	Calibrate the vernier, micrometer and slip gauges and setting up the comparator for the inspection.	K1

SEMESTER VI

Course Name: DESIGN OF TRANSMISSION SYSTEMS C309		BT Level
C 309.1	Apply the concepts of design to belts, chains and rope drives.	K3
C 309.2	Apply the concepts of design to spur, helical gears.	K3
C 309.3	Apply the concepts of design to worm and bevel gears.	K3
C 309.4	Apply the concepts of design to gear boxes .	K3
C 309.5	Apply the concepts of design to cams, brakes and clutches	K3

Course Name: COMPUTER AIDED DESIGN AND MANUFACTURING C310		BT Level
C 310.1	Explain the 2D and 3D transformations, clipping algorithm, Manufacturing models and Metrics	K2
C 310.2	Explain the fundamentals of parametric curves, surfaces and solids.	K2
C 310.3	Summarize the different types of Standard systems used in CAD	K2
C 310.4	Apply NC & CNC programming concepts to develop part programme for lathe and milling machines.	K3
C 310.5	Summarize the different types of techniques used in cellular manufacturing and FMS.	K2

Course Name: HEAT AND MASS TRANSFER C311		BT Level
C 311.1	Apply heat conduction equations to different surface configurations under steady state and transient conditions and	K3
C 311.2	Apply free and forced convective heat transfer correlations to internal and external flows through/over various surface configurations and solve problems	K1
C 311.3	Explain the phenomena of boiling and condensation, apply LMTD and NTU methods of thermal analysis to different types of heat exchanger configurations and solve problems	K2
C 311.4	Explain basic laws for Radiation and apply these principles to radiative heat transfer between different types of surfaces to solve problems	K2
C 311.5	Apply diffusive and convective mass transfer equations and correlations to solve problems for different applications	K3

Course Name: FINITE ELEMENT ANALYSIS C312		BT Level
C 312.1	Summarize the basics of finite element formulation	K2
C 312.2	Apply finite element formulations to solve one dimensional Problems	K3
C 312.3	Apply finite element formulations to solve two dimensional scalar Problems	K3
C 312.4	Apply finite element method to solve two dimensional Vector problems.	K3
C 312.5	Apply finite element method to solve problems on iso parametric element and dynamic Problems.	K3

Course Name: HYDRAULICS AND PNEUMATICS C313		BT Level
C 313.1	Explain the Fluid power and operation of different types of pumps.	K2
C 313.2	Summarize the features and functions of Hydraulic motors, actuators and Flow control valves	K1
C 313.3	Explain the different types of Hydraulic circuits and systems	K2
C 313.4	Explain the working of different pneumatic circuits and system	K2

C 313.5	Summarize the various trouble shooting methods and applications of hydraulic and pneumatic system.	K1
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Course Name: RENEWABLE SOURCES OF ENERGY C314		BT Level
C 314.1	Discuss the importance and Economics of renewable Energy	K2
C 314.2	Discuss the method of power generation from Solar Energy	K1
C 314.3	Discuss the method of power generation from Wind Energy	K2
C 314.4	Explain the method of power generation from Bio Energy	K2
C 314.5	Explain the Tidal energy, Wave Energy, OTEC, Hydro energy, Geothermal Energy, Fuel Cells and Hybrid Systems.	K1

Course Name: CAD /CAM LABORATORY C315		BT Level
C 315.1	Draw 3D and Assembly drawing using CAD software.	K2
C 315.2	Demonstrate manual part programming with G and M codes using CAM.	K2

Course Name: DESIGN AND FABRICATION PROJECT C316		BT Level
C 316.1	design and Fabricate the machine element or the mechanical product.	K6
C 316.2	demonstrate the working model of the machine element or the mechanical product.	K2

Course Name: PROFESSIONAL COMMUNICATION C317		BT Level
C 317.1	Make effective presentations	K2
C 317.2	Participate confidently in Group Discussions.	K1
C 317.3	Attend job interviews and be successful in them.	K2
C 317.4	Develop adequate Soft Skills required for the workplace	K6

SEMESTER VII

Course Name: POWER PLANT ENGINEERING C401		BT Level
C 401.1	Explain the layout, construction and working of the components inside a thermal power plant.	K2
C 401.2	Explain the layout, construction and working of the components inside a Diesel, Gas and Combined cycle power	K2
C 401.3	Explain the layout, construction and working of the components inside nuclear power plants.	K2
C 401.4	Explain the layout, construction and working of the components inside Renewable energy power plants.	K2
C 401.5	Explain the applications of power plants while extend their knowledge to power plant economics and environmental hazards and estimate the costs of electrical energy production.	K2

Course Name: PROCESS PLANNING AND COST ESTIMATION C402		BT Level
C 402.1	select the process, equipment and tools for various industrial products	K2
C 402.2	prepare process planning activity chart.	K1
C 402.3	explain the concept of cost estimation.	K2
C 402.4	compute the job order cost for different type of shop floor	K3
C 402.5	calculate the machining time for various machining operations.	K3

Course Name: MECHATRONICS C403		BT Level
C 403.1	Discuss the interdisciplinary applications of Electronics, Electrical, Mechanical and Computer Systems for the Control of Mechanical, Electronic Systems and sensor technology.	K2
C 403.2	Discuss the architecture of Microprocessor and Microcontroller, Pin Diagram, Addressing Modes of Microprocessor and Microcontroller.	K1
C 403.3	Discuss Programmable Peripheral Interface, Architecture of 8255 PPI, and various device interfacing	K2
C 403.4	Explain the architecture, programming and application of programmable logic controllers to problems and challenges in the area of mechatronic engineering.	K2
C 403.5	Discuss various Actuators and Mechatronics system using the knowledge and skills acquired through the course and also from the given case studies.	K2

Course Name: UNCONVENTIONAL MACHINING PROCESSES C404		BT Level
C 404.1	Explain the need for unconventional machining processes and its classification	K2
C 404.2	Compare various thermal energy and electrical energy based unconventional machining processes.	K1
C 404.3	Summarize various chemical and electro-chemical energy based unconventional machining processes.	K5
C 404.4	Explain various nano abrasives based unconventional machining processes.	K2
C 404.5	Distinguish various recent trends based unconventional machining processes.	

Course Name: ROBOTICS C405		BT Level
C 405.1	Explain the concepts of industrial robots, classification, specifications and coordinate systems. Also summarize need and application of robots in different sectors.	K2
C 405.2	Illustrate the different types of robot drive systems as well as robot end effectors.	K1
C 405.3	Apply the different sensors and image processing techniques in robotics to improve the ability of robots.	K3
C 405.4	Develop robotic programs for different tasks and familiarize with the kinematics motions of robots.	K6
C 405.5	Examine the implementation of robots in various industrial sectors and interpolate the economic analysis of robots.	K1

Course Name: NON DESTRUCTIVE TESTING AND EVALUATION C406		BT Level
C 406.1	Explain the fundamental concepts of NDT	K2
C 406.2	Discuss the different methods of NDE	K1
C 406.3	Explain the concept of Thermography and Eddy current testing	K2
C 406.4	Explain the concept of Ultrasonic Testing and Acoustic Emission	K2
C 406.5	Explain the concept of Radiography	K2

Course Name: SIMULATION AND ANALYSIS LABORATORY C407		BT Level
C 407.1	simulate the working principle of air conditioning system, hydraulic and pneumatic cylinder and cam follower mechanisms using MATLAB.	K2
C 407.2	analyze the stresses and strains induced in plates, brackets and beams and heat transfer problems.	K1
C 407.3	calculate the natural frequency and mode shape analysis of 2D components and beams.	K3

Course Name: MECHATRONICS LABORATORY C408		BT Level
C 408.1	Demonstrate the functioning of mechatronics system with various pneumatic, hydraulic and electrical systems.	K2
C 408.2	Demonstrate the functioning of control systems with the help of PLC and microcontrollers.	K1

Course Name: TECHNICAL SEMINAR C409		BT Level
C 409.1	Establish motivation for any topic of interest and develop a thought process for technical presentation.	K2
C 409.2	Organize a detailed literature survey and build a document with respect to technical publications.	K1
C 409.3	Analysis and comprehension of proof-of-concept and related data.	K4

SEMESTER VIII

Course Name: PRINCIPLES OF MANAGEMENT C410		BT Level
C 410.1	Upon completion of the course, students will be able to have clear understanding of managerial functions like planning, organizing, staffing, leading and controlling and have same basic knowledge on international aspect of	K2

Course Name: COMPUTER INTEGRATED MANUFACTURING SYSTEMS C411		BT Level
C 411.1	Explain the basic concepts of CAD, CAM and computer integrated manufacturing systems	K2
C 411.2	Summarize the production planning and control and computerized process planning	K1
C 411.3	Differentiate the different coding systems used in group technology	K2
C 411.4	Explain the concepts of flexible manufacturing system (FMS) and automated guided vehicle (AGV) system	K2
C 411.5	Classification of robots used in industrial applications	K2

Course Name: PROJECT WORK C412		BT Level
C 412.1	On completion of the project work students will be in a position to take up any challenging practical problems and find solution by formulating proper methodology.	K2

B.E CIVIL ENGINEERING

SEMESTER: III

Course Name : Transforms and Partial Differential Equations

C 201

C 201.1	Understand how to solve the given standard partial differential equations
C 201.2	Solve differential equations using Fourier series analysis which plays a vital role in engineering applications.
C 201.3	Appreciate the physical significance of Fourier series techniques in solving one and two dimensional heat flow problems and one dimensional wave equations.
C 201.4	Understand the mathematical principles on transforms and partial differential equations would provide them the ability to formulate and solve some of the physical problems of engineering.
C 201.5	Use the effective mathematical tools for the solutions of partial differential equations by using Z transform techniques for discrete time systems.

Course Name : Engineering Mechanics

C 202

C 202.1	Illustrate the vectorial and scalar representation of forces and moments
C 202.2	Analyse the rigid body in equilibrium
C 202.3	Evaluate the properties of distributed forces
C 202.4	Determine the friction and the effects by the laws of friction
C 202.5	Calculate dynamic forces exerted in rigid body

Course Name : Fluid Mechanics

C 203

C 203.1	Demonstrate the difference between solid and fluid, its properties and behaviour in static conditions.
C 203.2	Apply the conservation laws applicable to fluids and its application through fluid kinematics and dynamics.
C 203.3	Formulate the relationship among the parameters involved in the given fluid phenomenon and to predict the performance of prototypes by model studies.
C 203.4	Estimate the losses in pipelines for both laminar and turbulent conditions and analysis of pipes connected in series and parallel.
C 203.5	Explain the concept of boundary layer and its application to find the drag force exerted by the fluid on the flat solid surface.

Course Name : Construction Materials and Technology

C 204

C 204.1	Identify the good quality brick, stone and blocks for construction.
C 204.2	Recognize the market forms of timber, steel, aluminum and applications of various composite materials.
C 204.3	Identify the best construction and service practices such as thermal insulations and air conditioning of the building.
C 204.4	Select various equipments for construction works conditioning of building.
C 204.5	Understand the construction planning and scheduling techniques.

Course Name : Water Supply and Waste Water Engineering

C 205

C 205.1	Understand the various components of water supply scheme and design of intake structure and conveyance system for water transmission
C 205.2	Understand on the characteristics and composition of sewage, ability to estimate sewage generation and design sewer system including sewage pumping stations
C 205.3	Understand the process of conventional treatment and design of water and wastewater

	treatment system and gain knowledge of selection of treatment process and biological treatment process
C 205.4	Ability to design and evaluate water distribution system and water supply in buildings and understand the self-purification of streams and sludge and septage disposal methods.
C 205.5	Able to understand and design the various advanced treatment system and knowledge about the recent advances in water and wastewater treatment process and reuse of sewage.

Course Name : Surveying and Levelling

C 206

C 206.1	Introduce the rudiments of various surveying and its principles.
C 206.2	Imparts knowledge in computation of levels of terrain and ground features
C 206.3	Imparts concepts of Theodolite Surveying for complex surveying operations
C 206.4	Understand the procedure for establishing horizontal and vertical control
C 206.5	Imparts the knowledge on modern surveying instruments

Course Name : Surveying and Levelling Laboratory

C 207

C 207.1	Impart knowledge on the usage of basic surveying instruments like chain/tape, compass and levelling instruments
C 207.2	Able to use levelling instrument for surveying operations
C 207.3	Able to use theodolite for various surveying operations
C 207.4	Able to carry out necessary surveys for social infrastructures
C 207.5	Able to prepare planimetric maps

Course Name : Water and Wastewater Analysis Laboratory

C 208

C 208.1	Calibrate and standardize the equipment
C 208.2	Collect proper sample for analysis
C 208.3	To know the sample preservation methods
C 208.4	To perform field oriented testing of water, wastewater
C 208.5	To perform coliform analysis

Course Name : Professional Development

C 209

C 209.1	Use MS Word to create quality documents, by structuring and organizing content for their day to day technical and academic requirements
C 209.2	Use MS EXCEL to perform data operations and analytics, record, retrieve data as per requirements and visualize data for ease of understanding
C 209.3	Use MS PowerPoint to create high quality academic presentations by including common tables, charts, graphs, interlinking other elements, and using media objects

SEMESTER - IV

Course Name : Applied Hydraulics Engineering

C 210

C 210.1	Describe the basics of open channel flow, its classification and analysis of uniform flow in steady state conditions with specific energy concept and its application
C 210.2	Analyse steady gradually varied flow, water surface profiles and its length calculation using direct and standard step methods with change in water surface profiles due to change in grades.
C 210.3	Derive the relationship among the sequent depths of steady rapidly varied flow and estimating energy loss in hydraulic jump with exposure to positive and negative surges.
C 210.4	Design turbines and explain the working principle
C 210.5	Differentiate pumps and explain the working principle with characteristic curves and design centrifugal and reciprocating pumps.

Course Name : Strength of Materials

C 211

C 211.1	Understand the concepts of stress and strain, principal stresses and principal planes.
C 211.2	Determine Shear force and bending moment in beams and understand concept of theory of simple bending.
C 211.3	Calculate the deflection of beams by different methods and selection of method for determining slope or deflection.
C 211.4	Analyze propped cantilever, fixed beams and continuous beams for external loadings and support settlements.
C 211.5	Determine the stresses due to Unsymmetrical bending of beams, locate the shear center, and study the various theories of failure

Course Name : Concrete Technology

C 212

C 212.1	Understand the requirements of cement, aggregates and water for concrete
C 212.2	Select suitable admixtures for enhancing the properties of concrete
C 212.3	Design concrete mixes as per IS method of mix design
C 212.4	Determine the properties of concrete at fresh and hardened state.
C 212.5	Know the importance of special concretes for specific requirements.

Course Name : Soil Mechanics

C 213

C 212.1	Demonstrate an ability to identify various types of soils and its properties, formulate and solve engineering Problems
C 212.2	Show the basic understanding of flow through soil medium and its impact of engineering solution
C 212.3	Understand the basic concept of stress distribution in loaded soil medium and soil settlement due to consolidation
C 212.4	Show the understanding of shear strength of soils and its impact of engineering solutions

	to the loaded soil medium and also will be aware of contemporary issues on shear strength of soils.
C 212.5	Demonstrate an ability to design both finite and infinite slopes, component and process as per needs and specifications.

Course Name : Environmental Sciences and Sustainability

C 215

C 215.1	To recognize and understand the functions of environment, ecosystems and biodiversity and their conservation.
C 215.2	To identify the causes, effects of environmental pollution and natural disasters and contribute to the preventive measures in the society.
C 215.3	To identify and apply the understanding of renewable and non-renewable resources and contribute to the sustainable measures to preserve them for future generations.
C 215.4	To recognize the different goals of sustainable development and apply them for suitable technological advancement and societal development.
C 215.5	To demonstrate the knowledge of sustainability practices and identify green materials, energy cycles and the role of sustainable urbanization.

Course Name : Hydraulic Engineering Laboratory

C 216

C 216.1	Apply Bernoulli equation for calibration of flow measuring devices.
C 216.2	Measure friction factor in pipes and compare with Moody diagram.
C 216.3	Determine the performance characteristics of rotodynamic pumps.
C 216.4	Determine the performance characteristics of positive displacement pumps.
C 216.5	Determine the performance characteristics of turbines.

Course Name : Materials Testing Laboratory

C 217

C 217.1	Determine the mechanical properties of steel.
C 217.2	Determine the physical properties of cement
C 217.3	Determine the physical properties of fine and coarse aggregate.
C 217.4	Determine the workability and compressive strength of concrete.
C 217.5	Determine the strength of brick and wood.

Course Name : Soil Mechanics Laboratory

C 218

C 218.1	Conduct tests to determine the index properties of soils
C 218.2	Determine the insitu density and compaction characteristics.
C 218.3	Conduct tests to determine the compressibility, permeability and shear strength of soils.
C 218.4	Understand the various tests on Geosynthetics.

SEMESTER -V

Course Name : Design of Reinforced Concrete structural Elements

C 301

C 301.1	Know the various design concepts and design RC rectangular beams by working stress and limit state methods
C 301.2	Understand the design of flanged beams, design for shear and torsion, and anchorage and development length.
C 301.3	Design a RC slabs and staircase and draw the reinforcement detailing.
C 301.4	Design short columns for axial, uni-axial and bi-axial eccentric loadings
C 301.5	Design wall footings, isolated footings and combined rectangular footing.

Course Name : Structural Analysis - I

C 302

C 302.1	Analyze the pin-jointed plane and space frames.
C 302.2	Analyse the continuous beams and rigid frames by slope deflection method.
C 302.3	Understand the concept of moment distribution and analysis of continuous beams and rigid frames with and without sway.
C 302.4	Analyse the indeterminate pin jointed plane frames continuous beams and rigid frames using matrix flexibility method.
C 302.5	Understand the concept of matrix stiffness method and analysis of continuous beams, pin jointed trusses and rigid plane frames.

Course Name : Foundation Engineering

C 303

C 303.1	Graduate will demonstrate an ability to plan and execute a detailed site investigation to select geotechnical design parameters and type of foundation
C 303.2	Graduate will demonstrate an ability to design shallow foundations, its component or process as per the needs and specifications.
C 303.3	Graduate will demonstrate an ability to design combined footings and raft foundations, its component or process as per the needs and specifications.
C 303.4	Graduate will demonstrate an ability to design deep foundations, its component or process as per the needs and specifications.
C 303.5	Graduate will demonstrate an ability to design retaining walls, its component or process as per the needs and specifications.

Course Name : Ground Improvement Techniques

C 304

C 304.1	Identify and evaluate the deficiencies in the deposits of the given project area and improve its characteristics by hydraulic modifications
C 304.2	Improve the ground characteristics by mechanical modifications using various method and design the system
C 304.3	Improve the ground characteristics by physical modifications using various method and

	design the system
C 304.4	Improve the characteristics of soils by various reinforcement techniques and design
C 304.5	Analyse the ground and decide the suitable chemical method for improving its characteristics.

Course Name : Prefabricated Structures

C 305

C 305.1	Understand concepts about principles of prefabrication, production, transportation, erection.
C 305.2	Acquire knowledge about panel systems, slabs, beams, shear walls and columns used in precast construction.
C 305.3	Acquire knowledge about design of cross section, joint flexibility.
C 305.4	Acquire knowledge about joints and connection in precast construction.
C 305.5	Acquire knowledge about structural stability.

Course Name : Solid and Hazardous Waste Management

C 306

C 306.1	Explain the various functional elements of solid and hazardous waste management including the associated legal, health, safety, and cultural issues as well as responsibilities of different stakeholders
C 306.2	Apply the knowledge of science and engineering fundamentals to characterize different types of solid and hazardous wastes, assess the factors affecting variation and assess performance of waste treatment and disposal systems
C 306.3	Design of systems and processes to meet specified needs of waste minimization, storage, collection, transport, recycling, processing and disposal.
C 306.4	Select appropriate methods for processing and disposal of solid and hazardous wastes, taking into account the impact of the solutions in a sustainability context
C 306.5	Conduct research pertinent to solid and hazardous waste management and communicate effectively to different stakeholders as well as engage in independent lifelong learning

Course Name : Disaster Risk Reduction and Management

C 307

C 307.1	To impart knowledge on the concepts of Disaster, Vulnerability and Disaster Risk reduction (DRR)
C 307.2	To enhance understanding on Hazards, Vulnerability and Disaster Risk Assessment prevention and risk reduction
C 307.3	To develop disaster response skills by adopting relevant tools and technology
C 307.4	Enhance awareness of institutional processes for Disaster response in the country and
C 307.5	Develop rudimentary ability to respond to their surroundings with potential Disaster response in areas where they live, with due sensitivity

Course Name :Highway Engineering Laboratory

C 308

C 308.1	Characterize Pavement Aggregate through relevant test.
C 308.2	Ascertain the Quality of Bitumen.
C 308.3	Determine the Optimum Binder Content Using Marshall Method.
C 308.4	Evaluate the Consistency and Properties of Bitumen.
C 308.5	Determine the Bitumen Content in the Bituminous Mixes

Course Name :Survey Camp

C 309

C 309.1	Handle the modern surveying instruments like Total station and GPS
C 309.2	Apply modern surveying techniques in field to establish horizontal control.
C 309.3	Understand the surveying techniques in field to establish vertical control
C 309.4	Apply different survey adjustment techniques.
C 309.5	Carry out different setting out works in the field

SEMESTER VI

Course Name : Design of Steel Structural Elements

C 310

C 310.1	Recognize the design philosophy of steel structures and identify the different failure modes of bolted and welded connections, and determine their design strengths
C 310.2	Select the most suitable section shape and size for tension and compression members and beams according to specific design criteria
C 310.3	Apply the principles, procedures and current code requirements to the analysis and design of steel tension members, columns, column bases and beams
C 310.4	Identify and compute the design loads on Industrial structures, and gantry girder
C 310.5	Find out ultimate load of steel beams and portal frames using plastic analysis

Course Name : Structural Analysis II

C 311

C 311.1	Draw influence lines for statically determinate structures and calculate critical stress resultants.
C 311.2	Understand Muller Breslau principle and draw the influence lines for statically indeterminate beams.
C 311.3	Analyse three hinged, two hinged and fixed arches.
C 311.4	Analyse the suspension bridges with stiffening girders
C 311.5	Analyse rigid frames by approximate methods for gravity and horizontal loads.

Course Name : Engineering Geology

C 312

C 312.1	Knowing the internal structure of earth and its relation to earthquakes. Landforms created by various geological agents and their importance in civil engineering.
C 312.2	Getting knowledge on various minerals and rocks that can be used as construction materials and road aggregates. In addition, testing the suitability of rocks for foundation purposes.
C 312.3	Studying various geological structures and their impact in engineering constructions. Further, learning the geomechanical properties of rocks and their significance in

	engineering projects.
C 312.4	Gaining knowledge on the role of geological mapping, remote sensing and geophysics for surface and subsurface investigations. In addition, students will also gain knowledge on borehole logging techniques and their applications in civil engineering.
C 312.5	Applying geological knowledge for designing and constructing major civil engineering structures, and also mitigating various geological hazards such as earthquakes, landslides and tsunamis.

Course Name : Pavement Engineering

C 313

C 313.1	Get knowledge about types of rigid and flexible pavements.
C 313.2	Able to design of rigid pavements
C 313.3	Able to design of flexible pavements
C 313.4	Determine the causes of distress in rigid and flexible pavements.
C 313.5	Understand stabilization of pavements, testing and field control.

Course Name : Watershed Conservation and Management

C 314

C 314.1	Recognize and Interpret the morphological features of a watershed.
C 314.2	State, design and sketch the soil conservation structures.
C 314.3	Describe the micro catchment and apply the concepts to design the small water harvesting structures.
C 314.4	Illustrate the application of modern tools and technology in the management of watershed.
C 314.5	Classify the management activities and to develop an integrated watershed development plan.

Course Name : Environmental Quality Monitoring

C 315

C 315.1	Understand the basics of environmental monitoring
C 315.2	Able to select appropriate sampling protocol for chemical analysis
C 315.3	Understand various methods of analysis of pollutants in water
C 315.4	Select correct method for toxic pollutants estimation in air
C 315.5	Familiar with analysis of land and wastes

Course Name : Artificial Intelligence and Machine Learning Fundamentals

C 316

C 316.1	Understand the foundations of AI and the structure of Intelligent Agents
C 316.2	Use appropriate search algorithms for any AI problem
C 316.3	Study of learning methods
C 316.4	Solving problem using Supervised learning
C 316.5	Solving problem using Unsupervised learning

Course Name : Industrial Safety

C 317

C 317.1	Describe, with example, the common work-related diseases and accidents in occupational setting
C 317.2	Name essential members of the Occupational Health team
C 317.3	What roles can a community health practitioners play in an Occupational setting to ensure the protection, promotion and maintenance of the health of the employee

Course Name : Building Drawing and Detailing Laboratory

C 318

C 318.1	Draft the plan, elevation and sectional view of the load bearing and framed buildings
C 318.2	Draw the structural detailing of RCC elements

C 318.3	Draw the structural detailing of RCC water tanks, footings and retaining walls
C 318.4	Draw the structural detailing of steel structures
C 318.5	Draft the structural detailing of Industrial structures

SEMESTER VII

Course Name : Estimation, Costing and Valuation Engineering
401

C

C 401.1	Gain knowledge on types of contracts.
C 401.2	Understand types of specifications, principles for report preparation, tender notices types.
C 401.3	Rate Analysis for all Building works, canals, and Roads and Cost Estimate.
C 401.4	Estimate the quantities for buildings.
C 401.5	Evaluate valuation for building and land.

Course Name : Hydrology and Irrigation Engineering

C 402

C 402.1	Define and list out the key drivers of hydrological processes and their integrated behaviour in catchments. Apply the knowledge of hydrological processes to address basin characteristics, runoff and hydrograph.
C 402.2	Describe the soil-water-plant characteristics, measurement soil moisture, estimation of crop water and hence to perform irrigation scheduling.
C 402.3	Explain the concept of flood, drought and reservoirs; to understand and explain the hydraulic structures.
C 402.4	Draw the components of irrigation canal network, to design the canal and to familiarize with the different irrigation methods.
C 402.5	Apply the concepts of groundwater for water resources management; explain the concepts of irrigation water management from the bottom-up approach.

Course Name : Human Values and Ethics

C 403

C 403.1	Identify the importance of democratic, secular and scientific values in harmonious functioning of social life.
C 403.2	Practice democratic and scientific values in both their personal and professional life.
C 403.3	Find rational solutions to social problems.
C 403.4	Behave in an ethical manner in society.
C 403.5	Practice critical thinking and the pursuit of truth.

Course Name : Total Quality Management

C 404

C 404.1	Ability to apply TQM concepts in a selected enterprise.
C 404.2	Ability to apply TQM principles in a selected enterprise.
C 404.3	Ability to understand Six Sigma and apply Traditional tools, New tools, Benchmarking and FMEA.
C 404.4	Ability to understand Taguchi's Quality Loss Function, Performance Measures and apply QFD, TPM, COQ and BPR.
C 404.5	Ability to apply QMS and EMS in any organization.

Course Name : Data Science Fundamentals

C 405

C 405.1	Gain knowledge on data science process.
C 405.2	Perform data manipulation functions using Numpy and Pandas.
C 405.3	Understand different types of machine learning approaches.
C 405.4	Perform data visualization using tools.
C 405.5	Handle large volumes of data in practical scenarios.

Course Name : Drinking Water Supply and Treatment

C 406

C 406.1	An understanding of water quality criteria and standards, and their relation to public health
C 406.2	The ability to design the water conveyance system
C 406.3	The knowledge in various unit operations and processes in water treatment
C 406.4	An ability to understand the various systems for advanced water treatment
C 406.5	An insight into the structure of drinking water distribution system

Course Name : Geographical Information System

C 407

C 407.1	Have basic idea about the fundamentals of GIS.
C 407.2	Understand the types of data models.
C 407.3	Get knowledge about data input and topology
C 407.4	Gain knowledge on data quality and standards
C 407.5	Understand data management functions and data output

SEMESTER VIII

Course Name : Project Work

C 408

C 408.1	Identify civil engineering problems reviewing available literature.
C 408.2	Identify appropriate techniques to analyze complex civil engineering problems.
C 408.3	Apply engineering and management principles through efficient handling of Project have a clear idea of his/her area of work and they are in a position to carry out the work in a systematic way.

B.E AGRICULTURE ENGINEERING

(REGULATION-2017)

SEMESTER: III

Course Name : Transforms And Partial Differential Equations

C 201

C 201.1	Understand how to solve the given standard partial differential equations.	K2
C 201.2	Solve differential equations using Fourier series analysis which plays a vital role in engineering applications.	K3
C 201.3	Appreciate the physical significance of Fourier series techniques in solving one and two dimensional heat flow problems and one dimensional wave equations.	K3
C 201.4	Understand the mathematical principles on transforms and partial differential equations would provide them the ability to formulate and solve some of the physical problems of engineering.	K2
C 201.5	Use the effective mathematical tools for the solutions of partial differential equations by using Z transform techniques for discrete time systems.	K5

Course Name : Soil Science And Engineering

C 202

C 202.1	Fundamental knowledge of soil physical parameters.	K1
C 202.2	The procedures involved in soil survey, soil classification.	K3
C 202.3	The phase relationship and soil compaction.	K2
C 202.4	Concepts of bearing capacity and slope stability.	K4

Course Name : Fluid Mechanics And Hydraulics

C 203

C 203.1	The students will be able to get a basic knowledge of fluids in static, kinematic and dynamic equilibrium.	K1
C 203.2	They will also gain the knowledge of the applicability of physical laws in addressing	K1

	problems in hydraulics.	
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Course Name : Theory Of Machines

C 204

C 204.1	Basic knowledge on the friction applications, gear and gear trains.	K2
C 204.2	Learn the fundamentals related to motion of cam and follower and fly wheel balancing	K1

Course Name : Surveying And Levelling

C 205

C 205.1	Students are expected to use all surveying equipments, prepare LS & CS, contour maps and carryout surveying works related to land and civil engineering projects.	K3
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Course Name : Thermodynamics

C 206

C 206.1	Upon completion of this course, the students can able to understand different gas power cycles and use of them in IC and R&AC applications.	K2
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Course Name : Surveying And Leveling Laboratory

C 207

C 207.1	Students completing this course would have acquired practical knowledge on handling basic survey instruments including leveling and development of contour map of given area.	K3
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Course Name : Fluid Mechanics Laboratory

C 208

C 208.1	The students will be able to measure flow in pipes and determine frictional losses.	K4
C 208.2	The students will be able to develop characteristics of pumps and turbines.	K6

Course Name : Interpersonal Skills/Listening And Speaking

C 209

C 209.1	Listen and respond appropriately.	K1
C 209.2	Participate in group discussions	K2
C 209.3	Make effective presentations	K3
C 209.4	Participate confidently and appropriately in conversations both formal and informal	K2

SEMESTER: IV

Course Name : Probability And Statistics

C 210

C 210.1	Understand the fundamental knowledge of the concepts of probability and have knowledge of standard distributions which can describe real life phenomenon.	K2
C 210.2	Understand the basic concepts of one and two dimensional random variables and apply in engineering applications.	K2
C 210.3	Apply the concept of testing of hypothesis for small and large samples in real life problems	K3
C 210.4	Apply the basic concepts of classifications of design of experiments in the field of agriculture and statistical quality control	K3
C 210.5	Have the notion of sampling distributions and statistical techniques used in engineering and management problems.	K3

Course Name : Unit Operations In Agricultural Processing

C 211

C 211.1	Fundamentals of various unit operations of Agricultural Processing.	K1
C 211.2	Material handling equipments	K2

Course Name : Farm Tractors

C 212

C 212.1	The students will be able to understand the various equipments and mechanizations used in the farm.	K2
C 212.2	The students will have the knowledge on earth moving machineries, tractor classification and tillage implements.	K2

Course Name : Hydrology And Water Resources Engineering

C 213

C 213.1	An understanding of the key drivers on water resources, hydrological processes and their integrated behaviour in catchments,	K2
C 213.2	Ability to construct and apply a range of hydrological models to surface water and groundwater problems including Hydrograph, Flood/Drought management, artificial recharge	K3
C 213.3	Ability to conduct Spatial analysis of rainfall data and design water storage reservoirs	K4
C 213.4	Understand the concept and methods of ground water management.	K2

Course Name : Strength Of Materials

C 214

C 214.1	Upon completion of this course, the students can able to apply mathematical knowledge to calculate the deformation behavior of simple structures.	K3
C 214.2	Critically analyze problem and solve the problems related to structural elements and analyze the deformation behavior for different types of loads.	K4

Course Name : Environmental Science And Engineering

C 215

C 215.1	Environmental Pollution or problems cannot be solved by mere laws. Public participation is an important aspect which serves the environmental Protection. One will obtain knowledge on the following after completing the course.	K4
C 215.2	Public awareness of environmental is at infant stage	K2
C 215.3	Ignorance and incomplete knowledge has lead to misconceptions	K1
C 215.4	Development and improvement in std. of living has lead to serious environmental disasters	K6

Course Name : Soil Science Laboratory

C 216

C 216.1	Students know the techniques to determine various physical and chemical properties of soil that are applicable for agriculture and irrigation by conducting appropriate tests.	K2
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Course Name : Strength Of Materials Laboratory

C 217

C 217.1	The students will have the required knowledge in the area of testing of materials and components of structural elements experimentally.	K1
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Course Name : Advanced Reading And Writing

C 218

C 218.1	Write different types of essays.	K1
C 218.2	Write winning job applications.	K3
C 218.3	Read and evaluate texts critically.	K5
C 218.4	Display critical thinking in various professional contexts	K6

SEMESTER: V

Course Name : Irrigation And Drainage Engineering

C 301

C 301.1	The students will have knowledge and skills on Planning, design, operation and management of reservoir system.	K6
C 301.2	The student will gain knowledge on different methods of irrigation including canal irrigation	K2

Course Name : Farm Machinery And Equipment

C 302

C 302.1	The students will be able to understand the mechanization and various equipment used in the farm for different field operations.	K2
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Course Name : Design Of Basic Machine Elements

C 303

C 303.1	At the end of the course the student will have the knowledge on detailed design and drawing of basic machine components.	K6
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Course Name : Post Harvest Technology

C 304

C 304.1	Material handling equipments	K3
C 304.2	Different Post Harvest operations and processing methods of harvested crops.	K2
C 304.3	Fundamentals of various unit operations of Agricultural Processing.	K2

Course Name : Human Rights

C 305

C 305.1	Engineering students will acquire the basic knowledge of human rights.	K1
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Course Name : Renewable Energy Sources

C 306

C 306.1	Understanding the physics of solar radiation.	K2
C 306.2	Ability to classify the solar energy collectors and methodologies of storing solar energy.	K1
C 306.3	Knowledge in applying solar energy in a useful way.	K3
C 306.4	Knowledge in wind energy and biomass with its economic aspects	K4
C 306.5	Knowledge in capturing and applying other forms of energy sources like wind, biogas and geothermal energies.	K3

Course Name : Operation And Maintenance Of Farm Machinery Lab

C 307

C 307.1	The practice of different farm machinery in the field on tillage, sowing, plant protection, harvesting and threshing; care and maintenance; lubrication; fits and tolerances and replacements.	K2
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Course Name : Post Harvest Engineering Laboratory

C 308

C 308.1	On completion of the course students will be able to determine various engineering properties of grains, test and evaluate different post harvesting machineries.	K1
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Course Name : Irrigation Field Laboratory

C 309

C 309.1	On the completion of the course the student will have the knowledge on various meteorological instruments and understanding the concept of different irrigational systems in the laboratory tests.	K3
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Course Name : Professional Communication

C 310

C 310.1	Make effective presentations	K2
C 310.2	Participate confidently in Group Discussions.	K1
C 310.3	Attend job interviews and be successful in them.	K3
C 310.4	Develop adequate Soft Skills required for the workplace Knowledge in applying solar energy in a useful way.	K3

SEMESTER: VI

Course Name : Groundwater And Well Engineering

C 311

C 311.1	Students know the technical aspects of groundwater, its availability, assessment and utilization	K1
C 311.2	Familiarized with the theory behind well design, construction and management of wells.	K6

Course Name : Food And Dairy Engineering

C 312

C 312.1	The students will gain knowledge about Dairy and Food process engineering	K1
C 312.2	Understand the process of manufacturing of dairy products and thermal processing of food.	K2
C 312.3	Students will understand the importance of quality control and food preservation and packaging.	K2

Course Name : Protected Cultivation

C 313

C 313.1	The students will be able to appreciate the different methods of protected cultivation practices available for vegetable crops and flowers	K3
C 313.2	A clear understanding of precision farming techniques and its application to horticultural crops is possible	K2

Course Name : Solar And Wind Energy Engineering

C 314

C 314.1	The concepts of solar and wind energy resources.	K1
C 314.2	The applications of solar and wind energy systems	K3

Course Name : Intellectual Property Rights

C 315

C 315.1	Ability to manage Intellectual Property portfolio to enhance the value of the firm.	K3
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Course Name : Sustainable Agriculture And Food Security

C 316

C 316.1	Upon completion of this course, the students will gain knowledge on the need for sustainable agriculture	K1
C 316.2	They will be able to comprehend the need for food security on global level and the Nutritional Security.	k2
C 316.3	The students will be able to demonstrate how ecological balance is required for sustainability of agriculture.	K3

Course Name : Cad For Agricultural Engineering

C 317

C 317.1	The student will be able to understand the plan and layout of underground pipes, post harvesting units and check dams.	K1
C 317.2	The students also will be able to design and draw the components using computer aided methods	K6

Course Name : Drawing Of Farm Structures

C 318

C 318.1	At the end of the course, the student will be able to design and draw all farm structures connected to agricultural engineering including animal housing, grain storage, small civil structures.	K6
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Course Name : Food Process Engineering Laboratory

C 319

C 319.1	On completion of the lab course, the students will be able to get experience on various aspects of food processing, preservation	K5
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Course Name : Study Tour

C 320

C 320.1	Students will develop a deeper understanding of real-world agricultural engineering problems and solutions.	K2
C 320.2	Students will gain hands-on experience with tools, technologies, and processes used in the agricultural industry	K3

SEMESTER: VII

Course Name : Soil And Water Conservation Engineering

C 401

C 401.1	The students will be able to gain fundamental knowledge on the concepts of erosion and sedimentation.	K1
C 401.2	They will have sufficient knowledge on soil and water conservation measures.	K1

Course Name : Remote Sensing And Geographical Information System

C 402

C 402.1	The students will understand the remote sensing principles, remote sensing systems satellite data processing and available data products.	K2
C 402.2	The students will understand decision making process using DBMS and utilization of these advanced techniques in addressing the real world problems.	K2

Course Name : Remote Sensing And Geographical Information System

C 403

C 403.1	The students will be able to understand the concepts of bio energy sources and its applications.	K2
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Course Name : Total Quality Management

C 404

C 404.1	The student would be able to apply the tools and techniques of quality management to manufacturing and services processes	K3
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Course Name : Robotics

C 405

C 405.1	Upon completion of this course, the students can able to apply the basic engineering knowledge for the design of robotics	K3
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Course Name : GIS Laboratory For Agricultural Engineers

C 406

C 406.1	On completion of the lab course, the students will have adequate knowledge in application of RS and GIS in various fields of agricultural engineering.	K3
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Course Name : Renewable Energy Laboratory

C 407

C 407.1	Be exposed to renewable energy sources and their applications.	K3
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Course Name : ICT In Agricultural Engineering Lab Exercises

C 408

C 408.1	Be exposed to renewable energy sources and their applications.	K3
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Course Name : Industrial Training

C 409

C 409.1	On completion of the training working experience and skills in carrying out engineering tasks related to various fields of agriculture.	K4
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SEMESTER: VIII

Course Name : Professional Ethics In Engineering

C 410

C 410.1	Upon completion of the course, the student should be able to apply ethics in society, discuss the ethical issues related to engineering and realize the responsibilities and rights in the society	K3
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Course Name : Fundamentals Of Nanoscience

C 411

C 411.1	Familiarize about the science of nanomaterials	K1
C 411.2	Demonstrate the preparation of nanomaterials	K3
C 411.3	Develop knowledge in characteristic nanomaterial	K3

Course Name : Project Work

C 412

C 412.1	On completion of the project work, students will be in a position to take up any challenging practical problem and find solution by formulating proper methodology.	K4
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2.6.1 Course Outcome (COs)

Course Name: COMMUNICATIVE ENGLISH		C 101	BT Level
C 101.1	Read articles of a general kind in magazines and newspapers		K2
C 101.2	Participate effectively in informal conversations; introduce themselves and their friends and		K3
C 101.3	Comprehend conversations and short talks delivered in English		K2
C 101.4	Write short essays of a general kind and personal letters and emails in English		K4

Course Name: ENGINEERING MATHEMATICS– I		C 102	BT Level
C 102.1	Use both the limit definition and rules of differentiation to differentiate functions.		K2
C 102.2	Apply differentiation to solve maxima and minima problems.		K3
C 102.3	Evaluate integrals both by using Riemann sums and by using the Fundamental Theorem of Calculus.		K3
C 102.4	Apply integration to compute multiple integrals, area, volume, integrals in polar coordinates, in addition to change of order and change of variables.		K4
C 102.5	Evaluate integrals using techniques of integration, such as substitution, partial fractions and integration by parts		K4
C 102.6	Determine convergence/divergence of improper integrals and evaluate convergent improper integrals.		K4
C 102.7	Apply various techniques in solving differential equations.		K4

Course Name: ENGINEERING PHYSICS		C 103	BT Level
C 103.1	The students will gain knowledge on the basics of properties of matter and its applications,		K1
C 103.2	The students will acquire knowledge on the concepts of waves and optical devices and their applications in fibre optics,		K1
C 103.3	The students will have adequate knowledge on the concepts of thermal properties of materials and their applications in expansion joints and heat exchangers,		K2
C 103.4	The students will get knowledge on advanced physics concepts of quantum theory and its application in tunneling microscopes,		K2
C 103.5	The students will understand the basics of crystals, their structures and different crystal growth techniques.		K2

Course Name: ENGINEERING CHEMISTRY		C 104	BT Level
C 104.1	The knowledge gained on engineering materials, fuels, energy sources and water treatment techniques will facilitate better understanding of engineering processes and applications for further learning.		K2

Course Name: PROBLEM SOLVING AND PYTHON PROGRAMMING		C 105	BT Level
C 105.1	Develop algorithmic solutions to simple computational problems		K3
C 105.2	Read, write, execute by hand simple Python programs.		K2
C 105.3	Structure simple Python programs for solving problems.		K3
C 105.4	Decompose a Python program into functions.		K4
C 105.5	Represent compound data using Python lists, tuples, dictionaries.		K3
C 105.6	Read and write data from/to files in Python Programs.		K3

Course Name: ENGINEERING GRAPHICS		C 106	BT Level
C 106.1	Familiarize with the fundamentals and standards of Engineering graphics		K1
C 106.2	Perform freehand sketching of basic geometrical constructions and multiple views of objects.		K3
C 106.3	Project orthographic projections of lines and plane surfaces.		K3
C 106.4	Draw projections and solids and development of surfaces.		K4
C 106.5	visualize and to project isometric and perspective sections of simple solids.		K4

Course Name: PROBLEM SOLVING AND PYTHON PROGRAMMING LABORATORY		C 107	BT Level
C 107.1	Write, test, and debug simple Python programs.		K3
C 107.2	Implement Python programs with conditionals and loops.		K3
C 107.3	Develop Python programs step-wise by defining functions and calling them.		K4
C 107.4	Use Python lists, tuples, dictionaries for representing compound data.		K3
C 107.5	Read and write data from/to files in Python.		K3

Course Name: PHYSICS AND CHEMISTRY LABORATORY		C 108	BT Level
C 108.1	Apply principles of elasticity, optics and thermal properties for engineering applications.		K3

Course Name: TECHNICAL ENGLISH		C 109	BT Level
C 109.1	Read technical texts and write area- specific texts effortlessly.		K2
C 109.2	Listen and comprehend lectures and talks in their area of specialisation successfully.		K3
C 109.3	Speak appropriately and effectively in varied formal and informal contexts.		K3
C 109.4	Write reports and winning job applications.		K3

Course Name: ENGINEERING MATHEMATICS– II		C 110	BT Level
C 110.1	Eigen values and eigenvectors, diagonalization of a matrix, Symmetric matrices, Positive definite matrices and similar matrices.		K3
C 110.2	Gradient, divergence and curl of a vector point function and related identities.		K3
C 110.3	Evaluation of line, surface and volume integrals using Gauss, Stokes and Green's theorems and their		K4
C 110.4	Analytic functions, conformal mapping and complex integration.		K4
C 110.5	Laplace transform and inverse transform of simple functions, properties, various related theorems and application to differential equations with constant coefficients.		K4

Course Name: PHYSICS FOR ELECTRONICS ENGINEERING		C111	BT Level
C 111.1	Gain knowledge on classical and quantum electron theories, and energy band structures,		K1
C 111.2	Acquire knowledge on basics of semiconductor physics and its applications in various devices		K2
C 111.3	Get knowledge on magnetic and dielectric properties of materials,		K2
C 111.4	Have the necessary understanding on the functioning of optical materials for optoelectronics,		K3
C 111.5	Understand the basics of quantum structures and their applications in spintronics and carbon electronics..		K4

Course Name: ENGINEERING MECHANICS FOR BIOMEDICAL ENGINEERING		C 112	BT Level
C 112.1	Use scalar and vector analytical techniques for analysing forces in statically determinate structures		K3
C 112.2	Apply fundamental concepts of kinematics and kinetics of particles to the analysis of simple, practical problems		K3

Course Name: FUNDAMENTALS OF BIO CHEMISTRY		C 113	BT Level
C 113.1	The student will be able to Explain the fundamentals of biochemistry		K2
C 113.2	The student will be able to Clinical application of Biochemistry		K3

Course Name: CIRCUIT ANALYSIS		C 114	BT Level
C 114.1	The student should be able to Develop the capacity to analyze electrical circuits, apply the circuit theorems in real time.		K3
C 114.2	The student should be able to Design and understand and evaluate the AC and DC circuits		K3

Course Name: ENGINEERING PRACTICES LABORATORY		C 115	BT Level
C 115.1	Fabricate carpentry components and pipe connections including plumbing works.		K3
C 115.2	Use welding equipments to join the structures.		K3
C 115.3	Carry out the basic machining operations		K3
C 115.4	Make the models using sheet metal works		K3
C 115.5	Illustrate on centrifugal pump, Air conditioner, operations of smithy, foundry and fittings		K2
C 115.6	Carry out basic home electrical works and appliances		K3
C 115.7	Measure the electrical quantities		K3
C 115.8	Elaborate on the components, gates, soldering practices.		K2

Course Name: BIO CHEMISTRY LABORATORY		C116	BT Level
C 116.1	Understand the Biochemistry laboratory functional components		K2
C 116.2	Understand the basic principle of preparation of buffers.		K2
C 116.3	Have a sound knowledge of qualitative test of different biomolecules.		K3
C 116.4	Understand the basic knowledge of Biochemical parameter and their interpretation in Blood sample.		K2
C 116.5	Have a sound knowledge of separation technology of proteins and amino acids		K4

Course Name: LINEAR ALGEBRA AND PARTIAL DIFFERENTIAL EQUATION		C201	BT Level
C 201.1	To extend student's logical and mathematical maturity and ability to deal with abstraction		K3
C 201.2	To introduce most of the basic terminologies used in computer science courses and application of ideas to solve practical problems.		K3
C 201.3	To understand the basic concepts of combinatorics and graph theory.		K3
C 201.4	Able to solve various types of partial differential equations		K4
C 201.5	Able to solve engineering problems using Fourier series basis for further reading and study in the subject		K4

Course Name: SIGNALS AND SYSTEM		C202	BT Level
C 202.1	To be able to determine if a given system is linear/causal/stable		K3
C 202.2	Capable of determining the frequency components present in a deterministic signal		K3
C 202.3	Capable of characterizing LTI systems in the time domain and frequency domain		K4
C 202.4	To be able to compute the output of an LTI system in the time and frequency domains		K4

Course Name: ANATOMY AND HUMAN PHYSIOLOGY		C203	BT Level
C 203.1	Students would be able to explain basic structure and functions of cell		K2
C 203.2	Students would be learnt about anatomy and physiology of various systems of human body		K2
C 203.3	Students would be able to explain interconnect of various systems		K3

Course Name: SENSORS AND MEASUREMENTS		C204	BT Level
C 204.1	Measure various electrical parameters with accuracy, precision, resolution.		K3
C 204.2	Select appropriate passive or active transducers for measurement of physical phenomenon		K3
C 204.3	Select appropriate light sensors for measurement of physical phenomenon		K3
C 204.4	Use AC and DC bridges for relevant parameter measurement.		K3
C 204.5	Employ Multimeter, CRO and different types of recorders for appropriate measurement.		K3

Course Name: ELECTRONIC DEVICES AND CIRCUITS		C205	BT Level
C 205.1	Explain the structure and working operation of basic electronic devices.		K2
C 205.2	Able to identify and differentiate both active and passive elements		K2
C 205.3	Analyze the characteristics of different electronic devices such as diodes and transistors		K4
C 205.4	Choose and adapt the required components to construct an amplifier circuit		K4
C 205.5	Employ the acquired knowledge in design and analysis of oscillators		K4

Course Name: PATHOLOGY AND MICROBIOLOGY		C206	BT Level
C 206.1	Analyze structural and functional aspects of living organisms.		K4
C 206.2	Explain the function of microscope		K2
C 206.3	Discuss the importance of public health.		K2
C 206.4	Describe methods involved in treating the pathological diseases		K3

Course Name: PATHOLOGY AND MICROBIOLOGY LABORATORY		C207	BT Level
C 207.1	Student can perform practical experiments on tissue processing, cryoprocessing, staining Processes etc.		K3

Course Name: DEVICES AND CIRCUITS LABORATORY		C208	BT Level
C 208.1	Analyze the characteristics of basic electronic devices Processes etc.		K4
C 208.2	Design RL and RC circuits		K3
C 208.3	Verify Thevinin & Norton theorem KVL & KCL, and Super Position Theorems		K4

Course Name: HUMAN PHYSIOLOGY LABORATORY		C209	BT Level
C 209.1	Identification and enumeration of blood cells		K3
C 209.2	Enumeration of haematological parameters		K3
C 209.3	Analysis of special sensory organs test		K4

SEMESTER IV

Course Name: PROBABILITY AND STATISTICS		C210	BT Level
C 210.1	Understand the fundamental knowledge of the concepts of probability and have knowledge of standard distributions which can describe real life phenomenon		K2
C 210.2	Understand the basic concepts of one and two dimensional random variables and apply in engineering applications		K3
C 210.3	Apply the concept of testing of hypothesis for small and large samples in real life problems.		K3
C 210.4	Apply the basic concepts of classifications of design of experiments in the field of agriculture and statistical quality control		K3
C 210.5	Have the notion of sampling distributions and statistical techniques used in engineering and management problems		K4

Course Name: MEDICAL PHYSICS		C211	BT Level
C 211.1	Explain about non-ionizing radiation, interaction with tissue and its effects.		K2
C 211.2	Define and compare intensities of sensory stimuli		K2
C 211.3	Summarizes how ionizing radiation interacts with the human body, how to quantify it and its levels seen in the environment		K3
C 211.4	Explain the fundamentals of radioactivity and radioactive isotopes		K2
C 211.5	Illustrates the methods of detecting and recording the ionizing radiation and its interaction with matter		K3

Course Name: BASICS OF ELECTRICAL ENGINEERING		C212	BT Level
C 212.1	Design simple electrical circuits and understand through nodal, mesh analysis about constructing series and parallel configuration of circuits with sources and variable loads.		K3
C 212.2	Get knowledge on electrical machines and on its efficient operating principle.		K2
C 212.3	Understand metering principles, safety measures while working with electrical circuits.		K2
C 212.4	Analyse existing power distribution and hence apply technology in electrical applications		K3

Course Name: LINEAR INTEGRATED CIRCUITS		C213	BT Level
C 213.1	Design linear and non linear applications of OP – AMPS		K4
C 213.2	Design applications using analog multiplier and PLL		K4
C 213.3	Design ADC and DAC using OP – AMPS		K4
C 213.4	Generate waveforms using OP – AMP Circuits		K3
C 213.5	Analyze special function IC		K3

Course Name: FUNDAMENTALS OF DATA STRUCTURE IN C		C214	BT Level
C 214.1	Implement linear and non-linear data structure operations using C		K3
C 214.2	Suggest appropriate linear / non-linear data structure for any given data set.		K3
C 214.3	Apply hashing concepts for a given problem		K3
C 214.4	Modify or suggest new data structure for an application		K4
C 214.5	Appropriately choose the sorting algorithm for an application		K3

Course Name: DIGITAL ELECTRONICS		C215	BT Level
C 215.1	Use digital electronics in the present contemporary world		K2
C 215.2	Design various combinational digital circuits using logic gates		K3
C 215.3	Do the analysis and design procedures for synchronous and asynchronous sequential circuits		K4
C 215.4	Use the semiconductor memories and related technology		K3
C 215.5	Use electronic circuits involved in the design of logic gates		K3

Course Name: FUNDAMENTALS OF DATA STRUCTURE IN C LABORATORY		C216	BT Level
C 216.1	Write basic and advanced programs in C		K3
C 216.2	Implement functions and recursive functions in C		K4
C 216.3	Implement data structures using C		K3
C 216.4	Choose appropriate sorting algorithm for an application and implement it in a modularized way		K4

Course Name: INTEGRATED CIRCUITS LABORATORY		C217	BT Level
C 217.1	Design oscillators and amplifiers using operational amplifiers.		K4
C 217.2	Design filters using Opamp and perform experiment on frequency response.		K4
C 217.3	Analyse the working of PLL and use PLL as frequency multiplier.		K3
C 217.4	Design DC power supply using ICs.		K4
C 217.5	Aquire knowledge in using SPICE		K2

SEMESTER V

Course Name: ANALOG AND DIGITAL COMMUNICATION		C301	BT Level
C 301.1	Apply analog and digital communication techniques.		K3
C 301.2	Use data and pulse communication techniques.		K3
C 301.3	Analyze Source and Error control coding.		K4
C 301.4	Utilize multi-user radio communication.		K3
C 301.5	Understand digital communication techniques		K2

Course Name: BIO CONTROL SYSTEM		C302	BT Level
C 302.1	Understand the need for mathematical modeling of various systems, representation of systems in block diagrams and signal flow graphs and are introduced to biological control systems		K3
C 302.2	Analyze the time response of various systems and discuss the concept of system stability		K4
C 302.3	Understand the concept of modeling basic physiological systems		K3
C 302.4	Comprehend the application aspects of time and frequency response analysis in physiological control systems.		K4

Course Name: BIOMEDICAL INSTRUMENTATION		C303	BT Level
C 303.1	Differentiate different bio potentials and its propagations.		K2
C 303.2	Illustrate different electrode placement for various physiological recordings		K3
C 303.3	Design bio amplifier for various physiological recordings		K4
C 303.4	Explain various technique for non-electrical physiological measurements		K3
C 303.5	Demonstrate different biochemical measurement techniques.		K3

Course Name: DISCRETE-TIME SIGNAL PROCESSING		C304	BT Level
C 304.1	Apply DFT for the analysis of digital signals and systems		K3
C 304.2	Design IIR and FIR filters		K4
C 304.3	Characterize the effects of finite precision representation on digital filters		K4
C 304.4	Design multirate filters		K4
C 304.5	Apply adaptive filters appropriately in communication systems		K3

Course Name: TOTAL QUALITY MANAGEMENT		C305	BT Level
C 305.1	The student would be able to apply the tools and techniques of quality management to manufacturing and services processes.		K3

Course Name: RENEWABLE ENERGY SYSTEM		C306	BT Level
C306.1	Ability to create awareness about renewable Energy Sources and technologies.		K2
C306.2	Ability to get adequate inputs on a variety of issues in harnessing renewable Energy.		K3
C306.3	Ability to recognize current and possible future role of renewable energy sources.		K2
C306.4	Ability to explain the various renewable energy resources and technologies and their applications.		K3
C306.5	Ability to explain the various renewable energy resources and technologies and their applications.		K3
C306.6	Ability to understand basics about biomass energy.		K2
C306.7	Ability to acquire knowledge about solar energy.		K3

Course Name: DIGITAL SIGNAL PROCESSING LABORATORY		C307	BT Level
C 307.1	Carryout basic signal processing operations		K3
C 307.2	Demonstrate their abilities towards MATLAB based implementation of various DSP systems		K4
C 307.3	Analyze the architecture of a DSP Processor		K3
C 307.4	Design and Implement the FIR and IIR Filters in DSP Processor for performing filtering operation over real-time		K4
C 307.5	Design a DSP system for various applications of DSP		K4

Course Name: BIOMEDICAL INSTRUMENTATION LABORATORY		C308	BT Level
C 308.1	Design preamplifiers and amplifiers for various bio signal recordings		K4
C 308.2	Measure various non-electrical parameters using suitable sensors/transducers		K3
C 308.3	Design PCB layout for any bio amplifier.		K4

Course Name: INTERPERSONAL SKILLS/LISTENING AND SPEAKING		C309	BT Level
C 309.1	Listen and respond appropriately.		K3
C 309.2	Participate in group discussions		K3
C 309.3	Make effective presentations		K4
C 309.4	Participate confidently and appropriately in conversations both formal and informal		K3

SEMESTER VI

Course Name: MICROPROCESSORS AND MICROCONTROLLERS		C310	BT Level
C 310.1	Understand and execute programs based on 8086 microprocessor.		K3
C 310.2	Design Memory Interfacing circuits.		K4
C 310.3	Design and interface I/O circuits.		K4
C 310.4	Design and implement 8051 microcontroller based systems		K4

Course Name: DIAGNOSTIC AND THERAPEUTIC EQUIPMENT-1		C311	BT Level
C 311.1	Describe the working and recording setup of all basic cardiac equipment		K2
C 311.2	Understand the working and recording of all basic neurological equipment'		K2
C 311.3	Discuss the recording of diagnostic and therapeutic equipment's related to EMG		K3
C 311.4	Explain about measurements of parameters related to respiratory system		K3
C 311.5	Describe the measurement techniques of sensory responses.		K3

Course Name: BIOMECHANICS		C312	BT Level
C 312.1	Understand the principles of mechanics		K2
C 312.2	Outline the principles of biofluid dynamics		K3
C 312.3	Explain the fundamentals of bio-solid mechanics		K2
C 312.4	Apply the knowledge of joint mechanics.		K4
C 312.5	Give Examples of computational mathematical modelling applied in biomechanics.		K3

Course Name: ENVIRONMENTAL SCIENCE AND ENGINEERING		C313	BT Level
C 313.1	aspect which serves the environmental Protection. One will obtain knowledge on the following after completing the course		K2
C 313.2	Public awareness of environmental is at infant stage.		K2
C 313.3	Ignorance and incomplete knowledge has lead to misconception		K3
C 313.4	Development and improvement in std. of living has lead to serious environmental disasters		K3

Course Name: HOSPITAL MANAGEMENT		C314	BT Level
C 314.1	Explain the principles of Hospital administration.		K2
C 314.2	Identify the importance of Human resource management		K3
C 314.3	List various marketing research techniques		K2
C 314.4	Identify Information management systems and its uses.		K3
C 314.5	Understand safety procedures followed in hospitals.		K2

Course Name: TELEHEALTH TECHNOLOGY		C315	BT Level
C 315.1	Apply multimedia technologies in telemedicine		K3
C 315.2	Explain protocols behind encryption techniques for secure transmission of data		K4
C 315.3	Apply telehealth in healthcare.		K3

Course Name: MICROPROCESSORS AND MICROCONTROLLERS LABORATORY		C316	BT Level
C 316.1	Write ALP Programmes for fixed and Floating Point and Arithmetic operations		K4
C 316.2	Interface different I/Os with processor		K4
C 316.3	Generate waveforms using Microprocessors		K3
C 316.4	Execute Programs in 8051		K4
C 316.5	Explain the difference between simulator and Emulator		K2

Course Name: DIAGNOSTIC AND THERAPEUTIC EQUIPMENT LABORATORY		C317	BT Level
C 317.1	Measure different bioelectrical signals using various methods		K3
C 317.2	Assess different non-electrical parameters using various methodologies		K3
C 317.3	Illustrate various diagnostic and therapeutic techniques		K3
C 317.4	Examine the electrical safety measurements		K3
C 317.5	Analyze the different bio signals using suitable tools.		K2

Course Name: MINI PROJECT		C318	BT Level
C 318.1	Formulate a real world problem, identify the requirement and develop the design solutions		K2
C 318.2	Express the technical ideas, strategies and methodologies		K3
C 318.3	Utilize the new tools, algorithms, techniques that contribute to obtain the solution of the project		K3
C 318.4	Test and validate through conformance of the developed prototype and analysis the cost effectiveness.		K3

C 318.5	Prepare report and present the oral demonstrations.	K3
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Course Name: PROFESSIONAL COMMUNICATION		C319	BT Level
C 319.1	Make effective presentations		K2
C 319.2	Participate confidently in Group Discussions.		K3
C 319.3	Attend job interviews and be successful in them.		K4
C 319.4	Develop adequate Soft Skills required for the workplace		K3

SEMESTER VII

Course Name: DIAGNOSTIC AND THERAPEUTIC EQUIPMENT-II		C401	BT Level
C 401.1	Discuss the various equipment used in ICU and applications of telemetry		K3
C 401.2	Explain the types of diathermy and its applications.		K3
C 401.3	Express the basics of ultrasound and its application in medicine		K3
C 401.4	Discuss the various extracorporeal and special diagnostic devices used in hospitals		K3
C 401.5	Outline the importance of patient safety against electrical hazard		K2

Course Name: DIGITAL IMAGE PROCESSING		C402	BT Level
C 402.1	Know and understand the basics and fundamentals of digital image processing, such as digitization, sampling, quantization, and 2D-transforms.		K2
C 402.2	Operate on images using the techniques of smoothing, sharpening and enhancement.		K3
C 402.3	Understand the restoration concepts and filtering techniques.		K3
C 402.4	Learn the basics of segmentation, features extraction, compression and recognition methods for color models		K3

Course Name: RADIOLOGICAL EQUIPMENT		C403	BT Level
C 403.1	Describe the working principle of X ray machine and its application.		K2
C 403.2	Illustrate the principle computed tomography		K3
C 403.3	Interpret the technique used for visualizing various sections of the body using magnetic resonance imaging		K4
C 403.4	Demonstrate the applications of radio nuclide imaging		K3
C 403.5	Outline the methods of radiation safety		K3

Course Name: REHABILITATION ENGINEERING		C404	BT Level
C 404.1	Gain adequate knowledge about the needs of rehabilitations and its future development		K2
C 404.2	Have an in depth idea about Engineering Concepts in Sensory & Motor rehabilitation.		K3
C 404.3	Apply the different types of Therapeutic Exercise Technique to benefit the society.		K3
C 404.4	Design and apply different types Hearing aids, visual aids and their application in biomedical field and hence the benefit		K4
C 404.5	Gain in-depth knowledge about different types of models of Hand and arm replacement.		K4

Course Name: INTERNET OF THINGS		C405	BT Level
C 405.1	Explain the concept of IoT.		K2
C 405.2	Analyze various protocols for IoT.		K3
C 405.3	Design a PoC of an IoT system using Rasperry Pi/Arduino		K4
C 405.4	Apply data analytics and use cloud offerings related to IoT		K4

C 405.5	Analyze applications of IoT in real time scenario	K3
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Course Name: ELECTRONICS MATERIALS

C406

**BT
Level**

C 406.1	With the basis, students will be able to have clear concepts on electronic behaviors of materials	K2
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Course Name: DIGITAL IMAGE PROCESSING LABORATORY

C407

**BT
Level**

C 407.1	Perform enhancing operations on the image using spatial filters and frequency domain filters	K3
C 407.2	Use transforms and analyse the characteristics of the image	K3
C 407.3	Perform segmentation operations in the images	K4
C 407.4	Estimate the efficiency of the compression technique on the images	K3
C 407.5	Apply image processing technique to solve real health care problems.	K4

Course Name: HOSPITAL TRAINING

C408

**BT
Level**

C 408.1	Advocate a patient-centred approach in healthcare	K3
C 408.2	Communicate with other health professionals in a respectful and responsible manner	K3
C 408.3	Recognize the importance of inter-professional collaboration in healthcare.	K3
C 408.4	Propose a patient-centred inter-professional health improvement plan based upon the patient's perceived needs	K4
C 408.5	Use the knowledge of one's own role and those of other professions to address the healthcare needs of populations and patients served.	K3

SEMESTER VIII

Course Name: ELECTRICAL SAFETY AND QUALITY ASSURANCE		C409	BT Level
C409.1	The purpose of this course is to help students to develop knowledge and insight into the procedures used in quality control and assurance activities as well as		K2
C409.2	safety measures to be followed in hospitals.		K3
C409.3	To know the Standards and requirement		K2
C409.4	To know the Electrical protection and maintenance		K3
C409.5	To know the Standardization of quality medical care in hospitals		K2

Course Name: HOSPITAL WASTE MANAGEMENT		C410	BT Level
C 410.1	Analyse various hazards, accidents and its control		K3
C 410.2	Design waste disposal procedures for different biowastes		K4
C 410.3	Categorise different biowastes based on its properties		K3
C 410.4	Design different safety facility in hospitals		K4
C 410.5	Propose various regulations and safety norms		K3

Course Name: PROJECT WORK		C411	BT Level
C 411.1	To develop the ability to solve a specific problem right from its identification and literature review till the successful solution of the same		K4
C 411.2	To train the students in preparing project reports and to face reviews and viva voce examination.		K3
C 411.3	To take up any challenging practical problems and find solution by formulating proper methodology.		K4
C 411.4	To understand the team work		K3
C 411.5	On Completion of the project work students will be in a position to take up any challenging practical problems and find solution by formulating proper		K4