

**SWAMI VIVEKANAND SUBHARTI UNIVERSITY, MEERUT**

**SUBHARTI INSTITUTE OF ENGINEERING & TECHNOLOGY**

**COURSE OUTCOMES-PROGRAMME OUTCOMES**

**[BTECH 1ST YEAR ODD SEMESTER]**



## **PROGRAM OUTCOMES (POS)**

### **PO 1:**

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

### **PO 2:**

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

### **PO 3:**

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

### **PO 4:**

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

### **PO 5:**

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

### **PO 6:**

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

### **PO 7:**

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

**PO 8: Ethics:**

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

**PO 9:**

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

**PO 10: Communication:**

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

**PO 11:**

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

**PO 12:**

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

## GROUP 1

**SUBJECT NAME: ENGINEERING CHEMISTRY**

**SUBJECT CODE: BAS-102**

**BRANCH: EEE/CS/EC**

### **COURSE OUTCOME:**

CO1	Use of different analytical instruments
CO2	Measure molecular/system properties such as ST, Viscosity, Conductance of solution, Chloride and iron Content in water
CO3	Measure hardness of water
CO4	Estimate the rate of reaction

**SUBJECT NAME: MATHEMATICS – I**

**SUBJECT CODE: BAS-103**

**BRANCH: CSE/ECE/EEE/ME/CE**

### **COURSE OUTCOME:**

CO1	Remember the concept of matrices and apply for solving linear simultaneous equations.
CO2	Understand the concept of limit, continuity and differentiability and apply in the study of Rolle's theorem, Lagrange's and Cauchy's mean value theorem and Leibnitz theorems.
CO3	Identify the application of partial differentiation and apply for evaluating maxima, minima, series and Jacobians.
CO4	Illustrate the working methods of multiple integral and apply for finding area, volume, centre of mass and centre of gravity.
CO5	Remember the concept of vector and apply for directional derivatives, tangemt and normal planes. Also evaluate line, surface and volume integrals.

**SUBJECT NAME: PROGRAMMING FOR PROBLEM SOLVING**

**SUBJECT CODE: BCSE-101**

**BRANCH: CSE/ECE/EEE**

**COURSE OUTCOME:**

CO1	To understand in depth about computers and its memory and to formulate simple algorithms and programs in C.
CO2	To test and execute the programs by using conditional branching, iteration and recursion. And correct syntax and logical errors.
CO3	To understand array for storing homogenous data.
CO4	To decompose a problem into functions and synthesize a complete program using divide and conquer approach.
CO5	To use arrays, pointers and structures to formulate algorithms and programs for heterogeneous data to solve problem statements.

**SUBJECT NAME: ENGINEERING CHEMISTRY LAB**

**SUBJECT CODE: BAS-152**

**BRANCH:/: EEE/CS/EC**

**COURSE OUTCOME:**

CO1	Use of different analytical instruments
CO2	Measure molecular/system properties such as ST, Viscosity, Conductance of solution, Chloride and iron Content in water
CO3	Measure hardness of water
CO4	Estimate the rate of reaction
CO5	Chloride and iron Content in water

**SUBJECT NAME: PROGRAMMING FOR PROBLEM SOLVING LAB**

**SUBJECT CODE: BCSE-151**

**BRANCH: CSE/ECE/EEE**

**COURSE OUTCOME:**

CO1	Analyze concepts in problem solving do programming in C language and write diversified solutions using C language.
CO2	Identify situations where computational methods and computers would be useful.
CO3	Understand the programming tasks using techniques learned and write pseudo-code.
CO4	Compare the program on a computer, edit, compile, debug, correct, recompile and run it.
CO5	Identify tasks in which the numerical techniques learned are applicable and apply them to write programs, and hence use computers effectively to solve the task.

**SUBJECT NAME: WORKSHOP PRACTICE LAB**

**SUBJECT CODE: BME-152**

**BRANCH: CSE/ECE/EEE**

**COURSE OUTCOME:**

CO1	To identify tools, work material and measuring instruments useful for fitting, welding, carpentry.
CO2	To handle tools and instruments and use them to prepare joints of specific shape and size.

## GROUP II

**SUBJECT NAME: PHYSICS**

**SUBJECT CODE: BAS-101**

**BRANCH: CE, ME**

### **COURSE OUTCOME:**

CO1	Able to understand the general scientific concepts of relativistic mechanics.
CO2	An ability to identify, formulate, and solve Electromagnetic problems.
CO3	To become familiar with blackbody radiation, schrodinger's wave equation for many systems etc.
CO4	Students understand the concept of interference, diffraction which are very basic in the field of wave optics.
CO5	An ability to understand the basic concepts of optical fibers & their properties and the Laser fundamentals.

**SUBJECT NAME: ELECTRICAL ENGINEERING**

**SUBJECT CODE: BEEE-101**

**BRANCH/: CE, ME**

### **Course Outcomes (COs)**

CO1	Apply the concepts of KCL/KVL and network theorems in solving DC circuits.
CO2	Analyze the steady state behaviour of single phase and three phase AC electrical circuits
CO3	Identify the application areas of a single phase two winding transformers as well as auto-transformers and calculate their efficiency. Also identify the connections of a three phase transformer
CO4	Illustrate the working principles of induction motor, synchronous machine as well as DC machine and employ them in different area of application
CO5	Describe the components of low voltage electrical installations and perform elementary calculations for energy consumptions

**SUBJECT NAME: ENGINEERING GRAPHIC & DESIGN LAB**

**SUBJECT CODE: BME-151**

**BRANCH: CE, ME**

**COURSE OUTCOMES: At the end of the course, the student will be able to:**

CO1	Understand 2D/ 3D drafting of line, plane and solids; letter writing, AUTO CAD, scale and about the horizontal plane, vertical plane and other important tool used for creating the drawing.
CO2	Get the knowledge about the quadrant system, first angle projection, and third angle projection also their symbol used in drawing, geometrical construction such as pentagon, hexagon.etc.
CO3	Get the knowledge about the orthographic projection, top view front view, side view of a plane object.
CO4	Draw the solid projection such as pyramid, prism and cone etc
CO5	Draw sections of solids including cylinders, cones, prisms and pyramids.
CO6	Draw isometric view of different plane figure and solid.

**SUBJECT NAME: PHYSICS LAB**

**SUBJECT CODE: BAS 151**

**BRANCH: CE, ME**

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**COURSE OUTCOME:**

CO1	Use Carey foster 'bridge, LCR, potentiometer, polarimeter and BH curves for making measurements.
CO2	Test optical components using principles of interference, polarization and diffraction of light
CO3	Determine the band gap, hall coefficient and mobility for a semiconductor.
CO4	Determine the width of narrow slits, spacing between close rulings using lasers and appreciate the accuracy in measurements.

**SUBJECT NAME: Electrical Engineering Lab**

**SUBJECT CODE: BEEE 151**

**BRANCH/YEAR/SEMESTER: CE, ME**

**Course Outcomes (COs)**

CO1	Conduct experiments illustrating the application of KVL/KCL and network theorems to DC electrical circuits.
CO2	Demonstrate the behavior of AC circuits connected to single phase AC supply and measure power in single phase as well as three phase electrical circuits.
CO3	Perform experiment illustrating BH curve of magnetic materials. Calculate efficiency of a single phase transformer and DC machine.
CO4	Perform experiments on speed measurement and reversal of direction of three phase induction motor and identify the type of DC and AC machines based on their construction.



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**COURSE OUTCOMES-PROGRAMME OUTCOMES**

**[BTECH 1ST YEAR EVEN SEMESTER]**

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**PO 9:**

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**PO 10:**

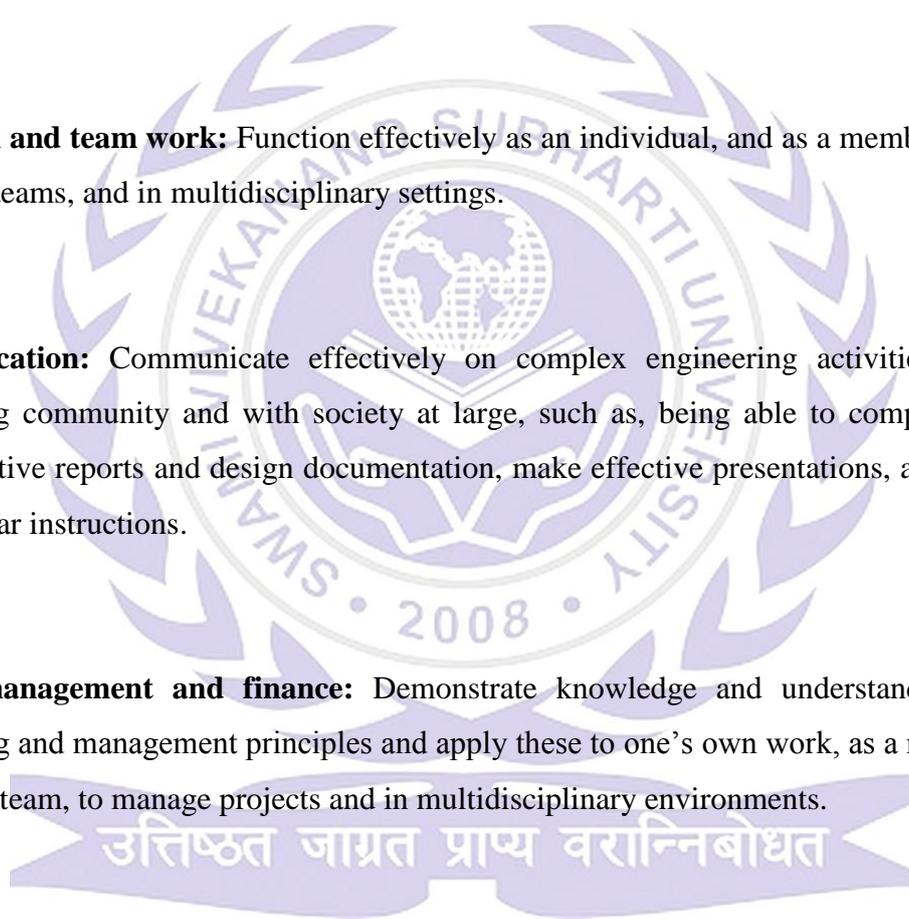
**Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

**PO 11:**

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

**PO 12:**

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



## GROUP I

**SUBJECT NAME: PHYSICS**

**SUBJECT CODE: BAS 201**

**BRANCH/YEAR/SEMESTER: CSE, ECE, EEE**

### **COURSE OUTCOME:**

CO1	Able to understand the general scientific concepts of relativistic mechanics.
CO2	An ability to identify, formulate, and solve Electromagnetic problems.
CO3	To become familiar with blackbody radiation, schrodinger's wave equation for many systems etc.
CO4	Students understand the concept of interference, diffraction which are very basic in the field of wave optics.
CO5	An ability to understand the basic concepts of optical fibers & their properties and the Laser fundamentals.

**SUBJECT NAME: Mathematics – II**

**SUBJECT CODE: BAS-203**

**BRANCH/YEAR/SEMESTER: CSE/ECE/EEE/ME/CE**

### **COURSE OUTCOME:**

CO1	Understand the concept of differentiation and apply for solving differential equations.
CO2	Remember the concept of definite integral and apply for evaluating surface areas and volumes.
CO3	Understand the concept of convergence of sequence and series for evaluating Fourier series.
CO4	Illustrate the working methods of complex functions and apply for finding analytic functions.
CO5	Apply the complex functions for finding Taylor's series, Laurent's series and evaluation of definite integrals.

**SUBJECT NAME: ELECTRICAL ENGINEERING**

**SUBJECT CODE: BEEE-201**

**BRANCH/YEAR/SEMESTER: EC, CS, EE**

**Course Outcomes (COs)**

CO1	Apply the concepts of KCL/KVL and network theorems in solving DC circuits.
CO2	Analyze the steady state behaviour of single phase and three phase AC electrical circuits
CO3	Identify the application areas of a single phase two winding transformers as well as an auto-transformer and calculate their efficiency. Also identify the connections of a three phase transformer.
CO4	Illustrate the working principles of induction motor, synchronous machine as well as DC machine and employ them in different area of application
CO5	Describe the components of low voltage electrical installations and perform elementary calculations for energy consumptions

**SUBJECT NAME: Physics Lab**

**SUBJECT CODE: BAS 251**

**BRANCH/YEAR/SEMESTER: CSE, ECE, EEE**

**COURSE OUTCOME:**

CO1	Use Carey foster'bridge, LCR, potentiometer, polarimeter and BH curves for making measurements.
CO2	Test optical components using principles of interference, polarizatyion and diffraction of light
CO3	Determine the band gap, hall coefficient and mobility for a semiconductor.
CO4	Determine the width of narrow slits, spacing between close rulings using lasers and appreciate the accuracy in measurements.

**SUBJECT NAME: Electrical Engineering Lab**

**SUBJECT CODE: BEEE 251**

**BRANCH/YEAR/SEMESTER: EC, CS, EEE I/II**

**Course Outcomes (COs)**

CO1	Conduct experiments illustrating the application of KVL/KCL and network theorems to DC electrical circuits.
CO2	Demonstrate the behavior of AC circuits connected to single phase AC supply and measure power in single phase as well as three phase electrical circuits.
CO3	Perform experiment illustrating BH curve of magnetic materials.
CO4	Calculate efficiency of a single phase transformer and DC machine.
CO5	Perform experiments on speed measurement and reversal of direction of three phase induction motor and identify the type of DC and AC machines based on their construction.

**SUBJECT NAME: Engineering Graphic & Design Lab**

**SUBJECT CODE: BME-251**

**BRANCH/YEAR/SEMESTER: EC,CS, EEE/I/II**

**COURSE OUTCOMES: At the end of the course, the student will be able to:**

CO1	Understand 2D/ 3D drafting of line, plane and solids; letter writing, – AUTO CAD, scale and about the horizontal plane, vertical plane and other important tool used for creating the drawing.
CO2	Get the knowledge about the quadrant system, first angle projection, and third angle projection also their symbol used in drawing, geometrical construction such as pentagon, hexagon.etc.
CO3	Get the knowledge about the orthographic projection, top view front view, side view of a plane object.
CO4	Draw the solid projection such as pyramid, prism and cone etc
CO5	Draw sections of solids including cylinders, cones, prisms and pyramids.
CO6	Draw isometric view of different plane figure and solid.

## GROUP II

**SUBJECT NAME:** Engineering Chemistry

**SUBJECT CODE:** BAS-202

**BRANCH/YEAR/SEMESTER:** ME, CE I/II

### **COURSE OUTCOME:**

CO1	Use of different analytical instruments
CO2	Measure molecular/system properties such as ST, Viscosity, Conductance of solution, Chloride and iron Content in water
CO3	Measure hardness of water
CO4	Estimate the rate of reaction

**SUBJECT NAME:** Programming for Problem Solving

**SUBJECT CODE:** BCSE-201

**BRANCH/YEAR/SEMESTER:** ME, CE I/II

### **COURSE OUTCOME:**

CO1	To understand in depth about computers and its memory and to formulate simple algorithms and programs in C.
CO2	To test and execute the programs by using conditional branching, iteration and recursion. And correct syntax and logical errors.
CO3	To understand array for storing homogenous data.
CO4	To decompose a problem into functions and synthesize a complete program using divide and conquer approach.
CO5	To use arrays, pointers and structures to formulate algorithms and programs for heterogeneous data to solve problem statements.

**SUBJECT NAME: Workshop Practice Lab**

**SUBJECT CODE: BME-252**

**BRANCH/YEAR/SEMESTER: ME/CE/1st/2<sup>ND</sup>**

**COURSE OUTCOME:**

CO1	To identify tools, work material and measuring instruments useful for fitting, welding, carpentry.
CO2	To handle tools and instruments and use them to prepare joints of specific shape and size.

**SUBJECT NAME: Engineering Chemistry Lab**

**SUBJECT CODE: BAS-252**

**BRANCH/YEAR/SEMESTER: ME, CE(1/II)**

**COURSE OUTCOME:**

CO1	Use of different analytical instruments
CO2	Measure molecular/system properties such as ST, Viscosity, Conductance of solution, Chloride and iron Content in water
CO3	Measure hardness of water
CO4	Estimate the rate of reaction
CO5	Chloride and iron Content in water

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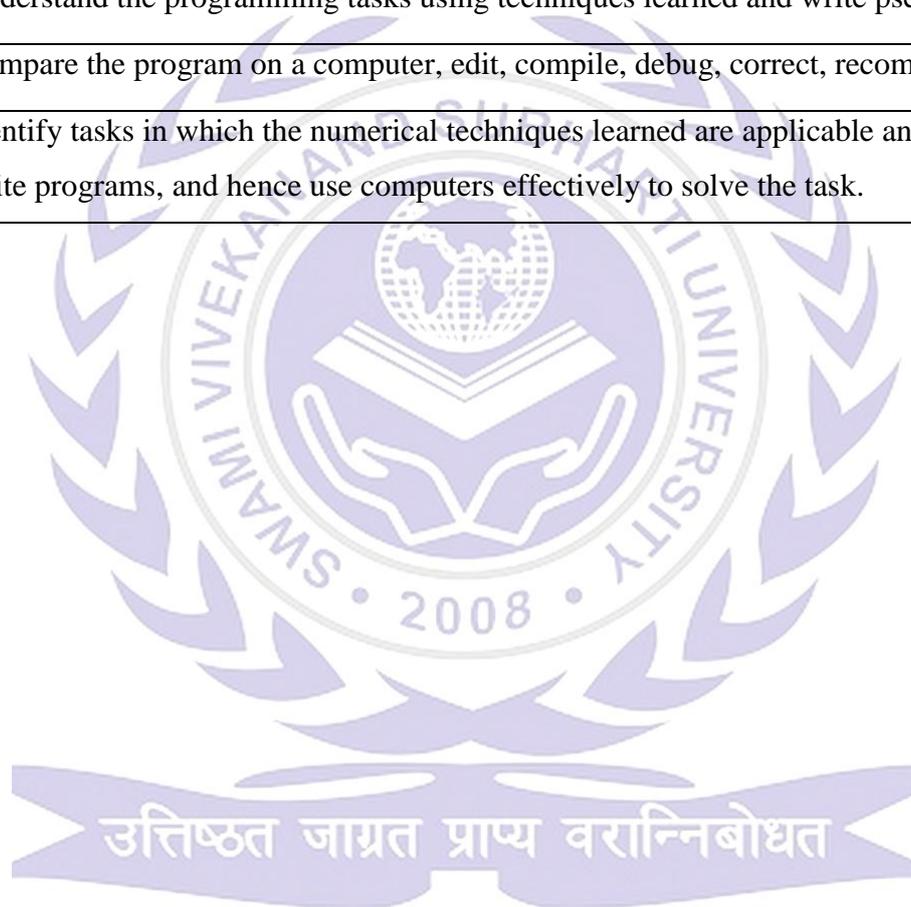
**SUBJECT NAME: Programming for Problem Solving Lab**

**SUBJECT CODE: BCSE-251**

**BRANCH/YEAR/SEMESTER: ME, CE (I/II)**

**COURSE OUTCOME:**

CO1	Analyze concepts in problem solving do programming in C language and write diversified solutions using C language.
CO2	Identify situations where computational methods and computers would be useful.
CO3	Understand the programming tasks using techniques learned and write pseudo-code.
CO4	Compare the program on a computer, edit, compile, debug, correct, recompile and run it.
CO5	Identify tasks in which the numerical techniques learned are applicable and apply them to write programs, and hence use computers effectively to solve the task.



**DEPARTMENT OF COMPUTER SCIENCE ENGINEERING**

**THIRD SEMESTER:**

**SUBJECT NAME: DATA STRUCTURE & ALGORITHM**

**SUBJECT CODE: BCSE-301**

**YEAR/SEMESTER: II / III**

**COURSE OUTCOME:**

CO1	Compare different programming methodologies and define asymptotic notations to Analyse performance of algorithms.
CO2	Use appropriate data structures like arrays, linked list, stacks and queues to solve real world problems efficiently.
CO3	Represent and manipulate data using nonlinear data structures like trees and graphs to design algorithms for various applications.
CO4	Illustrate and compare various techniques for searching and sorting.
CO5	Illustrate various hashing techniques.

**SUBJECT NAME: DIGITAL ELECTRONICS**

**SUBJECT CODE: BECE-306**

**YEAR/SEMESTER: II YEAR III SEMESTER**

**COURSE OUTCOME:**

CO1	Understand the philosophy of number system and codes. Simplify the logic expressions using Boolean laws and theorem and design them by using logic gates. Minimize the logic expressions using K-map method and tabular method
CO2	Design and analysis of combinational logic circuits using logic gates.
CO3	Design and analysis of synchronous sequential logic circuits (like flip flop, registers, counters etc.)
CO4	Design of memory and programmable logic circuits (like RAM, ROM, PLA, ASM etc.)
CO5	Design and analysis of asynchronous logic circuits.

**SUBJECT NAME: Data Structure & Algorithm lab**

**SUBJECT CODE: BCSE-351**

**YEAR/SEMESTER: II YEAR III SEMESTER**

**COURSE OUTCOMES (COs)**

CO1	Demonstrate the various linear data structures using simple applications
CO2	Demonstrate the various Non Linear data structures using simple applications
CO3	Implement various sorting and searching Techniques.

**SUBJECT NAME: DIGITAL ELECTRONICS LAB**

**SUBJECT CODE: BECE-356**

**YEAR/SEMESTER: II YEAR III SEMESTER**

**COURSE OUTCOME:**

CO1	Graduate will have a composite understanding of logic gates and flip –flops.
CO2	Design the sequential and combinational circuits.

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## FOURTH SEMESTER

**SUBJECT NAME: Computer Organization and Architecture**

**SUBJECT CODE:BCSE-402**

**YEAR/SEMESTER: II YEAR IV SEMESTER**

CO1	Have a better understanding of sets and application of set theory.
CO2	Acquire the knowledge of relations, different types of functions, equivalence relations and their properties.
CO3	Understand logical arguments and constructs simple mathematical proofs.
CO4	Know various graphs and learn different algorithms.
CO5	Acquire the knowledge of partially ordered sets, lattices, Boolean algebra and able to apply in circuits.

### COURSE OUTCOME:

CO1	Understand the basic organization of computer and different instruction formats and addressing modes
CO2	Understand and analyze various issues related to memory hierarchy.
CO3	Evaluate various modes of data transfer between CPU and I/O devices.
CO4	Understand the advantage of instruction level parallelism and pipelining for high performance Processor design

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**SUBJECT NAME: OPERATING SYSTEMS**

**SUBJECT CODE:BCSE-403**

**YEAR/SEMESTER: II YEAR IV SEMESTER**

### COURSE OUTCOME:

CO1	To understand the fundamental concepts of OS.
CO2	Understanding of practical experience with software tools available in modern OS.
CO3	Understand process scheduling in a multiprogramming environment and implement a process scheduling algorithm.
CO4	Understanding memory management techniques, including virtual memory in the modern OS
CO5	To understand file system structure and implement a file system such as FAT.

**SUBJECT NAME: DESIGN & ANALYSIS OF ALGORITHM**

**SUBJECT CODE:BCSE-404**

**YEAR/SEMESTER: II YEAR IV SEMESTER**

**COURSE OUTCOME:**

CO1	Ability to analyze algorithms with various asymptotic Notation. Interpret the fundamental needs of algorithms in problem solving. Argue the correctness of algorithms using inductive proofs and invariants.
CO2	Ability to employ appropriate data structure like stack/ tree/ graphs to model engineering problems.
CO3	Derive and solve recurrences describing the performance of divide-and-conquer algorithms. Classify the different algorithm design techniques for problem solving Synthesize dynamic-programming algorithms, and analyze them.
CO4	Recite Algorithms that design and implement Dynamic Programming applications. It will help to explain the suitability of algorithms design principle needed for a specific problem. Understand the concept of Backtracking and analyze several applications.
CO5	Understand the concept of NP Hard and NP Complete. Explain what amortized running time is and what it is good for.
CO6	Perform amortized analysis. Also understand the notation of computational complexity & advanced concepts.



**SUBJECT NAME: COMPUTER ORGANIZATION AND ARCHITECTURE LAB**

**SUBJECT CODE:BCSE-452**

**YEAR/SEMESTER:II / IV**

**COURSE OUTCOMES (COs)**

CO1	Recognize basic logic gates with IC chips
CO2	Design combinational circuits using IC Chips
CO3	Connect the theory of computer organization with hardware.
CO4	Apply fundamentals of digital design and extend the learning to design sequential circuits

**SUBJECT NAME: OPERATING SYSTEM LAB**

**SUBJECT CODE:BCSE-453**

**YEAR/SEMESTER:II YEAR IV SEMESTER**

**COURSE OUTCOME:**

CO1	To use Unix utilities and perform basic shell control of the utilities.
CO2	To use of an operating system to develop software
CO3	To write software systems based on multiple cooperating processes or threads
CO4	To implement process scheduling & synchronization algorithms
CO5	To implement algorithms considering time and space complexity

**SUBJECT NAME: DAA LAB**

**SUBJECT CODE: BCSE454**

**YEAR/SEMESTER: II YEAR IV SEMESTER**

**COURSE OUTCOMES (COs)**

CO 1	Design and implement appropriate data structures for computation
CO 2	Demonstrate algorithms using divide and conquer approach
CO 3	Solve problems using greedy method.

CO 4	Employ dynamic programming techniques
CO 5	Problem solving Using backtracking techniques

**FIFTH SEMESTER:**

**SUBJECT NAME: Signal & system**

**SUBJECT CODE: BECE-508**

**YEAR/SEMESTER: III YEAR V SEMESTER**

**COURSE OUTCOME:**

CO1	Able to classify signals as discrete/continuous, even/odd, periodic/non-periodic, etc.
CO2	Analyze CT and DT systems using Laplace transforms and Z Transforms.
CO3	Analyze CT and DT systems in Frequency domain using tools like CTFT, DTFT.
CO4	Classify different types of systems as LTI and their properties.
CO5	Able to understand time and frequency domain analysis of systems.

**SUBJECT NAME: DATA BASE MANAGEMENT SYSTEM**

**SUBJECT CODE:**

**BCSE-501**

**YEAR/SEMESTER: III YEAR V SEMESTER**

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**COURSE OUTCOME:**

CO 1	It introduces the fundamentals concepts related to the database, its applications and categorization of the Database. It will also highlight the ER modelling used to illustrate the conceptual database design.
CO 2	It describes the relational data model and relational DBMSs. it also describe the operations of the relations Alzebra and relational calculus. Students will learn about the SQL language which is implemented in most relational systems.
CO 3	It introduces concepts related to the database design including functional dependencies and

	normal forms of the relations. it also other types of dependencies like multivalued and join dependencies.
CO 4	It describes the transaction processing including the concepts of schedules and its classification based on serializability and recoverability. it also provide the information related to the recovery techniques. We will also get to know about the formal introduction to the distributed databases.
CO 5	It gives us the insight into the techniques related to the concurrency control like locking, timestamp techniques, multiple granularity and multi version schemes.

**SUBJECT NAME: FORMAL LANGUAGE & AUTOMATA THEORY**

**SUBJECT CODE: BCSE-502**

**YEAR/SEMESTER: III YEAR V SEMESTER**

**COURSE OUTCOME:**

CO 1	The ability to define the mathematical principles behind theoretical computer science. It's give a way to convert non-linear problem to linear and systematic solutions. It sets the path to convert any object into predefined and recognized by data structure as well as opens the path for many complicated algorithms.
CO 2	To understand and analyze in identifying cohesive searching and less coupling of one regular expression to another regular expression. So it follows the basic rule of computer science "and coupling rule". Differentiate and help in providing examples for the different types of automata finite automata, push down automata, linear bounded automata and Turing machine.
CO 3	This unit analyses input coming from any source with any syntax and stability can be converted into a specified syntax with no redundancy of data as well as parsing of data can be done with standard format specified by corresponding language.
CO 4	Evaluate and choose and design appropriate automata for the diverse requirements defined by theoretical computer science.
CO 5	To identify the different computational problems and their accompanying complexity.

**SUBJECT NAME: GRAPH THEORY**

**SUBJECT CODE: BCSE-511**

**YEAR/SEMESTER: III YEAR V SEMESTER**

**COURSE OUTCOME:**

CO 1	Classify precise and accurate mathematical meanings of objects in graph theory including terminology, properties and characterization of graphs.
CO 2	Explain about the goods of Trees and develop efficient algorithms for graph related problems different areas of engineering and science.
CO 3	Illustrate essentials of circuits, cut sets, network flows & graph. Also Distinguish between planar and non-planar graphs and solve difficulties.
CO 4	Define the Matrix Representation of Graph also outline Permutations and Combinations with generating function. Discuss about chromatic features and directed graph.
CO 5	Make use of theoretical knowledge and independent mathematical intellectual in graph theory questions' study.

**SUBJECT NAME: DATA BASE MANAGEMENT SYSTEM LAB**

**SUBJECT CODE: BCSE-551**

**YEAR/SEMESTER:III / V**

**Course Outcomes:**

CO 1	Understand, analyze and apply common SQL statements including DDL, DML and DCL statements to perform different operations.
CO 2	Design different views of tables for different users and to apply embedded and nested queries.
CO 3	Design and implement a database for a given problem according to well known design principles that balance data retrieval performance with data consistency.
CO 4	Write triggers to implement various complex database constraints which are not possible Using integrity constraints.
CO 5	Understand the Concepts for Roll Back, Commit & Check Points.

**SIXTH SEMESTER:**

**SUBJECT NAME: COMPILER DESIGN**

**SUBJECT CODE: BCSE-601**

**YEAR/SEMESTER: III YEAR VI SEMESTER**

**Course Outcomes:**

CO 1	Identify all essential steps for automatically converting source code into object code.
CO 2	Generate the low-level code for calling functions/methods in modern languages.
CO 3	Discuss opportunities for optimization introduced by naïve translation and approaches for achieving optimization.
CO 4	Interpret benefits and limitations of automatic memory management.
CO 5	Explain advantages, disadvantages and difficulties of just in time and dynamic recompilation.

**SUBJECT NAME: COMPUTER NETWORKS**

**SUBJECT CODE: BCSE-602**

**YEAR/SEMESTER: III YEAR VI SEMESTER**

**Course Outcomes:**

CO 1	It gives us the introduction to the data communication concepts and networking details like network topology, transmission media and communication modes. It also describes the most popular network model OSI and TCP/IP Protocol suite.
CO 2	This Unit will give the basic working details of the Data link Layer including the protocols used for the flow control and error control. It also describes the LAN technologies.
CO 3	It introduces concepts related to the working of the network layer. It also defines the techniques used for the routing, congestion control. It also Provide the details of the basic networking protocol like IPV4 and IPV6.
CO 4	Students will learn about the basic concepts of the transport layer and various protocols used at the transport layer. It describes the basic concepts of the cryptography.
CO 5	It will introduce the various protocols used at the application layer like SNMP, SMTP, FTP, DNS, and Telnet. Students will learn about the various real world application of the networking.

**SUBJECT NAME: ARTIFICIAL INTELLIGENCE**

**SUBJECT CODE: BCSE-611**

**YEAR/SEMESTER: III YEAR VI SEMESTER**

**Course Outcomes:**

CO 1	Learn about different application of Artificial Intelligence
CO 2	Understand methods of searching
CO 3	Understand the method of knowledge representation
CO 4	Learn about machine learning
CO 5	Understand Pattern Recognition.

**SUBJECT NAME: COMPUTER GRAPHICS**

**SUBJECT CODE: BCSE-623**

**YEAR/SEMESTER: III YEAR VI SEMESTER**

**Course Outcomes:**

CO 1	To get an introduction of graphics, displays, and shape generating algorithms.
CO 2	Understanding the 2-D transformations, windowing and various clipping algorithms.
CO 3	Understanding 3-D transformation, Projection and clipping.
CO 4	To understand cures, surfaces, hidden lines and algorithms related to all these.

**SUBJECT NAME: COMPILER DESIGN LAB**  
**YEAR/SEMESTER: III YEAR VI SEMESTER**

**SUBJECT CODE: BCSE-651**

**COURSE OUTCOMES (COs)**

CO 1	Implement the techniques of Lexical Analysis and Syntax Analysis.
CO 2	Generate Intermediate code for High level Language.
CO 3	Use Optimization techniques and generate machine level code.
CO 4	Design a compiler for a subset of any High level language.

**SUBJECT NAME: COMPUTER NETWORKS LAB**  
**SUBJECT CODE: BCSE-652**  
**YEAR/SEMESTER: III YEAR VI SEMESTER**

**COURSE OUTCOMES (COs)**

CO 1	Recognize the different internetworking devices and their functions
CO 2	Role of protocols in networking.
CO 3	Design and apply subnet masks and addresses to fulfil networking requirements.
CO 4	Features of TCP/IP Protocol
CO 5	Analyze the features and operations of various application layer protocols such as Http, DNS

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**SEVENTH SEMESTER:**

**SUBJECT NAME: DATA MINING & DATA WAREHOUSING**

**SUBJECT CODE: BCSE-711**

**YEAR/SEMESTER:IV YEAR VII SEMESTER**

**COURSE OUTCOMES (COs)**

CO 1	To get an overview of Data Mining and Data pre-processing.
CO 2	Understanding data generalization, characterization and Statistical class Description.
CO 3	To understand classification & Prediction. Also, to get to know about cluster analysis.
CO 4	To get an overview off data warehousing and data marting.
CO 5	Understand Aggregation and OLAP functions & tools.

**SUBJECT NAME: INFORMATION THEORY & CODING**

**SUBJECT CODE: BCSE-723**

**YEAR/SEMESTER:IV YEAR VII SEMESTER**

**COURSE OUTCOME:**

CO1	To learn the basic concepts of information
CO2	To understand different codes and their properties.
CO3	To introduce channels and chan nel capacity
CO4	To Comprehend various error control code properties
CO5	To improve channel performance against burst errors

**SUBJECT NAME: CYBER LAWS & ETHICS**  
**YEAR/SEMESTER: IV YEAR VII SEMESTER**

**SUBJECT CODE: BCSE-003**

**COURSE OUTCOME:**

CO1	To Safeguard national critical information infrastructure
CO2	To Respond to, resolve, and recover from cyber incidents and attacks through timely information sharing, collaboration, and action
CO3	To Establish a legal and regulatory framework to enable a safe and vibrant cyberspace
CO4	To Foster a culture of cyber security that promotes safe and appropriate use of cyberspace
CO5	To Develop and cultivate national cyber security capabilities
CO6	Understanding the emergence of E commerce and issues related to it.

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**EIGHTH SEMESTER:**

**SUBJECT NAME: CRYPTOGRAPHY & NETWORK SECURITY**

**SUBJECT CODE: BCSE-812**

**YEAR/SEMESTER: IV YEAR VIII SEMESTER**

**COURSE OUTCOMES:**

C01	Students will be able to solve and relate mathematic concepts behind the cryptographic algorithms.
C02	Students will be able to describe various network security practice applications AND HASH function
C03	Students will be able analyze protocols for various security objectives with cryptographic tools
C04	Students will be able to evaluate the role played by various security mechanisms like passwords, access control mechanisms, firewalls etc.

**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**COURSE OUTCOMES-PROGRAMME OUTCOMES**

**Subject Name: ANALOG ELECTRONICS (BEEE-301)**

**Course Outcomes (COs)**

C01	Understand the characteristics of transistors.
C02	Design and analyse various rectifier and amplifier circuits.
C03	Design sinusoidal and non-sinusoidal oscillators.
C04	Understand the functioning of OP-AMP and design OP-AMP based circuits.

**Subject Name: ELECTRICAL MACHINES-I (BEEE-302)**

**Course Outcomes (COs)**

C01	Understand the concepts of magnetic circuits.
C02	Explain the construction and principle of operation and characteristics of DC machines.
C03	Analyze the performance of DC machines
C04	Understand the operation of Single phase and three phase transformers.
C05	Understand the Construction and operation of Autotransformers and tap-changing transformers.

**Subject Name: Electrical Circuit Analysis (2018-19) batch**

**Subject Code: BEEE-303**

**Course Outcomes (COs)**

C01	To apply network theorems for the analysis of electrical circuits.
C02	To obtain the transient and steady-state response of electrical circuits.
C03	To Analyze circuits in the sinusoidal steady-state (single-phase and three-phase). Analyze two port circuit behaviours.

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**Subject Name: ELECTROMAGNETIC FIELDS (BEEE-304)**

**Course Outcomes (COs)**

C01	Ability to understand basic laws of electromagnetism.
C02	To obtain the electric and magnetic fields for simple configurations under static conditions.
C03	Ability to analyse time varying electric and magnetic fields.
C04	Ability to understand Maxwell's equation in different forms and different media.
C05	To understand the propagation of EM waves.

**Subject Name: ANALOG ELECTRONICS LABORATORY (BEEE-351)**

**Course Outcomes (COs)**

C01	To obtain the characteristics of the PN junction diode.
C02	To understand the application of the zener diode.
C03	To obtain the input and output characteristics of Transistor in CB and CE Configuration.
C04	To understand the operation of half wave and full wave rectifiers without filters.
C05	To understand the operation of half-wave and full-wave rectifiers with filters

**Subject Name: ELECTRICAL MACHINES-I LAB (BEEE-352)**

**Course Outcomes (COs)**

C01	Assess the performance of DC shunt and compound machines.
C02	Determine the Efficiency of DC shunt, series and compound motors.
C03	Perform the speed control methods of DC shunt machines.
C04	Determine the Efficiency and voltage regulation of single phase transformers.
C05	Perform the testing on single phase and 3-phase transformers

**Subject Name: ELECTRICAL MACINES-II (BEEE-402)**

**Course Outcomes (COs)**

C01	Understand the fundamentals of ac machine windings.
C02	Understand the concept of pulsating and revolving magnetic fields.
C03	Understand and analyse the performance of induction machines.
C04	Understand the working of single-phase induction motors.
C05	Understand and analyse the performance of synchronous machines.

**Subject Name: POWER ELECTRONICS (BEEE-403)**

**Course Outcomes (COs)**

C01	Understand the differences between signal level and power level devices.
C02	Analyse controlled rectifier circuits.
C03	Analyse the operation of DC-DC choppers.
C04	Analyse the operation of voltage source inverters

**Subject Name: ELECTRICAL MACINES LABORATORY-II (BEEE-452)**

**Course Outcomes (COs)**

C01	Understand the characteristics of induction and synchronous machines using direct and in direct methods.
C02	Understand the Regulation of three phase alternator is predetermined using optimistic, pessimistic and accurate method are done.
C03	Understand Saliency nature of synchronous machine.
C04	Understand the Performance of single-phase induction motor.

**Subject Name: POWER ELECTRONICS LAB (BEEE-453)**

**Course Outcomes (COs)**

C01	Determine & analyse the characteristics of rectifiers, SCR, AC voltage controllers and inverter circuits.
C02	Evaluate the various performance indices like ripple factor .
C03	Design the control circuit and the power circuit for DC-DC converters & analyse their performance.
C04	Ability to construct test platforms and analyze power electronic circuits.

**Subject Name: POWER SYSTEM-I (BEEE-501)**

**Course Outcomes (COs)**

C01	Understand the concepts of power systems.
C02	Understand the various power system components. Evaluate fault currents for different types of faults.
C03	Understand the generation of over-voltages and insulation coordination.
C04	Understand basic protection schemes.
C05	Understand concepts of HVDC power transmission and renewable energy generation investor

**Subject Name: MICROPROCESSORS (BEEE-503)**

**Course Outcomes (COs)**

C01	Understand the basics of microprocessors and microcontrollers.
C02	Do assembly language programming
C03	Do interfacing design of peripherals like I/O, A/D, D/A, timer etc.
C04	Develop systems using different microcontrollers.

**Subject Name: MICROPROCESSOR LAB (BEEE-553)**

**Course Outcomes (COs)**

C01	Execution of different programs for 8086 in Assembly Level Language using MASM Assembler.
C02	Interfacing various I/O Devices like stepper motor, key board, ADC AND DAC TO 8086.
C03	Execution of different programs in 8051 etc they will learn assembly language programming
C04	Interfacing various peripherals to processor and controller with this knowledge they can design different microprocessor based mini & main project.

**Subject Name: POWER SYSTEM-I LAB (BEEE-551)**

**Course Outcomes (COs)**

C01	Understand practical application of MATLAB in switchgear system.
C02	Understand practical aspects of the working of various types of relays.
C03	Understand the mathematical modelling of various phenomenon's related to switchgear system in MATLAB.
C04	Understand practical aspects of transmission line performance.

**Subject Name: High Voltage Engineering (BEEE-519)**

**Course Outcomes (COs)**

C01	Understand the basic physics related to various breakdown processes in solid, liquid and gaseous insulating materials.
C02	Knowledge of generation and measurement of D. C., A.C., & Impulse voltages.
C03	Knowledge of tests on H. V. equipment and on insulating materials, as per the standards
C04	Knowledge of how over-voltages arise in a power system, and protection against these over-voltages.

**Subject Name: Power Quality and FACTS (BEEE-518)**

**Course Outcomes (COs)**

C01	Understand the characteristics of ac transmission and the effect of shunt and series reactive compensation.
C02	Understand the working principles of FACTS devices and their operating characteristics.
C03	Understand the basic concepts of power quality
C04	Understand the working principles of devices to improve power quality.

**Subject Name: Industrial Electrical Systems**

**Subject Code: BEEE-521/621/721/821**

**Course Outcomes (COs)**

C01	To understand the electrical wiring systems for residential, commercial and industrial consumers, representing the systems with standard symbols and drawings, SLD apply network theorems for the analysis of electrical circuits.
C02	To understand various components of industrial electrical systems.
C03	To Analyze and select the proper size of various electrical system components.

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**Subject Name: ELECTRIC DRIVES (BEEE-513/613/713/813 )**

**Course Outcomes (COs)**

C01	Understand the characteristics of dc motors and induction motors.
C02	Understand the principles of speed-control of dc motors and induction motors.
C03	Understand the power electronic converters used for dc motor and induction motor speed control
C04	Design the power converter for DC & AC drives.
C05	Describe the speed control schemes for DC & AC drives.

**Subject Name: HVDC TRANSMISSION SYSTEMS (BEEE-617)**

**Course Outcomes (COs)**

C01	Identify significance of DC over AC transmission system
C02	Understand the advantages of dc transmission over ac transmission
C03	Understand the operation of Line Commutated Converters and Voltage Source Converters.
C04	Understand the control strategies used in HVDC transmission system.
C05	Understand the improvement of power system stability using an HVDC system

**Subject Name: POWER SYSTEM-II (BEEE-601)**

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**Course Outcomes (COs)**

C01	Use numerical methods to analyse a power system in steady state.
C02	Understand stability constraints in a synchronous grid.
C03	Understand methods to control the voltage, frequency and power flow
C04	Understand the monitoring and control of a power system.
C05	Understand the basics of power system economics.

**Subject Name: INTERNET OF THINGS (BEEE-011)**

**Course Outcomes (COs)**

C01	Understand the vision of IoT from a global context
C02	Understand the application of IoT
C03	Determine the Market perspective of IoT
C04	Use of Devices, Gateways and Data Management in IoT
C05	Building state of the art architecture in IoT.

**Subject Name: POWER SYSTEM-II LAB (BEEE-651)**

**Course Outcomes (COs)**

C01	Understand practical application of MATLAB in switchgear system.
C02	Understand practical aspects of the working of various types of relays.
C03	Understand the mathematical modelling of various phenomenons related to switchgear system in MATLAB.
C04	Understand practical aspects of transmission line performance.

**Subject Name: ELECTRONIC DEVICES (BEEE-007)**

**Course Outcomes (COs)**

C01	Explain the V-I characteristic of diode, UJT and SCR.
C02	Describe the equivalence circuits of transistors.
C03	Operate the basic electronic devices such as PN junction diode, Bipolar and Field effect Transistors.
C04	Describe Power control devices, LED, LCD and other Opto-electronic devices

**Subject Name: IMAGE PROCESSING (BEEE-016)**

**Course Outcomes (COs)**

C01	Comprehend the need and usage of concepts of image processing.
C02	Enhance the visual quality of given grey/color image using well known transformations and filters
C03	Distinguish between lossy and lossless image compression prototypes.
C04	Segment the regions of given image using various feature extraction algorithms in order to recognize object.
C05	Demonstrate the use of MATLAB to create correlative image processing applications



**DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING**

**COURSE OUTCOMES-PROGRAMME OUTCOMES**

**3<sup>rd</sup> SEMESTER**

**SUBJECT NAME: ELECTRONICS DEVICES**

**SUBJECT CODE: BECE-301**

**YEAR/SEMESTER: 2<sup>nd</sup> /3<sup>rd</sup>**

**COURSE OUTCOME:**

CO1	Acquire knowledge in the field of semiconductor Physics.
CO2	Understand about the PN Junction characteristics and generation and recombination of
CO3	Establish various characteristics of Bipolar Junction Transistor and understand the structure of MOS capacitor with sound knowledge of MOS transistor.
CO4	Gain knowledge of Integrated circuit fabrication.

**SUBJECT NAME: DIGITAL SYSTEM DESIGN**

**SUBJECT CODE: BECE-302**

**YEAR/SEMESTER: 2<sup>nd</sup>/3<sup>rd</sup>**

**COURSE OUTCOME:**

CO1	Design and analyze combinational logic circuits
CO2	Design & analyze modular combinational circuits with MUX/DEMUX, Decoder, Encoder.
CO3	Design & analyze synchronous sequential logic circuits
CO4	Use HDL & appropriate EDA tools for digital logic design and simulation

**SUBJECT NAME: SIGNAL & SYSTEM**

**SUBJECT CODE: BECE-303**

**YEAR/SEMESTER: 2<sup>nd</sup>/3<sup>rd</sup>**

**COURSE OUTCOME:**

CO1	Able to classify signals as discrete/continuous, even/odd, periodic/non-periodic, etc.
CO2	Analyze CT and DT systems using Laplace transforms and Z Transforms.
CO3	Analyze CT and DT systems in Frequency domain using tools like CTFT,DTFT.
CO4	Classify different types of systems as LTI and their properties.
CO5	Able to understand time and frequency domain analysis of systems.

**SUBJECT NAME: NETWORK THEORY**

**SUBJECT CODE: BECE-304**

**YEAR/SEMESTER: 2<sup>ND</sup> /3<sup>RD</sup>**

**COURSE OUTCOME:**

CO1	To Understand basics electrical circuits with nodal and mesh analysis.
CO2	To understand and Appreciate electrical network theorems.
CO3	Apply Laplace Transform for steady state and transient analysis.
CO4	Explore and Determine different network functions.
CO5	Appreciate the frequency domain techniques.

**SUBJECT NAME: BASICS OF ELECTRONICS ENGINEERING**

**SUBJECT CODE: BECE-305**

**YEAR/SEMESTER: 2<sup>nd</sup> /3<sup>rd</sup>**

**COURSE OUTCOME:**

CO1	Students should be able to solve problems through analytical thinking.
CO2	Students should develop skills to solve problems in electronics and communication engineering using mathematical techniques and scientific knowledge.
CO3	Students should be able to employ necessary techniques, hardware and software tools for engineering applications.
CO4	Students should be able to synthesize solutions for existing problems within practical constraints.
CO5	Extend the understanding of how electronic circuits and their functions fit into communication system

**SUBJECT NAME: ELECTRONIC DEVICES LAB**

**SUBJECT CODE: BECE-351**

**YEAR/SEMESTER: II/III**

**COURSE OUTCOME:**

CO1	Study of PN Junction diode and there I-v and C-V characteristics and study of half wave rectifier and full wave rectifier.
CO2	Active filters, clipper clamper and study of Zener Diode as Voltage Regulator..
CO3	Measurement of Input and Output characterises of BJT, study of CE amplifier current and power gain and input, output impedances.
CO4	Study frequency response of RC coupled amplifier
CO5	Measurement and study of Output characteristics of JFET.

**SUBJECT NAME: DIGITAL SYSTEM DESIGN LAB**

**SUBJECT CODE: BECE 352**

**YEAR/SEMESTER: 2<sup>nd</sup>/3<sup>rd</sup>**

**COURSE OUTCOME:**

CO1	Graduate will have a composite understanding of logic gates and flip –flops.
CO2	Design the sequential and combinational circuits.

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**5<sup>th</sup> SEMESTER**

**SUBJECT NAME: ELECTROMAGNETIC WAVES**

**SUBJECT CODE: BECE-501**

**YEAR/SEMESTER: 3<sup>rd</sup> /5<sup>th</sup>**

**COURSE OUTCOME:**

CO1	Understand characteristics and wave propagation on high frequency transmission lines
CO2	Carryout impedance transformation on TL
CO3	Use sections of transmission line sections for realizing circuit elements
CO4	Analyze wave propagation on metallic waveguides in modal form
CO5	Understand principle of radiation and radiation characteristics of an antenna

**SUBJECT NAME: COMPUTER ARCHITECTURE**

**SUBJECT CODE: BECE502**

**YEAR/SEMESTER: 3<sup>rd</sup> /5<sup>th</sup>**

**COURSE OUTCOME:**

CO1	Understand the basic organization of computer and different instruction formats and addressing modes
CO2	Understand and analyze various issues related to memory hierarchy.
CO3	Evaluate various modes of data transfer between CPU and I/O devices
CO4	Understand the advantage of instruction level parallelism and pipelining for high performance Processor design

**SUBJECT NAME: PROBABILITY THEORY & STOCHASTIC PROCESSES**

**SUBJECT CODE: BECE-503**

**YEAR/SEM:3<sup>rd</sup> /5<sup>th</sup>**

**COURSE OUTCOME:**

CO1	Understand the concept of set theory and probability theory.
CO2	Understand the concept of discrete and continuous random variables and their statistical properties.
CO3	Understand the probability distribution functions of noise in a communication link.
CO4	Distinguish between random and stochastic processes and understand the concept central limit theorem.
CO5	Characterize LTI systems driven by a stationary random process using autocorrelation and power spectral density functions.

**SUBJECT NAME: DIGITAL SIGNAL PROCESSING**

**SUBJECT CODE: BECE-504**

**YEAR/SEMESTER: 3<sup>rd</sup> /5<sup>th</sup>**

**COURSE OUTCOME:**

CO1	Realization & Comparison Analysis Of Iir System And Example Of Ladder Realization
CO2	Iir Digital Filter Design By Using Impulse Invariant Transformation And Bi - Linear Transformation Techniques
CO3	Fir Filter Design By Windowing Techniques
CO4	Properties Of The Dft And Apply Dft For The Analysis Of Digital Signals And Systems
CO5	Computation Of Dft By Using Fft Algorithm

**SUBJECT NAME: INTRODUCTION MICRO ELECTRO MECHANICAL SYSTEM**

**SUBJECT CODE: BECE-511**

**YEAR/SEMESTER: 3<sup>RD</sup>/5<sup>TH</sup>.**

**COURSE OUTCOME:**

CO1	A fundamental understanding of standard micro fabrication techniques and the issues surrounding them
CO2	Know the major classes, components, and applications of MEMS devices/systems and to demonstrate an understanding of the fundamental principles behind the operation of these devices/systems.
CO3	Understand the unique requirements, environments, and applications of MEMS.
CO4	Apply knowledge of micro fabrication techniques and applications to the design and manufacturing of an MEMS device or Microsystems.
CO5	Analyze and understand the concept related to optical, RF, Magnetic, Electrical and Bio Medical.

**SUBJECT NAME: IMAGE PROCESSING**

**SUBJECT CODE: BECE-001**

**YEAR/SEMESTER: 3<sup>RD</sup> /5<sup>TH</sup>**

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**COURSE OUTCOME:**

CO1	Understand the need for image transforms and their properties.
CO2	Choose appropriate technique for image enhancement both in spatial and frequency domains.
CO3	Identify causes for image degradation and apply restoration techniques.
CO4	Compare the image compression techniques in spatial and frequency domains.
CO5	Select feature extraction techniques for image analysis and recognition.

**SUBJECT NAME: EMW LAB**

**SUBJECT CODE: BECE-551**

**BRANCH/YEAR/SEMESTER: EC/3/5**

**COURSE OUTCOME:**

CO1	Students can know the basics of the Electrical Field and Potential inside the Parallel Plate Capacitor
CO2	They can analyze the Capacitance and Inductance of Transmission Lines and Simulation of Electric Field and Potential Inside Capacitors.
CO3	They can know the Magnetic Field Outside a Straight Conductor.
CO4	They can learn the various applications Magnetic Force on a Current Carrying Conductor
CO5	They can know the importance of E.M Wave Radiation and Propagation of a Antenna.

**SUBJECT NAME: DIGITAL SIGNAL PROCESSING LAB**

**SUBJECT CODE: BECE 554**

**YEAR/SEMESTER: 3<sup>RD</sup> /5<sup>TH</sup>**

**COURSE OUTCOME:**

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CO 1	Design the various types of continuous time signals and discrete time signals.
CO 2	Design & analysis of the FIR and IIR filters by using MATLAB.
CO 3	Design and analyze the discrete time signals using FFT algorithm.

**7<sup>th</sup> SEMESTER**

**SUBJECT NAME: Microwave Theory and Techniques      SUBJECT CODE: BECE-711**

**YEAR/SEMESTER: 4<sup>th</sup>/7<sup>th</sup>**

**COURSE OUTCOME:**

CO1	Study the concept of microwave and understand the operation of various waveguide components.
CO2	Analyze various microwave components and discuss various microwave semiconductor devices with their performance.
CO3	Study and understand microwave design principles for amplifiers and antennas.
CO4	Study and identify measurement techniques for different parameters like frequency, VSWR etc.
CO5	Design microwave systems for different practical applications.

**SUBJECT NAME: FIBER OPTIC COMMUNICATION      SUBJECT CODE: BECE-721**

**YEAR/SEMESTER: 4<sup>TH</sup> /7<sup>TH</sup>**

**COURSE OUTCOME:**

CO1	Understand The Overview Of Optical Fiber Communication With Their Varioues Modes And Confifugartion.
CO2	Explore About The Losses In Optical Fibers Consisting Of Atenuation And Distortion With Various Bending Loss And Non Linear Effects.
CO3	Study Principle Of Various Optical Sources And Their Constuctions.
CO4	Analyze The Power Launching And Coupling Schemes Used In Various Source To Fiber With Their Output Pattern
CO5	Explore The Different Types Of Link Design And Various Wdm Concepts And Component Overview

**SUBJECT NAME: SATELLITE COMMUNICATION**

**SUBJECT CODE: BECE731-732**

**YEAR/SEMESTER: 4<sup>TH</sup>/7<sup>TH</sup>**

**COURSE OUTCOME:**

CO1	Understand the orbital and functional principles of satellite communication systems.
CO2	Understand principle and operation of various satellite sub systems as well as satellite antenna.
CO3	Analyze and evaluate a satellite link and suggest enhancements to improve the link performance like VSAT.
CO4	Interpret working principle of various satellite communication applications such as Direct broadcast satellite television, satellite navigation and global positioning system.
CO5	To gain knowledge about Global Mobile Satellite Systems.

**SUBJECT NAME: ENREPRENEURSHIP DEVELOPMENT**

**SUBJECT CODE: BECE-005**

**YEAR/SEMESTER:4<sup>TH</sup> /7<sup>TH</sup>**

**COURSE OUTCOME:**

CO1	Understand the meaning of Entrepreneurship
CO2	Understand the project Identification, demand analysis
CO3	Understand the Accountancy, Preparation of Balance sheet, Industrial Relations
CO4	Understands the Project planning and control
CO5	Understand the laws concerning entrepreneur

**SUBJECT NAME: PROJECT stage I**

**SUBJECT CODE: BECE-751**

**YEAR/SEMESTER: 4/7**

**COURSE OUTCOME:**

CO1	Apply critical and creative thinking in the design of engineering projects, Plan and manage your time effectively as a team
CO2	Consider the business context and commercial positioning of designed devices or systems and apply knowledge of the 'real world' situations that a professional engineer can encounter
CO3	Use fundamental knowledge and skills in engineering and apply it effectively on a project and design and develop a functional product prototype while working in a team
CO4	Undertake an engineering project under mentorship and timely reflect on your own and peers' technical and non-technical learning
CO5	Orally present and demonstrate your product to peers, academics, general and industry community and Manage any disputes and conflicts within and outside your team.



## 4<sup>TH</sup> SEMESTER

**SUBJECT NAME: ANALOG AND DIGITAL COMMUNICATION**

**SUBJECT CODE: BECE-401**

**YEAR/SEMESTER: 2<sup>ND</sup> /4<sup>TH</sup>**

**COURSE OUTCOME:**

CO1	To understand modulation, demodulation and design of major building blocks of Communication system.
CO2	To understand the communication systems and signal modulation techniques.
CO3	Analysis of modulation techniques based both in time and frequency domains.
CO4	Explore Transmission techniques (base band, band pass).
CO5	To develop a clear insight into the relations between the input and output ac signals in various stages of a transmitter and a Receiver of AM & FM systems.

**SUBJECT NAME: ANALOG CIRCUITS**

**SUBJECT CODE:BECE-402**

**YEAR/SEMESTER: 2<sup>ND</sup> /4<sup>TH</sup>**

**COURSE OUTCOME:**

CO1	Know the basic differential Amplifier using transistor and its operation & characteristic
CO2	Design linear Op-Amp circuits such as Voltage follower, Summing amplifier, scaling and averaging amplifier, Design Instrumentation amplifier circuits for various practical applications
CO3	Design non-linear Op-Amp such as Comparators, Comparator IC such as LM 339, Schmitt trigger, multivibrator circuits for various practical applications
CO4	Analyze and design amplifier circuits, oscillators, Filter, regulated power supply
CO5	Design PMOS and NMOS transistor, understand the 555 IC and working of PLL and Application.

**SUBJECT NAME: MICROCONTROLLER**

**SUBJECT CODE: BECE-403**

**YEAR/SEMESTER: 2<sup>ND</sup>/4<sup>TH</sup>**

**COURSE OUTCOME:**

CO 1:	Understand About The Microcontroller And Embedded Processor
CO 2:	Explore The 8051 Assembly Language Programming With Different Parameters And Data Types
CO 3:	Understand The 8051 Timer With Serial Communication And Counter Programming With Different Interrupts
CO 4:	Design And Interface Of 8051 With External Memories And Peripheral Devices
CO 5:	To Learn Various Concepts Used In 8255 And Interfacing With Motorola And Intel Microcontroller

**SUBJECT NAME: DIGITAL ELECTRONICS**

**SUBJECT CODE: BECE-404**

**YEAR/SEMESTER: 2<sup>ND</sup>/4<sup>TH</sup>**

**COURSE OUTCOME:**

CO1	Understand the philosophy of number system and codes. Simplify the logic expressions using Boolean laws and theorem and design them by using logic gates. Minimize the logic expressions using K-map method and tabular method
CO2	Design and analysis of combinational logic circuits using logic gates.
CO3	Design and analysis of synchronous sequential logic circuits (like flip flop, registers, counters etc.)
CO4	Design of memory and programmable logic circuits (like RAM,ROM, PLA,ASM etc.)
CO5	Design and analysis of asynchronous logic circuits.

**SUBJECT NAME: ANALOG & DIGITAL COMM. LAB**

**SUBJECT CODE: BECE-451**

**YEAR/SEMESTER: 2<sup>ND</sup> /4<sup>TH</sup>**

**COURSE OUTCOME:**

CO1	To understand modulation, demodulation techniques used in communication system, and develop the Modulation techniques used in both time and frequency domains.
CO2	To develop a knowledge of pre-emphasis and de-emphasis circuits used in the analogue communication
CO3	To analyze the Signal Modulation (amplitude, frequency, and phase) and transmission techniques (base band, SSB system.
CO4	To understand the concept of mixer, PLL, Digital phase detector and synchronous detector to develop a clear insight into the relations between the input and output ac signals in various stages of a transmitter and a Receiver of AM & FM systems.

**SUBJECT NAME: ANALOG CIRCUIT LAB**

**SUBJECT CODE: BECE-452**

**YEAR/SEMESTER: 2<sup>nd</sup> /4<sup>th</sup>**

**COURSE OUTCOME:**

CO1	Understand the operating principles of major electronic devices, circuit models and connection to the physical operation of the devices..
CO2	Able to apply this knowledge to the analysis and design of basic circuits.
CO3	An ability to design and conduct experiments, as well as to organize, analyzes, and interprets data.
CO4	An ability to identify, formulates, and solves hardware engineering problems.
CO5	They can know the importance of Operational Amplifier

**SUBJECT NAME: MICROCONTROLLER LAB**

**SUBJECT CODE: BECE-453**

**YEAR/SEMESTER: 2<sup>ND</sup>/4<sup>TH</sup>**

**COURSE OUTCOME:**

CO1	Discuss the major components that constitute an embedded system.
CO2	Implement small programs to solve we well-define problem on an embedded platform.

**SUBJECT NAME: DE LAB**

**SUBJECT CODE:BECE-454**

**YEAR/SEMESTER: 2<sup>ND</sup>/4<sup>TH</sup>**

**COURSE OUTCOME:**

CO1	Graduate will have a composite understanding of logic gates and flip –flops.
CO2	Design the sequential and combinational circuits.

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## 6<sup>TH</sup> SEMESTER

**SUBJECT NAME: CONTROL SYSTEM**

**SUBJECT CODE: BECE 601**

**YEAR/SEMESTER: 3<sup>RD</sup> /6<sup>TH</sup>**

### **COURSE OUTCOME:**

CO1	Demonstrate an understanding of the fundamentals of (feedback) control systems and use models of physical systems for use in the analysis and design of control systems
CO2	Express and solve system equations in state-variable form (state variable models).
CO3	Determine the time and frequency-domain responses of first and second-order systems to step and sinusoidal (and to some extent, ramp) inputs.
CO4	Analyze the system response and stability of systems represented in state space form .
CO5	Apply Nyquist stability criterion and bode plot to analyze and design control systems

**SUBJECT NAME: Bio-medical Electronics**

**SUBJECT CODE: BECE-611**

**YEAR/SEMESTER: 3<sup>RD</sup> /6<sup>th</sup>**

### **COURSE OUTCOME:**

CO1	Explain the basic Physiology of – Bioamplifier, Biosignals and characteristics.
CO2	Describe the concept of action potential, electrode theory and various bioelectric potentials generated in human body and related equipments.
CO3	Interpret various computer aided devices for biomedical applications.
CO4	Interpretation of EEG and EMG.
CO5	Discuss Therapeutic equipment, Mechanism of respiration, Spirometry, Pnemuotachograph Ventilators.

**SUBJECT NAME: COMPUTER NETWORK**

**SUBJECT CODE: BCSE602**

**YEAR/SEMESTER: 3<sup>rd</sup> /6<sup>th</sup>**

**COURSE OUTCOME:**

CO1	It Give Us The Introduction To The Data Communication Concepts And Networking Details Like Network Topology, Transmission Media And Communication Modes. It Also Describes The Most Popular Network Model Osi And Tcp/Ip Protocol Suite
CO2	This Unit Will Give The Basic Working Details Of The Data Link Layer Including The Protocols Used For The Flow Control And Error Control. It Also Describes The Lan Technologies.
CO3	It Introduces Concepts Related To The Working Of The Network Layer. It Also Defines The Techniques Used For The Routing, Congestion Control. It Also Provide The Details Of The Basic Networking Protocol Like Ipv4 And Ipv6.
CO4	Students Will Learn About The Basic Concepts Of The Transport Layer And Various Protocols Used At The Transport Layer. It Describes The Basic Concepts Of The Cryptography.
CO5	It Will Introduce The Various Protocols Used At The Application Layer Like Snmp, Sntp, Ftp, Dns & Telnet. Students Will Learn About The Various Real World Application Of The Networking.

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**SUBJECT NAME: ELECTRONIC MEASUREMENT**

**SUBJECT CODE: BECE 003**

**YEAR/SEMESTER: 3<sup>rd</sup> /6<sup>th</sup>**

**COURSE OUTCOME:**

CO1	Understand about standards, units and different instruments that are used for measurement purpose.
CO2	Analyze the Performance and characteristics of each electronic instrument as digital voltmeter, frequency meter etc.
CO3	Understanding of how different bridge networks are constructed and balanced for finding out values of resistance, capacitance and inductance.
CO4	Understanding the basic features of oscilloscope and its internal structures and different types.
CO5	Understand about different types of signal generators and recorders.

**SUBJECT NAME: Electronic Instrumentation & Measurement Lab**

**SUBJECT CODE: BECE 651**

**YEAR/SEMESTER: 3<sup>RD</sup> /6<sup>TH</sup>**

**COURSE OUTCOME:**

CO1	Design and validate DC and AC bridges
CO2	Design circuit for measurement of temperature, torque, pressure etc.
CO3	Measure different characteristics of ADC and DAC.

**SUBJECT NAME: Electronic Design Workshop**

**SUBJECT CODE: BECE-653**

**YEAR/SEMESTER: 3<sup>RD</sup>/6<sup>TH</sup>**

**COURSE OUTCOME:**

CO1	Appreciate the necessity and evolution of PCB, types and classes of PCB.
CO2	Understand the steps involved in schematic, layout, fabrication and assembly process of PCB design.
CO3	Art work and Layout should be made using CAD based PCB simulation software. Due considerations should be given for power requirement of the system, mechanical aspects for enclosure and control panel design
CO4	Design (schematic and layout) PCB for analogue circuits, digital circuits and mixed circuits.
CO5	Completed mini project and documentation in the form of mini project report

**SUBJECT NAME: COMPUTER NETWORK LAB**

**SUBJECT CODE: BCSE652**

**YEAR/SEMESTER: 3<sup>rd</sup> /6<sup>th</sup>**

**COURSE OUTCOME:**

CO1	It Recognize the different internetworking devices and their functions
CO2	Role of protocols in networking
CO3	Design and apply subnet masks and addresses to fulfil networking requirements
CO4	Features of TCP/IP Protocol
CO5	Analyze the features and operations of various application layer protocols such as Http, DNS

## 8<sup>TH</sup> SEMESTER

**SUBJECT NAME:** Mobile Communication and Networks      **SUBJECT CODE:** BECE-811

**YEAR/SEM:** 4<sup>TH</sup>/8<sup>TH</sup>

### **COURSE OUTCOME:**

CO1	Understand the fundamentals of cellular communication system and Analyze various methodologies to improve the cellular capacity.
CO2	Able to describe different propagation models and understand the concept of antenna used at base station
CO3	Able to classify multiple access techniques used in mobile communication
CO4	Able to classify different Equalization & diversity techniques used in wireless communication
CO5	Able to explain the various standards used in Wireless communication and understand the concept of GSM and CDMA

**SUBJECT NAME:** Antenna & Propagation

**SUBJECT CODE:** BECE-821

**YEAR/SEMESTER:** 4<sup>TH</sup> /8<sup>th</sup>

### **COURSE OUTCOME:**

CO1	Understand the Antenna Basics , Dipoles.
CO2	Understands the Reflector Antennas and degining of Yagi Uda Antenna.
CO3	Understand the Microstrip Antennas, feeding methods.
CO4	Understand the Antenna Array: Analysis & Synthesis.
CO5	Understand the basic concept & benefits of Smart Antennas.

**SUBJECT NAME:** VLSI Circuits

**SUBJECT CODE:** BECE-007

**YEAR/SEM:** 4<sup>TH</sup>/8<sup>TH</sup>

**COURSE OUTCOME:**

CO1	Understand the concept of IC fabrication & VLSI design methodology.
CO2	Understand the concept of MOS inverter & its different parameter.
CO3	Understand the design of different combinational logic circuits like gate, latch, FF etc.
CO4	Understand the design of different dynamic logic circuits like SRAM, DRAM, ROM etc.
CO5	Understand the design of low power CMOS logic circuits & concept of Design for Testability

**SUBJECT NAME:** DIGITAL SYSTEM DESIGN USING VHDL

**SUBJECT CODE:** BECE-009

**YEAR/SEMESTER:** 4<sup>TH</sup>/8<sup>TH</sup>

**COURSE OUTCOME:**

CO1	Develop a digital logic and apply to solve real life problems and learn the IEEE Standard 1076 Hardware Description Language
CO2	Model complex digital systems at several levels of abstraction; data flow, structural and behavioral, synthesis and rapid system prototyping
CO3	Develop and simulate register transfer level models of hierarchical digital systems
CO4	Develop simple formal test benches from informal system requirements, implement combinational and sequential circuits using VHDL
CO5	Design and model complex digital system independently or in a team.

**SUBJECT NAME:** Project stage II

**SUBJECT CODE:** BECE-851

**YEAR/SEMESTER:** 4<sup>TH</sup>/8<sup>TH</sup>

**COURSE OUTCOME:**

CO1	Apply critical and creative thinking in the design of engineering projects, Plan and manage your time effectively as a team
CO2	Consider the business context and commercial positioning of designed devices or systems and apply knowledge of the 'real world' situations that a professional engineer can encounter
CO3	Use fundamental knowledge and skills in engineering and apply it effectively on a project and design and develop a functional product prototype while working in a team
CO4	Undertake an engineering project under mentorship and timely reflect on your own and peers' technical and non-technical learning
CO5	Orally present and demonstrate your product to peers, academics, general and industry community and Manage any disputes and conflicts within and outside your team.



**DEPARTMENT OF MECHANICAL ENGINEERING**

**3<sup>rd</sup> SEMESTER**

**ENGINEERING MECHANICS (BME-301)**

**COURSE OUTCOMES: At the end of the course, the student will be able to:**

CO1	Determine the equilibrium of a particle in space using principle of laws of mechanics.
CO2	Compute the equilibrium of rigid bodies in two dimensions and in three dimensions.
CO3	Calculate and analysis the effect of forces on beam by shear force and bending moment
CO4	Solve the problems related to kinematic and kinetic of a moving body.
CO5	Solve the problems of simple system with sliding friction and calculate linear and angular acceleration of moving body in general plane motion.

**THERMODYNAMICS (BME-302)**

**COURSE OUTCOMES: At the end of the course, the student will be able to:**

CO1	Understand the basic concepts of continuum, system, control volume, thermodynamic properties, thermodynamic equilibrium, temperature, and work and heat energy.
CO2	Learn the laws of thermodynamics and apply them to refrigerators, heat engines, heat pumps compressors and nozzles etc.
CO3	Understand and apply the concept of entropy and exergy to thermodynamic systems
CO4	Evaluate properties of pure substances, gases and their mixtures and to derive and apply property relations to thermodynamic problems.

## 4<sup>TH</sup> SEMESTER

### APPLIED THERMODYNAMICS (BME-401)

**COURSE OUTCOMES:** Upon completion of this course, students should be able to:

CO1	Understand and determine air standard cycle efficiency, work output and mean effective pressure with a given set of operating parameters. .
CO2	Understand the operational parameters and constraints, determine cycle efficiency, its power output, and required heat input and will be able to make modifications to improve the overall cycle efficiency for the steam power cycle
CO3	Understand and determine cycle efficiency, work output, and required heat input for a gas turbine cycle for a given set of operating parameters.
CO4	Understand and determine work required to compress the air the air for required application and optimize the work by multi staging with intercoolers
CO5	Optimize a refrigeration system given the requirements and constraints of a refrigeration system and will be able to understand and apply thermodynamic laws of air conditioning to determine the capacity requirements of it.

### **FLUID MECHANICS & FLUID MACHINES (BME-402)**

#### **Course outcomes**

**After successful completion of the course, the student would be able to**

CO1	Discuss properties of fluids and classification of flows
CO2	Formulate and solve equations of momentum and energy
CO3	Solve problems in flow through pipes and dimensional analysis
CO4	Explain the concept of turbines with performance
CO5	Explain the working of pumps and study the performance

## **MATERIAL ENGINEERING (BME-404)**

**COURSE OUTCOMES: At the end of the course, the student will be able to:**

CO1	Understand the crystal structure and classification of materials
CO2	Understand the methods of determining mechanical properties and their suitability for applications
CO3	Interpret phase diagrams of materials
CO4	Select suitable heat treatment process to achieve desired mechanical properties of metals and alloys
CO5	Classify advanced materials and study their applications

## **STRENGTH OF MATERIALS (BME- 403)**

CO1	Evaluate principal stresses, strains and apply the concept of failure theories for design, MOHR Circle
CO2	Determine the resistance and deformation in members subjected to axial, flexural and torsional loads, BENDING, DEFLECTION, TORSION
CO3	Helical and Leaf Springs
CO4	Analyze and design thin, thick cylinders
CO5	Curved Beams, Unsymmetrical Bending, determination of shear center and flexural axis.

## 5<sup>th</sup> SEMESTER

### HEAT AND MASS TRANSFER (BME - 501)

**COURSE OUTCOMES: At the end of the course, the student will be able to:**

CO1	Learn the basic concept of conduction, convection and radiation heat transfer.
CO2	Understand how to formulate and be able to one dimension conduction problems.
CO3	Apply empirical correlations for both forced and free convection for determine the value of convection heat transfer coefficient.
CO4	Recognize basic concept of the radiation heat transfer for black and grey body.
CO5	Analyze the thermal analysis and sizing of Heat exchangers and to understand the mode of mass transfer

### Kinematics & Theory of Machine (BME-504)

**COURSE OUTCOMES: At the end of the course, the student will be able to:**

CO1	Model planar mechanisms which will have defined required motion.
CO2	Calculate kinematic properties of simple planar mechanisms using graphical approach, instantaneous center method and synthesis them at elementary level.
CO3	Design a possible gear train and determine the speeds of simple, compound and epicyclic gear trains.
CO4	Compute the forces and torques involved in friction drives like screw threads, clutches, belts, ropes and band and block brakes.
CO5	Sketch slow speed and high speed cam profile for the required predefined motion of follower.

## MANUFACTURING PROCESSES (BME-503)

**COURSE OUTCOMES: At the end of the course, the student will be able to:**

CO1	Explain the process of making patterns, preparation of sand mould, various special casting processes and casting defects.
CO2	Illustrate the various sheet metal forming processes for a specific application.
CO3	Explain the mechanics of metal cutting, cutting tool materials, tool wear and cutting fluids.
CO4	Explain the concept of data processing for additive manufacturing technology.
CO5	Describe various fusion, friction and special welding processes, soldering and brazing processes.

## SOLID MECHANICS (BME-501)

**COURSE OUTCOMES: At the end of the course, the student will be able to:**

CO1	Understand statically determinate and indeterminate problems.
CO2	Determine the resistance and deformation in member's subjected to axial, flexural and torsional loads.
CO3	Evaluate principal stresses, strains and apply the concept of failure theories for design.

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## 6<sup>TH</sup> SEMESTER

### COMPUTER AIDED DESIGN (CAD) (BME-623)

#### Course Outcomes

CO1	The students will be able to create fully constrained solid models that can be quickly modified using standard software tools. & explain the basic concept of a CAD system & create the different wireframe primitives using parametric representations.
CO2	The students will be able to use, identify and explain standard features in solid modelling including protrusions, revolutions, cut-outs, and patterns. & creates surface primitives using parametric modelling.
CO3	The students will be able to use standard software tools to create engineering drawings, or other documents, to fully describe the geometries and dimensions of parts, as well as to document assemblies according to standard practice. & creates the different solid primitives using the different representation schemes.
CO4	The students will be able to use standard software tools to create part assemblies and check for clearances. & applies geometric transformations on the created wireframe, surface and solid models.
CO5	The students will be able to use finite element analysis software to mesh a solid model, apply meaningful loads and boundary conditions, complete a linear static stress analysis, and interpret the results & Recall drawing and modification functions of CAD software.

### INTERNAL COMBUSTION ENGINE (BME-611)

**COURSE OUTCOMES: At the end of the course, the student will be able to:**

CO1	Understand performance and working of IC engine through thermodynamics cycles.
CO2	Understand latest developments in IC engine and alternative fuels.
CO3	Understand working principles of instrumentation used for engine performance
CO4	Understand combustion phenomena in CI & SI engine and factors influencing combustion chamber design
CO5	Evaluate the methods for improving the IC engine performance
CO6	Understand the effect of compressor on engine performance

## DESIGN OF MACHINE DESIGN (BME-602)

**COURSE OUTCOMES: At the end of the course, the student will be able to:**

CO1	Learn about the basic concepts of machine design.
CO2	Understand the concept of design of mechanical joints
CO3	Explain the design of various types of springs.
CO4	Develop the concept of design of Shafts
CO5	Learn the concept of keys and coupling design

## MANUFACTURING TECHNOLOGY (BME-601)

**COURSE OUTCOMES: At the end of the course, the student will be able to:**

CO1	Learn the process of metal casting.
CO2	Understand different sheet metal operations.
CO3	Recognize the concept of measurement and identify the errors involved in the measurement
CO4	Explain the different types of sensors and strain gauge and circuits used in measuring system .To describe the measurement of pressure, angular velocity and displacement.
CO5	Discuss the role of operations research in decision-making, and its applications in Industry and should be able to formulate and design real-world problems through models & experiments.
CO6	Apply and analyse various types of deterministic models like linear programming, transportation model etc.

## 7<sup>TH</sup> SEMESTER

### POWER PLANT ENGINEERING (BME-721)

**Course Outcomes:** At the end of the course, a student would be able to:

CO1	Describe and analyze different types of sources and mathematical expressions related to thermodynamics and various terms and factors involved with power plant operation.
CO2	Analyze the working and layout of steam power plants and the different systems comprising the plant and discuss about its economic and safety impacts
CO3	Combine concepts of previously learnt courses to define the working principle of diesel power plant, its layout, safety principles and compare it with plants of other types.
CO4	Describe the working principle and basic components of the nuclear power plant and the economic and safety principles involved with it.
CO5	Discuss the working principle and basic components of the hydroelectric plants and the economic principles and safety precautions involved with it.
CO6	Discuss and analyze the mathematical and working principles of different electrical equipments involved in the generation of power.

### REFRIGERATION AND AIR CONDITIONING (BME-711)

**COURSE OUTCOMES:** At the end of the course, the student will be able to:

CO1	Understand the crystal the principle of refrigeration and air conditioning
CO2	Understand the terms associated with refrigeration and for applications
CO3	Can calculate the coefficient of performance of refrigerating Plant
CO4	Can design a refrigeration system for both compression system and absorption system for storage of foods.
CO5	Can apply the theory to practical use in industry

## AUTOMATION IN MANUFACTURING (BME-701)

**COURSE OUTCOMES: At the end of the course, the student will be able to:**

CO1	Identify how automation can be used in production systems and understand the effect of manufacturing automation strategies.
CO2	Basic and advanced understanding of numerical controlled (NC) programming strategies. Development of manual and APT part programs for 2D complex profiles and test the programs through simulation.
CO3	Understand CNC machine structures and system drives and develop interpolation algorithms for control loops.
CO4	The students will be able to create fully constrained solid models that can be quickly modified using standard software tools. & explain the basic concept of a CAD system & create the different wireframe primitives using parametric representations.
CO5	The students will be able to use, identify and explain standard features in solid modelling including protrusions, revolutions, cut-outs, and patterns. & creates surface primitives using parametric modelling.
CO6	Student can understand Simulation as a research tool and how to simulate a physical system.

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## 8<sup>TH</sup> SEMESTER

### AUTOMOBILE ENGINEERING (BME-812)

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

CO1	Understand the principle of conventional and advanced automobiles.
CO2	Develop understanding and basic knowledge on automotive parts.
CO3	Learn about various mechanisms in automobile vehicles.
CO4	Improve the systems and subsystems in automotive.
CO5	Develop skills in automotive design and operation.

### TOTAL QUALITY MANAGEMENT (BME-822)

**COURSE OUTCOMES:** At the end of the course, the student will be able to:

CO1	Develop an understanding on quality management philosophies and frameworks.
CO2	Adopt TQM methodologies for continuous improvement of quality and importance of human factor in quality.
CO3	Apply control charts and business process reengineering to improve management processes.
CO4	Identification of defects and measure of process effectiveness and efficiency to identify areas for improvement
CO5	Assess the implementation of ISO 9000/9001 for given manufacturing, service sector.

**DEPARTMENT OF CIVIL ENGINEERING**

**3RD SEM**

**SUBJECT NAME: Computer- Aided Civil Engineering Drawing**

**SUBJECT CODE: BCE- 301**

**BRANCH/YEAR/SEMESTER: CE/2<sup>nd</sup>/3<sup>rd</sup>**

**COURSE OUTCOMES (COs)**

<b>CO1</b>	Draw simple objects using functional tools in AutoCAD
<b>CO2</b>	Develop and draw the positions and views of points, lines, planes and solids using AutoCAD
<b>CO3</b>	Develop and draw the orthographic and isometric projections of simple objects.
<b>CO4</b>	Develop and draw the projections of the solids by developing the surfaces.

**SUBJECT NAME: Introduction to Civil Engineering**

**SUBJECT CODE: BCE-302**

**BRANCH/YEAR/SEMESTER: CE/2<sup>nd</sup> /3<sup>rd</sup>**

**COURSE OUTCOMES (COs)**

<b>CO1</b>	Recognize the importance of building planning for construction
<b>CO2</b>	Identify appropriate building materials for construction purposes
<b>CO3</b>	Distinguish the different types of soils and foundations required for specific usage
<b>CO4</b>	Evaluate the basics of surveying and levelling operations for field application and categorize the important elements of roadway and railway networks
<b>CO5</b>	Discriminate the importance of quantity and quality aspects of water in the society and priorities for sanitation management.

**SUBJECT NAME: Engineering Mechanics**

**SUBJECT CODE: BCE-301**

**YEAR/SEMESTER: 2<sup>nd</sup> /3<sup>rd</sup>**

**COURSE OUTCOME:**

CO1	Use scalar and vector analytical techniques for analysing forces in statically determinate structures
CO2	Apply fundamental concepts of kinematics and kinetics of particles to the analysis of simple, practical problems
CO3	Understand basic dynamics concepts – force, momentum, work and energy.
CO4	Learn to solve dynamics problems. Appraise given information and determine which concepts apply, and choose an appropriate solution strategy
CO5	Attain an introduction to basic machine parts such as pulleys and mass-spring systems.

**5TH SEM**

**SUBJECT NAME: HYDRAULICS ENGINEERING**

**SUBJECT CODE: BCE-501**

**BRANCH/YEAR/SEMESTER: CE/3<sup>rd</sup> /5<sup>th</sup>**

**COURSE OUTCOMES (COs)**

CO1	Solve the open channel problems for uniform flows
CO2	Analyze various forms of non-uniform flows and to estimate formation of hydraulic jump and subsequent energy losses
CO3	Determine the impact force and work done for different types of vanes
CO4	Analyze suitability of turbines for different types for different applications
CO5	Identify the suitability of pumps for different applications and calculate their efficiencies

**SUBJECT NAME: Geotechnical Engineering**

**SUBJECT CODE: BCE-502**

**YEAR/SEMESTER: 3<sup>rd</sup> / 5<sup>th</sup>**

**COURSE OUTCOME:**

<b>CO1</b>	The students will be able to apply their knowledge of fluid Geotechnical Engineering in addressing problems in soil.
<b>CO2</b>	They will possess the skills to find out the permeability of soil using various field and laboratory methods.
<b>CO3</b>	The students will be able to determine the various stresses at various depth due to different types of loading.
<b>CO4</b>	The students will be able to determine the compaction and consolidation property of soil.
<b>CO5</b>	The students will be able to determine the concept of soil stabilization and soil exploration concept.

**SUBJECT NAME: Transportation Engineering**

**SUBJECT CODE: BCE-503**

**YEAR/SEMESTER: 3<sup>rd</sup> / 5<sup>th</sup>**

**COURSE OUTCOME:**

<b>CO1</b>	Acquire the knowledge of different Modes of Transportation, Historical development in road construction and various Road plans.
<b>CO2</b>	Acquire the knowledge of geometric design and draw appropriate conclusion.
<b>CO3</b>	Understand various Traffic studies and apply the knowledge in planning and design of pavement and geometrics
<b>CO4</b>	Acquire the knowledge of fundamental properties of highway materials, types of pavement, various stress theories.
<b>CO5</b>	Understand and use the concept of different methods in design, construction, inspection and maintenance of the pavement.

**SUBJECT NAME: Mechanics of Materials**

**SUBJECT CODE: BCE-504**

**YEAR/SEMESTER: 3<sup>rd</sup> / 5<sup>th</sup>**

**COURSE OUTCOME:**

<b>CO1</b>	Student will able to check the stability of Trusse, Retaining Wall, Chimany and stress-strain relationship under various load condition.
<b>CO2</b>	Student will able to draw the Bending Moment and Shear Force diagram for different structural member under various loading.
<b>CO3</b>	Student will able to find Multiaxial Stress-Strain relationship.
<b>CO4</b>	Student will study the various stresses generated due to combination of loads and failures due to bending, torsion, e.t.c.
<b>CO5</b>	Student will study the all terms (loading, failure, e.t.c) related to column.

**SUBJECT NAME: Structural Engineering**

**SUBJECT CODE: BCE-505**

**YEAR/SEMESTER: 3<sup>rd</sup> / 5<sup>th</sup>**

**COURSE OUTCOME:**

<b>CO1</b>	The students will be able to apply their knowledge of structural mechanics in addressing design problems of structural engineering
<b>CO2</b>	They will possess the skills to solve problems dealing with different loads combination on various structures.
<b>CO3</b>	Student will have knowledge in analyses of determinate and indeterminate trusses, beams, and frames, and design philosophies for structural engineering
<b>CO4</b>	Student will be able to design various structural elements made by concrete and steel.
<b>CO5</b>	Student will be able to design Cable Structures, Prestressed Concrete elements, e.t.c.

**SUBJECT NAME: ENVIRONMENTAL ENGINEERING**

**SUBJECT CODE: BCE-506**

**YEAR/SEMESTER: III /V**

**COURSE OUTCOME:**

CO1	Understand the impact of humans on environment and environment on humans
CO2	Be able to identify and value the effect of the pollutants on the environment: atmosphere, water and soil.
CO3	Be able to plan strategies to control, reduce and monitor pollution.
CO4	Be able to select the most appropriate technique for the treatment of water, wastewater solid waste and contaminated air.

**SUBJECT NAME: HYDROLOGY & WATER RESOURCE ENGINEERING**

**SUBJECT CODE: BCE-507**

**BRANCH/YEAR/SEMESTER: CE/3<sup>rd</sup> /5<sup>th</sup>**

**COURSE OUTCOMES (COs)**

CO1	Various components of hydrologic cycle that affect the movement of water in the earth .
CO2	Various Stream flow measurements technique
CO3	The concepts of movement of ground water beneath the earth
CO4	The basic requirements of irrigation and various irrigation techniques, requirements of the crop.
CO5	Distribution systems for canal irrigation and the basics of design of unlined and lined irrigation canals design

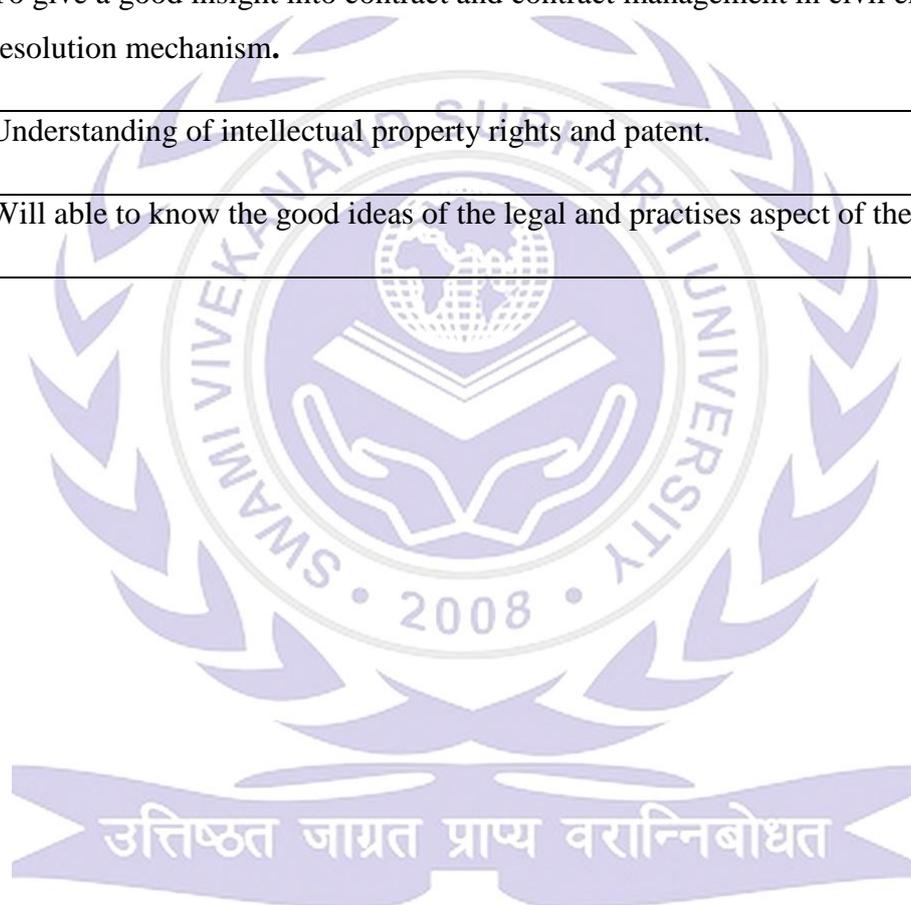
**SUBJECT NAME: Professional Practise Laws and Ethics**

**SUBJECT CODE: BHU- 502**

**BRANCH/YEAR/SEMESTER: CE/3<sup>rd</sup>**

**COURSE OUTCOMES (Cos)**

<b>CO1</b>	Understand the type of roles they are expected to play in the society and practice in civil Engineering professional.
<b>CO2</b>	To give a good insight into contract and contract management in civil engineering dispute resolution mechanism.
<b>CO3</b>	Understanding of intellectual property rights and patent.
<b>CO4</b>	Will able to know the good ideas of the legal and practises aspect of their professional.



## 7<sup>th</sup> SEMESTER

**SUBJECT NAME: Groundwater Engineering**

**SUBJECT CODE: BCE-713**

**YEAR/SEMESTER: IV/VII**

### **COURSE OUTCOME:**

CO1	Students can understand the concepts of hydrology and the water cycle.
CO2	Students can compute hydrologic mass balance in a closed basin.
CO3	Students can develop unit hydrographs based on stream flow data, and conduct basic unit hydrograph analysis.
CO4	Students can conduct frequency analysis on hydrologic data to determine return period or recurrence interval.
CO5	Students can perform hydrologic and hydraulic routing using governing equations for hydraulic river routing.

## 4<sup>TH</sup> SEM

**SUBJECT NAME: Engineering Geology**

**SUBJECT CODE: BCE-402**

**BRANCH/YEAR/SEMESTER: CE/2<sup>nd</sup> /4<sup>th</sup>**

### **COURSE OUTCOMES (COs)**

CO1	Demonstrate the importance of geological principles
CO2	Differentiate minerals based on physical properties
CO3	Distinguish various types of rocks based on their characteristic features
CO4	Interpret geological structures
CO5	Judge geophysical and geological considerations

**SUBJECT NAME: Materials, Testing & Evaluation**

**SUBJECT CODE: BCE-405**

**YEAR/SEMESTER: II /IV**

**COURSE OUTCOME:**

CO1	Operate various types of testing machines
CO2	Configure a testing machine to measure tension or compression behavior
CO3	Compute engineering values (e.g. stress or strain) from laboratory measures
CO4	Analyze a stress versus strain curve for modulus, yield strength and other related attributes
CO5	Identify modes of failure

**SUBJECT NAME: Introduction to Solid Mechanics**

**SUBJECT CODE: BCE-406**

**YEAR/SEMESTER: 2<sup>nd</sup> /IV<sup>th</sup>**

**COURSE OUTCOME:**

CO1	Understanding of the concepts of stress and strain.
CO2	Determination of internal forces and deflections in the beam
CO3	Understanding the various methods of analysis of beams, trusses and effect of torsion.
CO4	Application of the principles and basic of mechanics of solids in the civil engineering structures.

**SUBJECT NAME: Surveying & Geometrics**

**SUBJECT CODE: BCE-407**

**YEAR/SEMESTER: 2<sup>nd</sup> /IV<sup>th</sup>**

**COURSE OUTCOME:**

CO1	Apply the knowledge, techniques, skills, and applicable tools of the discipline to engineering and surveying activities
CO2	Enable to know the principle of surveying, Preparation of plan, calculate of angles.
CO3	Translate the knowledge gained for the implementation of Civil infrastructure
CO4	Relate the knowledge on Surveying to the new frontiers of science like Hydrographical surveying, Electronic Distance Measurement, Global Positioning System, Photogrammetry and Remote Sensing.

**SUBJECT NAME: Disaster Preparedness & Planning Management**

**SUBJECT CODE: BCE-408**

**YEAR/SEMESTER: II /IV**

**COURSE OUTCOME:**

CO1	The student will develop competencies in the application of Disaster Management Concepts
CO2	Analyzing Relationship between Development and Disasters.
CO3	Ability to understand Categories and impact of Disasters
CO4	realization of the responsibilities of society regarding environment and development

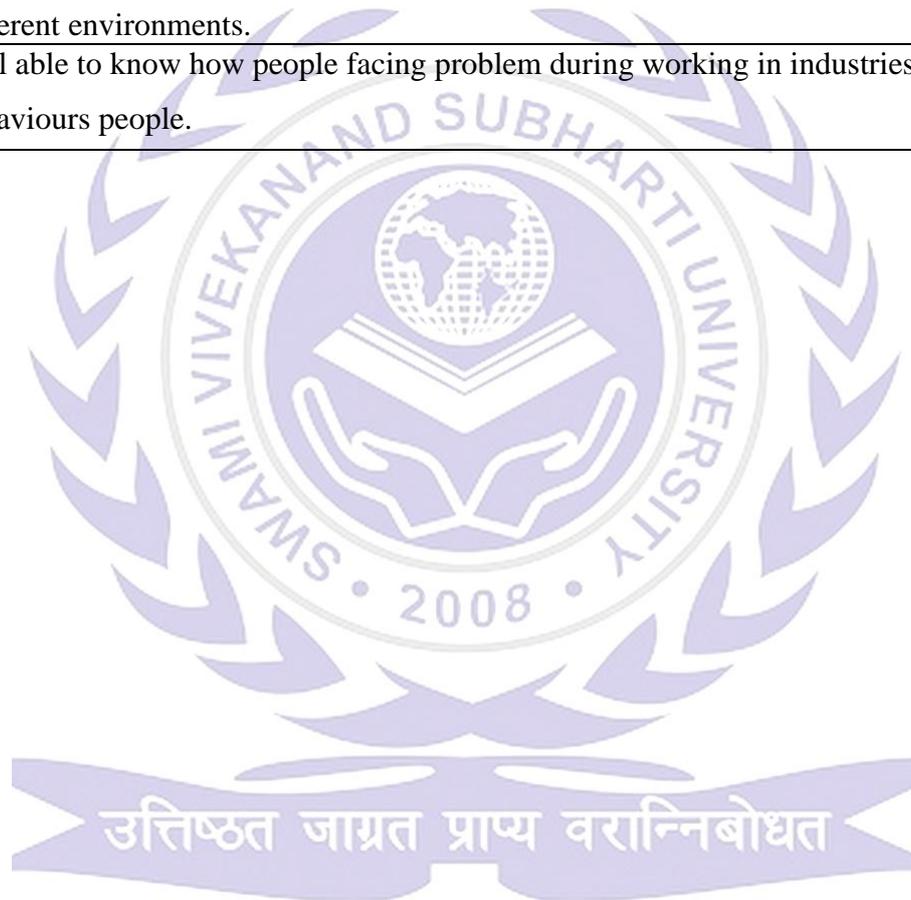
**SUBJECT NAME: Management –I (Organization Behaviour)**

**SUBJECT CODE: BCE- 410**

**BRANCH/YEAR/SEMESTER: CE/2<sup>nd</sup> /IV**

**COURSE OUTCOMES (Cos)**

CO1	Demonstrate an understanding of the forces that shape the business and economic structure
CO2	Explain why business ethics is an integral part of every business organization.
CO3	Understanding the business and related factors and business dependency on interactions with different environments.
CO4	Will able to know how people facing problem during working in industries with different behaviours people.



## 6<sup>TH</sup> SEMESTER

**SUBJECT NAME: Construction Engineering and Management**

**SUBJECT CODE: BCE-601**

**YEAR/SEMESTER: III/VI**

### **COURSE OUTCOME:**

CO1	Learn about various organizational structures and planning, monitoring, scheduling , updating of project
CO2	To understand various network techniques used in construction management
CO3	Gain knowledge of engineering economics and details about various contracts and tenders
CO4	To determine the optimal use of the equipment, owning, operating and maintenance and repair costs of the equipment.
CO5	To decide judiciously whether the equipment should be purchased or hired, repaired or sold.

**SUBJECT NAME: Engineering Economics, Estimation and Costing**

**SUBJECT CODE: BCE-602**

**YEAR/SEMESTER: 3<sup>rd</sup> /VI<sup>th</sup>**

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### **COURSE OUTCOME:**

CO1	Determine the Indian economy - Brief overview of post-independence period
CO2	Apply the concept of Challenges and Policy Debates in Monetary.
CO3	Determination the Estimation / Measurements for various items
CO4	Apply the concept of estimating earthwork and foundations estimation concrete and masonry.

**SUBJECT NAME: RAILWAY ENGINEERING**

**SUBJECT CODE: BCE-613**

**YEAR/SEMESTER: 3<sup>rd</sup> / 6<sup>th</sup>**

**COURSE OUTCOME:**

CO1	Student will be able to conduct various engineering survey for site selection of new routs.
CO2	Student will be able to select the various material for rails, sleepers; ballast, sub-grade and formation, rack fittings and fastenings and also find the track stresses.
CO3	Will able to design the horizontal curve, super-elevation, points and crossings, rail joints, safe speed on curves, etc.
CO4	After studying student able to understand rehabilitation and renewal of track.
CO5	Fundamental related to signalling and interlocking and functioning of high speed trains.

**SUBJECT NAME: Building Construction practice**

**SUBJECT CODE: BCE-621**

**YEAR/SEMESTER: III/VI**

**COURSE OUTCOME:**

CO1	To Understand basics electrical circuits with nodal and mesh analysis.
CO2	To understand and Appreciate electrical network theorems.
CO3	Apply Laplace Transform for steady state and transient analysis.
CO4	Explore and Determine different network functions.
CO5	Appreciate the frequency domain techniques.

**SUBJECT NAME: Rural Water Supply and Onsite Sanitation Systems**

**SUBJECT CODE: BCE-631**

**YEAR/SEMESTER: IV/VI**

**COURSE OUTCOME:**

CO1	Identify problems pertaining to rural water supply and sanitation.
CO2	Design water supply and sanitation system for rural community.
CO3	Design low cost waste management systems for rural areas.
CO4	Plan and design an effluent disposal mechanism.

**SUBJECT NAME: Design of Hydraulic Structures/ Irrigation Engineering**

**SUBJECT CODE: BCE-641**

**BRANCH/YEAR/SEMESTER: CE/3<sup>rd</sup> /6<sup>th</sup>**

**COURSE OUTCOMES (COs)**

CO1	Design the impervious floors for Diversion Head Works.
CO2	Interpret the design principles of Cross Drainage Works
CO3	Design the erodible and non-erodible canals
CO4	Analyze the stability of Gravity dams
CO5	Design of Spillways & estimate Irrigation Water Requirements.

## 8TH SEMESTER

**SUBJECT NAME: Ground Improvement Techniques**

**SUBJECT CODE: BCE - 812**

**BRANCH/YEAR/SEMESTER: CE/4<sup>th</sup>/8<sup>th</sup>**

### COURSE OUTCOMES (COs)

<b>CO1</b>	Identify the ground improvement techniques suitable for different soils.
<b>CO2</b>	Assess the process of drainage and dewatering of soils under various conditions.
<b>CO3</b>	Evaluate the suitable procedure for the in-situ treatment of soils.
<b>CO4</b>	Select the suitable grouting techniques for the soils in different conditions.
<b>CO5</b>	Recognize the appropriate application of geo synthetics in soils.

**SUBJECT NAME: DESIGN OF CONCRETE STRUCTURE-I**

**SUBJECT CODE: BCE-823**

**YEAR/SEMESTER: IV/VIII**

### COURSE OUTCOME:

<b>CO1</b>	Students will understand the general mechanical behavior of reinforced concrete
<b>CO2</b>	Students will be able to analyze and design reinforced concrete flexural and compression members.
<b>CO3</b>	Students will be able to analyze and design for vertical and horizontal shear in reinforced
<b>CO4</b>	Students will be able to analyze transfer and development length of concrete reinforcement.
<b>CO5</b>	Students will be able to analyze and design for deflection and crack control of reinforced concrete members.

**SUBJECT NAME: History of Science & Engineering**

**SUBJECT CODE: BCE-007**

**YEAR/SEMESTER: 4<sup>th</sup> /VIII**

**COURSE OUTCOME:**

CO1	Students will understand the Beginning and Development in different field of Science in ancient, medieval, and in modern period
CO2	Students will study the biography of different scientist like Baudhayan, Aryabhatta, Brahmgupta, Bhaskaracharya, Varahamihira, Nagarjuna etc.
CO3	Student will study the various research organization like DRDO, CSIR, IRC, ISRO etc.
CO4	Students will be able to study the Medical Science of Ancient India (Ayurveda & Yoga).

