2.6 Student Performance and Learning Outcome

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

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NITIN KRISHNARAO CHOUDHARI

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Program Outcome of B. Tech.

Lokmanya Tilak Jankalyan Shikshan Sanstha's
PRIYADARSHINI BHAGWATI COLLEGE OF ENGINEERING
Harpur Nagar, Umred Road (Near Bada Tajbagh), Nagpur-24
(Approved by AICTE, New Delhi, Govt. of Maharashtra
and affiliated to Rashtrasant Tukdoji Maharaj Nagpur University)
Email: principalpbcoe@gmail.com, Website: www.pbcoe.edu.in
NAAC Accredited

PROGRAM OUTCOMES (PO)

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

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

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

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

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

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

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

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

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

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

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

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

Course Outcomes of B. Tech First Year

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Department of B. Tech First Year

Course Outcomes

Course : Mathematics-I	**Subject Code: BESI-1T**
Class: B. Tech. First sem	**Session : 2022-23**
CO1	Determine n^{th} derivative of standard function using Leibnitz theorem, limits in inderminate forms by repeated use of L'Hospital rule, Maxima and Minima, Critical points of Functions of one variable
CO2	Apply the concept of Jacobian, Euler's theorem to find partial derivative of implicit function and function of several variable respectively and functional dependence.
CO3	Build an ability to use the essential tool of matrices and linear algebra in a comprehensive manner for analysis of system of linear equation, Finding linear and orthogonal transformation, Eigen values and Eigen Vector applicable to engineering problems.
CO4	Solve First order ordinary differential equation using integrating factor and recognize the practical importance of solving differential equation
CO5	Solve Higher order linear differential equation using appropriate technique for modeling and analyzing electrial circuits

Course : Applied Physics	**Subject Code: BESI-2T**
Class: B. Tech. First Sem	**Session : 2022-23**
CO1	Apply concepts in interference and diffraction to solve relevant numerical problems and to relate to relevant engineering applications.
CO2	Learn the basic concept of dual nature of matter and wave packet and apply them to analyse various relevant phenomena and to solve related numerical problem
CO3	Recall the basic concept of crystal structure and apply them in solving numerical problems based on them and in relating to applications for determination of crystal structure.
CO4	Relate the basic idea of total internal reflection to the propagation of light in an optical fiber and make use of the fiber concepts to solve numerical problems and relate to applications

	in engineering.
CO5	Find how to extend the basic concepts of motion of charged particles in electric magnetic fields to solve numerical problems and to relate to applications in electron optic devices and CRO.

Course : Energy and Environment	**Subject Code: BESI-3T**
Class: B. Tech. First sem	**Session : 2022-23**
CO1	Obtained the knowledge of solid and gaseous fuels and their calorific value determination
CO2	Recognize the type of liquid fuels and their uses in IC engine
CO3	Apply the knowledge about the use alternative sources of energy & utilize solid waste as energy source
CO4	Analyses the impacts of Industrial pollution and its control
CO5	Develop innovative ideas for use of advanced materials in sustainable development

Course : Communication Skills	**Subject Code: BSEI-4T**
Class: B. Tech. First sem	**Session : 2022-23**
CO1	Overcome barriers of Communication.
CO2	Students will acquire public speaking skills and handle group situations professionally.
CO3	To comprehend passage and compose paragraph.
CO4	To construct errors free and meaningful sentences in English.

Course : Engineering Graphics	**Subject Code: BESI-5T**
Class: B. Tech. First sem	**Session : 2022-23**
CO1	Students will be able to represent detailed conceptual knowledge about the dimensioning, specifications and conventions. Construct the various engineering curves using the drawing instruments and basic of orthographic projection through drawing the projection of point and line.
CO2	Students will be able to draw the projection of planes and solids.
CO3	Students will be able to draw and interpret the sectioned views and developments of various solids

CO4	Students will be able to draw a simple isometric projection view from given orthographic views

Course : Basics of Civil and Mechanical Engineering	**Subject Code: BESI-6T**
Class: B. Tech. First sem	**Session : 2022-23**
CO1	Introduction to what constitutes Civil Engineering. Identify the various areas available to pursue and specialize within the overall field of Civil Engineering, highlighting the depth of engagement possible within each of the areas.
CO2	Exploration of the various possibilities of career in this field. Understanding the vast interfaces this field has with the society at large. Understanding basic mechanism, techniques, methods and instruments used in different areas of civil engineering.
CO3	Understanding the techniques for repair and rehabilitation of structures. Showcasing the many monuments, heritage structures, nationally important infrastructures and impressive projects to serve as sources of inspiration. Highlighting possibilities for taking up entrepreneurial activities in this field with IT and IoT. Providing a foundation for the students to launch of upon an inspired academic pursuit into this branch of engineering with professional ethics.
CO4	Discuss several manufacturing process and identify the suitable process. Explain various types of mechanisms and its applications.
CO5	Describe and compare the conversion of energy from renewable and non-renewable energy sources.
CO6	List down the types of road vehicles and their specifications. Illustrates various basic parts and transmission system of road vehicles.

Course : Mathematics-II	Subject Code: BES2-1T
Class: B. Tech. Second sem	**Session : 2022-23**
CO1	Analyze real world scenarios to recognize when integrals are appropriate, formulate problems about the scenarios, creatively model these scenarios (using technology, if appropriate) in order to solve the problems using multiple approaches, judge if the results are reasonable, and then interpret and clearly communicate the results.
CO2	Define and understand the geometry of vector differential operators and line and surface integrals.
CO3	Explain and apply principles of study design and data collection.
CO4	Develop an ability to identify, formulate and/or solve real world problems.
CO5	Understand the impact of scientific and engineering solutions in a global and societal context.

Course : Advanced Engineering Materials	Subject Code: BES2-2T
Class: B. Tech. Second Sem	**Session : 2022-23**
CO1	Learn the concept of formation of energy bands and to classify solids on its basis..
CO2	Identify and explain different types of diodes, transistors and its applications
CO3	Learn the concepts of magnetism and superconductivity, classify and analyze various types of magnetic and superconducting materials
CO4	Learn and explain quantum transitions and apply it to working of lasers
CO5	Learn the concept of nano materials and compare its properties with those of bulk materials.

Course : APPLIED CHEMISTRY	Subject Code: BES2-3T
Class: B. Tech. Second sem	**Session : 2022-23**
CO1	Rationalize the periodic properties and analyze the Microscopic Chemistry in terms of atomic and molecular orbital
CO2	Rationalize bulk properties and processes using thermodynamic processes &understand the causes of corrosion, its consequences and methods to minimize corrosion
CO3	Distinguish the ranges of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques
CO4	Apply the principles of green chemistry in designing alternative reaction methodologies to minimize hazards and environmental degradation
CO5	Know about treatment of water and its applications in industry

Course : Computational skill	Subject Code: BES2-4T
Class: B. Tech. Second sem	**Session : 2022-23**
CO1	Illustrate basic components of computer system and basic structure of the C programming.
CO2	Demonstrate conditional branching, iterative statements, and arrays, searching and sorting techniques.
CO3	Illustrate library and user defined functions to solve real time problems
CO4	Demonstrate the use of structure and pointer in C

Course :Basic Electrical Engineering	Subject Code: BES2-6T
Class: B. Tech. Second sem	**Session : 2022-23**
CO1	Determine the unknown electrical quantities by applying the basic laws of Electric circuit.
CO2	Calculate the unknown quantities by using basic fundamental of magnetic circuit
CO3	Analyze & determine sinusoidal electrical quantities and parameters mathematically as well asgraphically for 1 phase & 3 phase AC circuit
CO4	Explain constructional, principle of operation, testing and applications of transformers.

Course : Engineering Mechanics	Subject Code: BES2 -7T
Class: B. Tech. Second sem	**Session : 2022-23**
CO1	Students will be able to find effect of forces on body and resultant of various force systems.
CO2	Students will be able to understand the concept of equilibrium of forces acting on the body, trusses, frames, free body diagram, friction.
CO3	Students will be able to find the centroid / C. G. and Moment of Inertia of composite figures. Students will be able to solve problem of connected bodies by virtual work principle.
CO4	Students will be able to solve problem of connected bodies by work energy and D' Alembert's principle. Students will be able to solve problem of connected bodies by impact and impulse.

Course : Indian culture and constitution	Subject Code: BES2 -8T
Class: B. Tech. First sem	**Session : 2022-23**
CO1	Student will become aware of Indian culture and civilization and their role in development of society
CO2	Students will understand industrial work - culture
CO3	Students will sensitized towards professional ethics
CO4	Students will understand Indian constitution and governance of the country
CO5	Students will be able to understand the structure and system of work organizations.

Course Outcomes of B. Tech(CSE)

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Department of Computer Science & Engineering

Course Outcomes

B. Tech. Third Semester (CBCS)

Course Name: Applied Math's III	
Code: BECSE301T	
At the end of the course student will be able to :	
CO1	Understand numerical methods, matrices for the solution of linear and non-linear equations, and the solution of differential equations, among other mathematical processes and activities.
CO2	Analyze real world scenarios to recognize when matrices and probability are appropriate, formulate problems about scenarios, and creatively model these scenarios, in order to solve the problems using multiple approaches.
CO3	Organize, manage and present data in clear and concise manner.
CO4	Develop an ability to identify, formulate and solve real world problems.
CO5	Understand the impact of scientific and engineering solutions in global and societal context
CO6	Create the groundwork for post graduate courses, specialized study and research in computational mathematics.

Course Name: Object Oriented Programming in JAVA	
Code: BECSE302T	
At the end of the course student will be able to :	
CO1	Identify classes, objects, members of class and relationships among them for specific problem.
CO2	Understand and demonstrate the concept of garbage collection, polymorphism, inheritance etc.
CO3	Do numeric (algebraic) and string based computation.
CO4	Understand and implement modularity as well as basic error handling techniques.
CO5	Develop, design and implement small multithreaded programs using Java language.
CO6	Apply appropriate problem-solving strategies for the implementation of small/medium scale Java applications.

Course Name: Operating System	
Code: BECSE303T	
At the end of the course student will be able to :	
CO1	Explain the basic concepts of operating system
CO2	Understand the process management policies and scheduling algorithm
CO3	Design the various memory management techniques.
CO4	Analyze process synchronization techniques
CO5	Understand file system concepts
CO6	Evaluate deadlock detection and prevention mechanism

Course Name: Computer Architecture and Digital System	
Code: BECSE304T	
At the end of the course student will be able to :	
CO1	Understand the basic concept of digital system, and apply for problem solving
CO2	Describe the computer architecture and addressing modes
CO3	Understand various instructions formats
CO4	Perform the arithmetic operations
CO5	Design and evaluate various memory management system
CO6	Illustrate I/O mapped and memory mapped operations.

Course Name: Ethics in IT	
Code: BECSE305T	
At the end of the course student will be able to :	
CO1	Acquire knowledge about ethical values and principles
CO2	Understand key issues of privacy protection policies
CO3	Understand and apply Intellectual Property Rights and related law in reality
CO4	Understand the core values that shape the ethical behavior of an engineer /IT professional
CO5	Identify the multiple ethical interests at stake in a real-world situation.
CO6	Develop cognitive skills in solving social problems

Course Name: Universal Human Values	
Code: BECSE306T	
At the end of the course student will be able to :	
CO1	Become more aware of themselves, and their surroundings (family, society, nature)
CO2	Become more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind.
CO3	They would have better critical ability
CO4	Become sensitive to their commitments towards what they have understand. (human values, human relationships, and human society)

Course Name: Environmental Science	
Code: BECSE307T	
At the end of the course student will be able to :	
CO1	Identify different types of air pollutions as well as explain their causes, detrimental effects on environment and effective control measures.
CO2	Recognize various source of water pollutants and interpret their causes and design its effective control measure.
CO3	Illustrate various types of pollutants and waste management.
CO4	Analyze various social issues related to environmental and challenges in implementation of environmental laws.

B. Tech. Fourth Semester (CBCS)

Course Name: Discrete Mathematics and Graph Theory	
Code: BECSE401T	
At the end of the course student will be able to :	
CO1	Apply graph theory models of data structures and state machines to solve problems of connectivity and constraint satisfaction.
CO2	Gain an introduction into how mathematical models for engineering are designed, analyzed and implemented in industry and organizations.
CO3	Reason mathematically about basic data types and structures (such as numbers, sets, graphs, and trees) used in computer algorithms and systems; distinguish rigorous definitions and conclusions from merely plausible ones.
CO4	Analyze real world scenarios to recognize when Logic, sets, functions are appropriate, formulate problems about the scenarios, creatively model these scenarios (using technology, if appropriate) in order to solve the problems using multiple approaches.
CO5	Apply knowledge of mathematics, physics and modern computing tools to scientific and engineering problems.
CO6	Apply their knowledge in life-long learning.

Course Name: Data Structure and Program Design	
Code: BECSE402T	
At the end of the course student will be able to :	
CO1	Analyze the complexity of algorithms and sorting techniques.
CO2	Apply the concept of stack and queues to solve real world problem.
CO3	Describe and implement linked list operation.
CO4	Demonstrate different methods for traversing trees.
CO5	Utilize the concepts of graphs to build solution. Design and implement searching techniques and hashing function

Course Name: Database Management Systems	
Code: BECSE403T	
At the end of the course student will be able to :	
CO1	Understand basic database concepts and data modeling techniques used in database design.
CO2	Study the concept of functional dependency and Perform the calculus with Design database by using different normalization technique.
CO3	Study query processing and Perform optimization on query processing.
CO4	Understand the concept of transaction processing and different recovery technique used in RDBMS.
CO5	Study and Implement advanced databases which are used real time system.

Course Name: Computer Networks	
Code: BECSE404T	
At the end of the course student will be able to :	
CO1	Describe the functions of each layer in OSI model along with basic networking concepts.
CO2	Explain physical layer functionality and its working along with transmission media with real time applications.
CO3	Describe the functions of data link layer and explain the protocols used in data link layer.
CO4	Classify the routing protocols and analyze how to map IP addresses. Identify the issues related to transport layer, congestion control
CO5	Describe Quality of Service, DNS, Application layer protocols & Network security issues.

Course Name: Theory of Computation	
Code: BECSE405T	
At the end of the course student will be able to :	
CO1	Design finite automata and its minimization along with Moore and Mealy machines.
CO2	Apply regular expression and create grammar for the same.
CO3	context free grammar and various normal forms of CFGs.
CO4	Create Push Down Automata for the given CFG and inter-conversion of the same.
CO5	Create Turning Machine for the grammar and Deal with Recursive and Recursively Enumerable Languages.

Course Name: System Programming	
Code:BECSE406T	
At the end of the course student will be able to :	
CO1	Identify the relevance of different system programs.
CO2	Describe the various data structures and passes of assembler design.
CO3	Identify the need for different features and designing of macros
CO4	Distinguish different loaders and linkers and their contribution in developing efficient user applications.
CO5	Grab the concepts of phases of compiler, LEX and YACC

Course Name: Computer Workshop-II-Lab	
Code:BECSE407P	
At the end of the course student will be able to :	
CO1	Declare python operators, numeric data types and string operations
CO2	Implement tuple, conditional blocks and loops in python
CO3	Apply functions, modules, and packages using python
CO4	Handle exceptions, sorting algorithms and various data structures
CO5	Implement various file operations using python and Implement concepts of object oriented programming and python database connectivity

B. Tech. Fifth Semester (CBCS)

Course Name: Artificial Intelligence	
Code: BTECH_CSE-501T	
At the end of the course student will be able to :	
CO1	Demonstrate knowledge of the building blocks of Al as presented in terms of Intelligent agents.
CO2	Analyze and formalize the problem as a state space, graph, design heuristics and select amongst different search or game based techniques to solve them.
CO3	To create an understanding of the basic issues of knowledge representation
CO4	Formulate and solve problems with uncertain information using Bayesian approaches.
CO5	Attain the capability to represent various real life problem domains using logic based techniques

Course Name: Design and Analysis of Algorithms	
Code: BTECH_CSE-502T	
At the end of the course student will be able to :	
CO1	Illustrate different approaches for analysis and design of efficient algorithms and Analyze performance of various algorithms using asymptotic notations.
CO2	Determine and Apply various divide & conquer strategies and greedy approaches for solving a given computational problem
CO3	Demonstrate and Solve various real-time problems using the concepts of dynamic programming
CO4	Make use of backtracking and graph traversal techniques for solving real-world problems
CO5	Recall and Classify the NP-hard and NP-complete problems

Course Name: Design and Analysis of Algorithms LAB	
Code: BTECH_CSE-502P	
At the end of the course student will be able to :	
CO1	Calculate the time complexity of algorithm.
CO2	Sort the given numbers using various sorting algorithms.
CO3	Develop programs for the problems using Divide and Conquer and greedy methods.
CO4	Develop programs for the problems using Dynamic programming,
CO5	Students will be able to write programs for the problems using Backtracking.

Course Name: Software Engineering and Project Management	
Code: BTECH_CSE-503T	
At the end of the course student will be able to :	
CO1	Understand software engineering methods, practices, process models and application,
CO2	Analyse various software engineering life cycle models and apply methods for design and development of software projects.
CO3	Analyze and extract requirements for product and translate these into a documented design using different modeling techniques.
CO4	Understand and apply software testing methods and types, And to understand debugging concept with various testing methods,
CO5	Identify and apply the principles, processes and main knowledge areas for Software Project Management

Course Name: Elective 1: TCP/IP	
Code:BTECH_CSE-504.1T	
At the end of the course student will be able to :	
CO1	Enumerate the layers of the TCP/IP model.
CO2	Analyze the services of TCP/IP protocol and be able to deal with its layers. Also the concepts of IP addressing
CO3	Acquire the knowledge of routing protocols
CO4	Familiarize students with the basic computer network protocols, and how they can be used to help develop and execute networks.
CO5	Generate the solution for basic issues of Internet Mechanism and its security.

Course Name: Elective 1: Design Patterns	
Code:BTECH_CSE-504.2T	
At the end of the course student will be able to :	
CO1	Understand common design patterns in the context of incremental/iterative development.
CO2	Exploit well-known Creational design patterns.
CO3	Distinguish between different types of structural design patterns.
CO4	Remember the appropriate design patterns, purpose and methods and use of Behavioral Design Pattern to solve object oriented design problems.
CO5	Demonstrate and understanding of Behavioral and other useful design patterns

Course Name: Elective 1: Data Warehousing and Mining	
Code:BTECH_CSE-504.3T	
At the end of the course student will be able to :	
CO1	To understand the basic concepts of Data Warehouse and Data Mining techniques
CO2	Capable to create a data warehouse and to process raw data.
CO3	Able to apply basic classification, clustering on a set of data.
CO4	Able to identify frequent data items and to apply association rule on a set of data.
CO5	To learn recent trends of data mining such as web mining.

Course Name: Professional Skills Lab I	
Code:BTECH_CSE-505P	
At the end of the course student will be able to :	
CO1	List various tags in HTML, DHTML and use these, apply Cascaded style sheet to create web page.
CO2	Understand and evaluate web application architecture, technologies and frameworks
CO3	Apply the knowledge of web technology in developing web applications
CO4	Develop an interactive web applications using ASP.NET
CO5	Evaluate different solutions in field of web application development.

Course Name: Effective Technical Communication	
Code: BTECH_CSE-506T	
At the end of the course student will be able to :	
CO1	Acquire knowledge of structure of language.
CO2	Be able to face competitive exams and the interview process and can become employable.
CO3	Develop business writing skills.
CO4	Become familiar with technology enabled communication and can develop technical and scientific writing skills.

B. Tech. Sixth Semester (CBCS)

Course Name: Compiler Design	
Code: BTECH_CSE-601T	
At the end of the course student will be able to :	
CO1	Define the Compiler along with phases and basic programs in LEX.
CO2	Develop programs for various kinds of the Parsers.
CO3	Write simple programs related to Type Checking, Parameter Passing and Overloading.
CO4	Implement the concepts of Code Optimizations and Code Generations.
CO5	Provide the Case Studies of Object-Oriented Compilers.

Course Name: Compiler Design Lab	
Code: BTECH_CSE-601P	
At the end of the course student will be able to :	
CO1	Generate scanner and parser from formal specification.
CO2	Generate top down and bottom up parsing tables using Predictive parsing, SLR and LR Parsing techniques.
CO3	Apply the knowledge of YACC to syntax directed translations for generating intermediate code -3 address code.
CO4	Build a code generator using different intermediate codes and optimize the target code.
CO5	Generate scanner and parser from formal specification

Course Name: Elective 2: Machine Learning	
Code: BTECH_CSE-602.1T	
At the end of the course student will be able to :	
CO1	Understand basics of Machine Learning Techniques..
CO2	Understand different types of Regression Techniques.
CO3	Be capable of applying classification techniques.
CO4	Apply unsupervised machine learning techniques.
CO5	Apply & evaluate the machine learning techniques to real world problems.

Course Name: Elective 2: Internet of Things	
Code: BTECH_CSE-602.2T	
At the end of the course student will be able to :	
CO1	Understand the vision of IoT from a global context.
CO2	Understand M2M to IoT — A Basic Perspective
CO3	Use of Devices, Gateways and Data Management in loT
CO4	Understand the Internet of Things Privacy, Security and Governance
CO5	Implement basic loT applications on embedded platform

Course Name: Elective 2: Cloud Computing	
Code: BTECH_CSE-602.3T	
At the end of the course student will be able to :	
CO1	Understand the different Cloud Computing environment
CO2	Analyze virtualization technology and install virtualization software
CO3	Use appropriate data storage technique on Cloud, based on Cloud application
CO4	Apply security in cloud applications
CO5	Use advance techniques in Cloud Computing

Course Name: Elective 3: Data Science	
Code: BTECH_CSE-603.1T	
At the end of the course student will be able to :	
CO1	Understanding the significance of exploratory data analysis in Data Science.
CO2	Demonstrate the usage of Random Sampling and bias in a given dataset.
CO3	Analysis of various Statistical Experiments through various types popular Testing methods,
CO4	Design and analysis of regression techniques to estimate outcomes and detect anomalies.
CO5	Ability to implement classification Techniques.

Course Name: Elective 3: Distributed Operating Systems	
Code: BTECH-CSE-603.2T	
At the end of the course student will be able to :	
CO1	Learn the principles, architectures, algorithms and programming models used in distributed systems.
CO2	Understand the core concepts of distributed systems.
CO3	Design and implement sample distributed systems, using different algorithm.
CO4	Understand the Distributed File System, Architecture, and Mechanism.
CO5	Analyze the Distributed Scheduling, Issues in Load Distributing, components of a Load Distributing Algorithm, Load Distributing Algorithms.

Course Name: Elective 3: Human Computer Interaction	
Code: BTECH-CSE-603.3T	
At the end of the course student will be able to :	
CO1	Understand the Importance of user Interface
CO2	Design effective dialog for HCI
CO3	Develop navigation panes in windows
CO4	Understand HCI using software tools, prototypes and golden rules
CO5	Analyse and apply various evaluation techniques.

Course Name: Open Elective 1: Linux Fundamentals	
Code: BTECH-CSE-604.1T	
At the end of the course student will be able to :	
CO1	Understand Linux Architecture, different Linux installation and Linux commands.
CO2	Effectively use Linux Environment using shell, file system, scripts, filters and

	program development tools
CO3	Perform user, group management , package management through commands
CO4	Perform storage management and failure recovery through commands.
CO5	Automate tasks and write simple programs using shell scripts.

Course Name: Open Elective 1: Android Application Development	
Code: BTECH-CSE-604.2T	
At the end of the course student will be able to :	
CO1	Describe the components and structure of a mobile development framework
CO2	Understand the specific requirements, possibilities and challenges when developing for a mobile context.
CO3	Apply Java programming concepts to Android application development
CO4	Design and develop user Interfaces for the Android platform
CO5	Publish an application to the Android Market

Course Name: Open Elective 1: Block-chain Technologies	
Code: BTECH-CSE-604.3T	
At the end of the course student will be able to :	
CO1	Understand emerging abstract models for Block chain Technology
CO2	Analyse the concept of Crypto currency and mathematical background behind it
CO3	Apply the tools for understanding the background of bit coins
CO4	Identify major research challenges and technical gaps existing between theory and practice in crypto currency domain
CO5	Understanding of latest advances and its applications in Block Chain Technology

Course Name: Mini Project Subject Code:	
Code:BTECH_CSE-607P	
At completion of mini-project:	
CO1	Students will get knowledge of all the necessary details required for the development of a software project and its documentation using software engineering approach.

Course Name: Intellectual Property Rights (Audit Course)	
Code: BTECH_CSE-609T	
At the end of the course student will be able to :	
CO1	Understand fundamental aspects of Intellectual property Rights.
CO2	Apply knowledge on patents, patent regime in India and abroad and registration aspects
CO3	Be capable of getting copyrights and its related rights and registration aspects
CO4	Be capable of getting trademarks and registration aspects
CO5	Apply knowledge on Design, Geographical Indication (Gl), Plant Variety and Layout Design Protection and their registration aspects

B. Tech. Seventh Semester (CBCS)

Course Name: Cryptography and Network Security	
Code:BTECHCSE70IT	
At the end of the course student will be able to :	
CO1	Acquire knowledge about security goals, background of cryptographic mathematics and identification of its application
CO2	Understand, analyze and implement - the symmetric key algorithm
CO3	Acquire knowledge about the background of mathematics of asymmetric key cryptography and understand and analyze - asymmetric key encryption algorithms, digital signatures
CO4	Analyze the concept of message integrity and the algorithms for checking the integrity of data
CO5	Analyze and understand the existing cryptosystem used in networking

Course Name: Cryptography and Network Security	
Code: BTECHCSE701P	
At the end of the course student will be able to :	
CO1	Acquire knowledge about security goals, background of cryptographic mathematics and identification of its application.
CO2	Understand, analyze and implement - the symmetric key algorithm
CO3	Acquire knowledge about the background of mathematics of asymmetric key cryptography and understand and analyze asymmetric key encryption algorithms, digital signatures
CO4	Analyze the concept of message integrity and the algorithms for checking the integrity of data.
CO5	Understand and analyze the existing cryptosystem used in networking

Course Name: Elective-IV Deep Learning	
Code: BTECHCSE702T	
At the end of the course student will be able to :	
CO1	Understand basic of deep learning algorithms.
CO2	Represent feedforward Neural Network
CO3	Evaluate the performance of different deep learning 'models with respect to the optimization, bias variance trade-off, overfitting and underfitting.
CO4	Apply the convolution networks in context with real world problem solving.
CO5	Apply recurrent neural networks in context with real world problem solving

Course Name: Elective IV : Optimization Technique	
Code: BTECHCSE702T	
At the end of the course student will be able to :	
CO1	Explain the theoretical workings of the graphical, simplex and analytical methods for making effective decision on variables so as to optimize the objective function,
CO2	Identify appropriate optimization method to solve complex problems involved in various industries.
CO3	Demonstrate the optimized material distribution schedule using transportation model to minimize total distribution cost.
CO4	Identify appropriate equipment replacement technique to be adopted to minimize maintenance cost by eliminating equipment break-down.
CO5	Apply the knowledge of game theory concepts to articulate real-world competitive situations to identify strategic decisions to counter the consequences.

Course Name: Elective IV : Gaming Architecture	
Code: BTECHCSE702T	
At the end of the course student will be able to :	
CO1	Discuss the concepts of Game Design and Development
CO2	Design the processes, and use mechanics for game development.
CO3	Explain the Core architectures of Game Programming.
CO4	Use Game Programming platforms, frame works and engines.
CO5	Create interactive Games.

Course Name: Elective IV : Salesforce Technology	
Code: BTECHCSE702T	
At the end of the course student will be able to :	
CO1	Develop skills in configuring and managing Salesforce orgs.
CO2	Understanding Salesforce Data Management:
CO3	Implementing automation, security and debugging data.
CO4	Acquire programming skills in Apex, Salesforce's programming language.
CO5	Enable to extend and customize Salesforce to meet specific business requirements.

Course Name: Elective V - Natural Language Processing	
Code:BTECHCSE703T	
At the end of the course student will be able to :	
CO1	Understand the basic concepts and applications of Natural Language Processing (NLP)
CO2	Identify the challenges in NLP and evaluate the solutions to these challenges
CO3	Analyze and preprocess text data for NLP tasks
CO4	Apply different NLP techniques and algorithms such as text classification, information retrieval and extraction, syntactic and semantic analysis and deep learning models
CO5	Evaluate a and compare different NLP techniques and algorithms using approprate metrics

Course Name: Elective V : Big Data Analytics	
Code: BTECHCSE703T	
At the end of the course student will be able to :	
CO1	Understand Concept, characteristics, types of big data
CO2	Build and maintain reliable, scalable, distributed systems with Apache Hadoop.
CO3	Apply Hadoop ecosystem components to solve real world problems.
CO4	Apply machine learning algorithm for big data analysis.
CO5	Implement Big Data Activities using Hive

Course Name: Elective V : Mobile Computing	
Code: BTECHCSE703T	
At the end of the course student will be able to :	
CO1	Understand the basic concepts of Wireless Communication with Cellular system.
CO2	To learn about GSM System with Cell layout, Radio, Network Switching and Operation subsystem, HLR & VLR.
CO3	To learn Wireless LAN with its Architecture and MAC Layer.
CO4	To learn Mobile IP, Dynamic Host Configuration Protocol, Mobile Ad hoc Networks
CO5	To learn about TCP over Wireless Networks with Wireless Application protocol.

Course Name: Open Elective II: Python Programming	
Code: BTECHCSE704T	
At the end of the course student will be able to :	
CO1	Develop programming skills in Python Programming language.
CO2	Implement object-oriented programming concepts using Python.
CO3	Utilize Python libraries for data analysis and visualization.
CO4	Develop web applications using Flask framework.
CO5	Apply machine learning concepts using Scikit-Learn.

Course Name: Open Elective II :JAVA Programming	
Code: BTECHCSE704T	
At the end of the course student will be able to :	
CO1	Understand the fundamentals of Java programming language and its application in software development.
CO2	Implement Java programming constructs such as variables, operators, control statements, loops, and arrays.
CO3	Design and implement object-oriented programs using inheritance, polymorphism, encapsulation, and abstraction concepts in Java.
CO4	Create and use classes, objects, and methods in Java programs.
CO5	Handle exceptions and use input/output techniques in Java programs.

Course Name: Open Elective II : Basics of Database Management System

Code: BTECHCSE704T	
At the end of the course student will be able to :	
CO1	Understand the basics of DBMS to analyze an information problem in the form of an Entity relation diagram and design an appropriate data model for it.
CO2	Demonstrate basics of File organizations and its types
CO3	Interpret functional dependencies and various normalization forms
CO4	Perform basic transaction processing and management
CO5	Demonstrate SQL queries to perform CRUD (Create, Retrieve, Update, Delete) operations on database.

B. Tech. Eighth Semester (CBCS)

Course Name: Program Elective – VI (Social Networks)	
Code: BTCME801.1T	
At the end of the course student will be able to :	
CO1	Learn social networks , its types and representation
CO2	Understand weak ties, strong and weak relationships , homophily and calculate
CO3	Analyze links
CO4	Understand Power Laws and Rich-Get-Richer Phenomena
CO5	Understand Small World Phenomenon

Course Name: Program Elective – VI (Reinforcement Learning)	
Code: BTCME801.2T	
At the end of the course student will be able to :	
CO1	Understand Bandit algorithm and its mathematical formulation.
CO2	Use dynamic programming for reinforcement learning
CO3	Perform function approximation and apply LSM
CO4	Fit Q, DQN & Policy Gradient for Full RL
CO5	Use combinatorial models for complex problems

Course Name: Program Elective – VI (GPU Architecture and Programming)	
Code: BTCME801.3T	
At the end of the course student will be able to :	
CO1	Understand conventional CPU architectures, their extensions for single instruction multiple data processing (SIMD)
CO2	Program in CUDA about data space & synchronization
CO3	Apply optimization on kernals, treads etc
CO4	Learn basics of QOpenCL
CO5	Design an application using neural networks

Course Name: Program Elective – VII(Predictive Analytics - Regression and

Classification)	
Code: BTCME802.1T	
At the end of the course student will be able to :	
CO1	To understand predictive models, LSM, Normal equations and GMT
CO2	Understand regression models and infer its statistical inference
CO3	Check model assumptions and bias variance tradeoff.
CO4	Perform regression analysis in various programming languages
CO5	Apply regression models and classification for predictive analysis

Course Name: Program Elective – VII(Data Analytics using Python)	
Code: BTCME802.2T	
At the end of the course student will be able to :	
CO1	Understand data analytics and Python fundamentals
CO2	Perform sampling using various methods and perform hypothesis test or ANOVA test
CO3	Fit linear regression model and calculate various errors
CO4	Apply ROC
CO5	Apply clustering and classification using python programming

Course Name: Program Elective – VII (Cloud Computing)	
Code: BTCME802.3T	
At the end of the course student will be able to :	
CO1	Understand on-demand computing service for shared pool of resources, namely servers, storage, networking, software, database, applications etc.,
CO2	Understand cloud model for enabling ubiquitous, on-demand access to a shared pool of configurable computing resources, which can be rapidly provisioned and released with minimal management effort.
CO3	Create a cloud and use cloud simulator software's
CO4	Perform VM resource management and cloud fog edge enabled analytics.
CO5	Practice case studies and understand advanced research areas

Course Outcomes of

B. Tech (IT)

Lokmanya Tilak Jankalyan Shikshan Sanstha's
PRIYADARSHINI BHAGWATI COLLEGE OF ENGINEERING
Harpur Nagar, Umred Road (Near Bada Tajbagh), Nagpur-24
(Approved by AICTE, New Delhi, Govt. of Maharashtra
and affiliated to Rashtrasant Tukdoji Maharaj Nagpur University)
Email: principalpbcoe@gmail.com, Website: www.pbcoe.edu.in
NAAC Accredited

Department of Information Technology

Course Outcome

B.Tech. Third Semester

Course Name : Applied Mathematics -III	
Code : BEIT301T	
At the end of course Students will be able to:	
CO1	Find Laplace and Fourier transform of functions and apply them for solving differential equations, integral equations. Evaluate Laplace transform, Fourier transform and inverse transforms of Engineering Problem.
CO2	Apply transform techniques to analyze continuous- time system and discrete time- system. Solve problems in various branches of Engineering using Z-Transform and inverse Z-transform.
CO3	Determine Eigen values, Eigen vectors for a linear transformation. Compare and analyze the methods in Matrices
CO4	Find Laplace and Fourier transform of functions and apply them for solving differential equations, integral equations. Evaluate Laplace transform, Fourier transform and inverse transforms of Engineering Problem.
CO5	Apply transform techniques to analyze continuous- time system and discrete time- system. Solve problems in various branches of Engineering using Z-Transform and inverse Z-transform.
Course Name : Programming Language and Design using C	
Code : BEIT302T	
At the end of course Students will be able to –	
CO1	Acquire fundamental knowledge of C programming language
CO2	Apply array, function and pointer techniques in program development
CO3	Apply sub routines/functions,structure and union in program develpment
CO4	Apply knowledge of console programming for file handling
CO5	Apply knowledge of memory management and graphics programming
Course Name : Programming Language and Design using C(Practical)	
Code : BEIT302P	
At the end of course Students will be able to –	
CO1	Acquire & Implement fundamental knowledge of C programming language
CO2	Apply array, function and pointer techniques in program development
CO3	Implement structutred program for complex data
CO4	Apply knowledge of console programming for file handling
CO5	Apply knowledge of memory management and graphics programming
Course Name : Digital Electronics and flundamentals of Microprocessor	
Code : BEIT303T	
At the end of course Students will be able to –	
CO1	The students would be able to understand the importance and necessity of logic gates,and solving boolean expression
CO2	The student would be able to solve various types of k-map in SOP and POS form

CO3	The students would be equipped with the basic knowledge related to design of combinational circuitsd
CO4	The students would be equipped with the basic knowledge related to design of sequential circuits,flip-flop,counters
CO5	The students should be understand of necceessity of instructions types of addressing modes and instruction sets,programming for microprocessor.
Course Name : Digital Electronics and flundamentals of Microprocessor	
Code : BEIT303P	
CO1	Apply the basic concept of logic gats and their use in combinational and sequential circuits.
CO2	Use and implements Universal logic gates.
CO3	Design and implement basic circuit required in computer system.
CO4	Develope and execute assembly language program.
Course Name : Emerging Trends in Information Technology	
Code : BEIT304T	
At the end of course Students will be able to :	
CO1	Describe a business case for emerging information technology.
CO2	Recognize factors affecting successful adoption of new information technology and also to recognize key attributes, business benefits risks and cost factors of a new technology.
CO3	Recognize how to effectively use advanced search and selection metrics for identifying and selecting new technology.
CO4	Describe technology trends that presently drive or are expected to drive the selection of new technologies over the next decade.
CO5	Hone analytical and logical skill for problem solving.
Course Name: System Programming	
Code : BEIT305T	
At the end of course Students will be able to:	
CO1	Recognize system software and software development process, recent trends and fundamentals of Language processing.
CO2	Recognize the concept of assembler, its types, design criteria, algorithms and assembly process.
CO3	Demonstrate the functions of macros and its processing.
CO4	Examine how linker and loader create an executable program from object module created by assembler and compiler.
CO5	Summarize various phases of Compiler, optimization and Interpretation technique and interpret the concept of JVM, JRF, types of errors and debuggers.
Course Name :Software Lab I	
Code-BEIT306P	
At the end of course Students will be able to:	
CO1	Understand the basic organization, working and applications of Personal computers
CO2	Assemble dessemble the computer system
CO3	Demonstrate the working of peripherals of computer system
CO4	Apply different utilities and tools(eg.MATLAB etc.)
CO5	Design the networking.
Course Name :Universal Human Values	

Code-BEIT307T	
At the end of course Students will be able to:	
CO1	Become more aware about themselves,and their surroundings(Family,Society,Nature)
CO2	Become more resbonsible in life, and in handling problem with sustainable solution, while keeping human relationship and human nature in mind.
CO3	They would have better critical ability.
CO4	Becomes sensitive to theire commitment towards thats have understand(Human values ,Human relationship,and Human society)
Course Name :Environmental Science	
Code-BEIT308T	
At the end of course Students will be able to:	
CO1	Identify different types of air pollutions as well as explain their causes, detrimental effects on environment and effective control measures.
CO2	Recognize various sources of water pollutants and interpret their causes and design its effective control measure
CO3	Illustrate various types of pollutants and waste management
CO4	Analyze various social issues related to environment and challenges in implementation of environmental laws.
B.Tech. Fourth Semester	
Course Name : Discrete Mathematics and Graph Theory	
Code : BEIT401T	
At the end of course Students will be able to –	
CO1	Compute the Cartesian product of sets. Represent various types of relations graphically. Determine the domain and range of discrete or non-discrete function , identify one-to-one functions, perform composition of function and apply the properties of functions to application problems.
CO2	Decide the difference between Crips set and fuzzy set theory. Recognize fuzzy logic membership function.
CO3	Recognize the mathematical objects like Group and Ring. Describe the fundamental concepts in group theory such as groupoid, monoid, subgroup, normal subgroup and in ring theory such as of the ideals, quotient rings, integral domain and fields.
CO4	Analyze the significance of graph theory, isomorphism of graphs, reachability and connectedness of graphs and tree structure in different engineering problems. Demonstrate algorithms used in interdisciplinary engineering domain
CO5	Analyze a given combinatorial problem with a view to solve it by applying one of the standard techniques they learned.
Course Name : Data Structure and Program Design	
Code : BEIT402T	
At the end of course Students will be able to:	
CO1	Define data structure and compare the different basic data structures such as arrays, linked lists, stacks and queues. Understand asymptotic notation and calculate complexity of algorithm
CO2	Apply the concept for solving problems like sorting, searching , insertion and deletion of data

CO3	Apply the different linear data structures like stack and queue to various computing problems to select and apply stack and queue concept also to create Linked list, doubly Linked List, circular queue, priority queue.
CO4	Evaluate Tree non linear data structure,Implement different types of trees and apply them to problem solutions.
CO5	Discuss graph structure and understand various operations on graphs and their applicability
Course Name : Data Structure and Program Design (Practical)	
Code : BTIT402P	
At the end of course Students will be able to –	
CO1	Learn the concept of linear and nonlinear data structure and ADT
CO2	Apply searching and sorting techniques
CO3	Identify nonlinear data structure and implement program
CO4	Design the development of various software programs
Course Name:Object Oriented Programming System	
Code : BEIT403T	
At the end of course Students will be able to:	
CO1	Explain the basic concept and properties/ features of OOPs
CO2	Illustrate and implement the concept of constructor and Destructor.
CO3	Implement the concept of Inheritance using C++
CO4	Explain and implement the concept of Polymorphism using C++
CO5	Implement file handling and Exception Handling in C++.
Course Name:Object Oriented Programming System (Practical)	
Code : BEIT403P	
At the end of course Students will be able to –	
CO1	Explain the basic concept and properties/ features of OOPs
CO2	Illustrate and implement the concept of constructor and Destructor.
CO3	Implement the concept of Inheritance using C++
CO4	Explain and implement the concept of Polymorphism using C++
CO5	Implement file handling in C++.
CO6	Implement the concept of Exception Handling in C++.
Course Name:Compute Architecture and Organization	
Code:BEIT404T	
At the end of course Students will be able to –	
CO1	Recognize the basic functional units, various Buses and addressing modes.
CO2	Determine fundamental concept for execution and sequencing of control signals.
CO3	Compare Hardwired and Micro-programmed Control unit, write the control steps/sequence of micro-programming.
CO4	Demonstrate the knowledge of computer arithmetic algorithm and solve the problems.
CO5	Design and implements various memory IC's, evaluate the main memory address.
Course Name : Introduction to Computer Network	
Code :BEIT405T	
At the end of course Students will be able to –	
CO1	To summarize the fundamentals of Computer Network
CO2	Comparison of OSI and TCP/IP reference models
CO3	To distinguish between different type of bit errors, explain the concept of bit redundancy, error detection and error correction methods

CO4	Compare routing principles, algorithms such as distance vector and link state, Internetworking principles, how, IP, IPV^, ICMP works
CO5	Demonstrate understanding of significance and purpose of protocols and standards, and their key elements and use in networkingand Transport layer protocol.
Course Name : Operating System	
Code :BEIT406T	
At the end of course Students will be able to –	
CO1	Interprete the basics of OS and computer system resources
CO2	Classify the process management policies and scheduling of processes by CPU.
CO3	Judge the requirement for process synchronization and coordination handled by OS
CO4	Compare and contrast the memory management and its allocation policies
CO5	Identify use and evaluate the storage management policies with respect to different storage management technologies.
Course Name : Software Lab-II (Practical)	
Code :BEIT407P	
At the end of course Students will be able to:	
CO1	Able to apply principles of Python Programming
CO2	To implement OOPs concepts using python
CO3	To develop testing, Debugging, Exceptions and Assertions in Pyhton
CO4	To design basic input/output, graphics programs using R language
CO5	Design the networking.
Course Name : Consumer Affairs(Audit)	
Code :BEIT408T	
At the end of course Students will be able to:	
CO1	Understand the basic concepts and importance of consumer education
CO2	Grasp the concepts related to consumer education and protection
CO3	Analyze the regulations and redressal mecahnism system
CO4	Aware of consumer movements
B.Tech. Fifth Semester	
Course Name : Software Engineering and Project Management	
Code :BEIT501T	
At the end of course Students will be able to:	
CO1	Student will be able to acquire knowledge of software engineering methods, practices , process models and application.
CO2	Student will be able to understand measure, matrices and indicatore and able to draw various modelling diagram.
CO3	Students will be to analyze extract requirements for product and translate these into a documented design using different modelling techniques .
CO4	Student will able to learn software tesing methods and types and undrstand debugging concpt with various testing methods.
CO5	Student will understand project mangement and to know software risks and principle of quality mangement, reengineering and reverse engineering.
Course Name : Software Engineering and Project Management (Practical)	
Code :BTIT501P	
At the end of course Students will be able to –	
CO1	Learn the concept of requirement gathering &learn the development of use case model
CO2	Apply the object creation and interaction between various object and their collaboration
CO3	Identify the various stages of object and different component views

CO4	Describe and Design the development of various UML models and understanding the complete design phase
Course Name : Design and Analysis of Algorithm	
Code : BEIT502T	
At the end of course Students will be able to:	
CO1	Illustrate different approaches for analysis and design of efficient algorithm and analyze performance of various algorithms using asymptotic notation.
CO2	Determine and Apply various divide and conquer strategies and greedy approaches for solving a given computational problem.
CO3	Demonstrate and Solve various real time problem using the concepts of dynamic programming.
CO4	Implement the concept of backtracking and graph traversal technique for solving real- world problems.
CO5	Recall and Classify the NP-hard and NP-complete problem.
Course Name : Java Programming	
Code : BEIT503T	
At the end of course Students will be able to:	
CO1	Interpret the basic data types and control flow constructs.
CO2	Make use of various Object Oriented Concepts like inheritance, data hiding, Exception Handling etc., to implement various programs in Java
CO3	classify the concepts of Multithreading & Multiprogramming
CO4	Implementation of String class, Date class, Time class and Calendar class in various
CO5	Classify the concepts of Collections Framework.
Course Name : Java Programming (Practical)	
Code : BEIT503P	
At the end of course Students will be able to:	
CO1	Implement the basic data types and control flow constructs.
CO2	Make use of various Object Oriented Concepts like inheritance, data hiding, Exception Handling etc.,
CO3	Implement the concepts of Multithreading & Multiprogramming
CO4	Implementation of String class, Date class, Time class and Calendar class, Vector class Wrapper class methods
Course Name : Theory of Computation	
Code : BEIT504T	
At the end of course Students will be able to:	
CO1	Compare and design different FA with and without output,convert NFA, epsilon NFA to DFA,convert Moore machine to mealy machine and vice versa, optimze FA with pairtable method.
CO2	Define regular expression, design RE for language condition, convert RE to FA and vice versa, design FA and RE.
CO3	Identify and remove ambuguos grammar,design CFG for language, construct parse tree,convert CFG to CNF& GNF, design PDA.
CO4	Define TM, its types and analyze chomsky hierarchy, accept the string , design of TM .
CO5	Analyze and identify REL,undecidale problems,solve PCP and ackerman's function
Course Name : E-I: Gaming Architecture And Programming	
Code : BEIT505T.1	
At the end of course Students will be able to –	
CO1	Discuss the concept of game design and development

CO2	Identify the process and design architecture of game
CO3	Identify the development process and game programming concepts
CO4	Describe game scripting language and device interface and its states
CO5	Design and develop interactive games
Course Name : E-I: High Performance Computing Architecture	
Code : BEIT505T.2	
At the end of course Students will be able to –	
CO1	Learn the fundamentals of computer architecture, pipelining and multiprocessing environment.
CO2	Understand the different levels of paparllelism.
CO3	Learn the design issue in parallel computing environment
CO4	Understand imortance of parallel programming
CO5	Learn the impact of high performance computing in recent developments.
Course Name : E-I: Human Computer Interface	
Code : BEIT505T.3	
At the end of course Students will be able to:	
CO1	Relate the imporatnce of the graphical user interface and popularity of graphics.
CO2	Interpret the imporatnce of human characteristics in design and how people inetract with computer.
CO3	Articulate and apply comomon design principles for making good decisions in desgin of good user interface.
CO4	Annote various kinds of windows and their charracteritics and have a abilitty to selct the proper device based and screen based control.
CO5	Apply differnt components that are available in the screen and various interaction devices which are used to inetract with the computer.
Course Name : Software Lab (Basics of AR & VR/Web Technology)	
Code : BEIT506P	
At the end of course Students will be able to:	
CO1	Develop dynamic web pages using Java Script
CO2	Develop web page using HTML, DHTML and Cascading Style Sheet.
CO3	Develop and deploy AR and VR application.
CO4	Memorize the physical principle of VR.
CO5	Design a comfortable, high performance VR application using Unity.
Course Name : Effective technical Communication	
Code: BTIT507T	
At the end of course Students will be able to	
CO1	Acquire the knowledge of structure of language.
CO2	Build vocabulary and face interview process and can become employable.
CO3	Develop business writing skills.
CO4	Understand Technical and writing skills.
B.Tech. Sixth Semester	
Course Name : Data Base Management Systems	
Code : BEIT601T	
At the end of course Students will be able to :	
CO1	Organize and design DBMS using ER Model.
CO2	Determine Indexing concept in database languages.
CO3	Solve database queries using database languages.

CO4	Construct normalized database design using normal forms.
CO5	Examine Transaction Management System Concept in real time situation.
Course Name : Database Management System Lab	
Code :BEIT601P	
At the end of course Students will be able to :	
CO1	Illustrate and design Database Management System using ER Model.
CO2	Implement database queries using database languages.
CO3	Summarize and implement the concept of Join and Sub-query.
CO4	Compare the concept of Pl/SQL stored procedure and stored function.
CO5	Determine the concept of Trigger and Database Connectivity.
Course Name : Artificial Intelligence and Machine Learning	
Code : BEIT602T	
At the end of course Students will be able to –	
CO1	Analyze the concept of Artificial Intelligence and its applications.
CO2	Create AI/ML solutions for various business problems
CO3	Analyze and apply the basic theory underlying machine learning
CO4	Analyze and apply a range of machine learning algorithms along with their strengths and weknesses
CO5	Apply the algorithms to a real world problem,optimize the models learned and report on the expected accuracy that can be achieved by applying the models.
Course Name : Artificial Intelligence and Machine Learning Lab	
Code : BEIT602P	
At the end of course Students will be able to –	
CO1	Understand the concept of Artificial Intelligence
CO2	Familirize with knowledge base AI system and approaches
CO3	Apply the aspectes of probabilities approach to AI
CO4	Identify and apply neural networks and NLP in designing AI models
CO5	Recognising the concept of machine learning and its deterministic tools
Course Name : E-II:Cluster and Grid Computing	
Code : BEIT603T.1	
At the end of course Students will be able to:	
CO1	Learn the fundamentals of the cluster computing environment .
CO2	Understand the differnt features of clustering system.
CO3	Learn the fundamentals of grid computing environment.
CO4	Understand differnt features of grid system.
CO5	Adhapt basic services like resoirce management process scheduling etc.
Course Name : E-II Blockchain Technology	
Code : BEIT603T.2	
At the end of course Students will be able to –	
CO1	Explain and explore working of blockchain technology
CO2	Explain how blockchain systems (Bitcoin and Ethereum) Works
CO3	Analyze the working of smart contract
CO4	Analyze working of Hyperledge
CO5	Apply learning of solidity and de-centralized apps on the Ethereum and understand the application of blockchain technology

Course Name : E-II Advances in Computer Networks	
Code : BEIT603T.3	
At the end of course Students will be able to:	
CO1	Develop an understanig advances in computer networking
CO2	Learn various fast access technologies
CO3	Comphrehend the feature of IPV6
CO4	Demonstarate various security protocol
CO5	Interpret advances in coputer network authentication
Course Name : E-III Cloud Computing	
Code :BEIT604T.1	
At the end of course Students will be able to –	
CO1	Illustrate the different cloud computing environment.
CO2	Analyze virtualization technology and install virtualization software.
CO3	Use appropriate data storage technique on cloud, based on cloud application.
CO4	Apply security in cloud application.
CO5	Use advance technique in cloud computing.
Course Name : E-III Internet of Things	
Code :BEIT604T.2	
At the end of course Students will be able to –	
CO1	Summarizing the various concepts,terminologies and architectures of IoT systems.
CO2	Identify and apply sensors and protocols for design of IoT systems.
CO3	Analyze various techniques of data storage and analytics in IoT.
CO4	Illustratte various applications of IoT.
CO5	Correlate real world IoT design constraints.
Course Name : E-III Software Testing and Quality Assurance	
Code :BEIT604T.3	
At the end of course Students will be able to –	
CO1	Understand the need of testing and issues in testing.
CO2	Know unit testing and debugging including tools for unit testing.
CO3	Analyze data flow testing and system intergration.
CO4	Analyze various system test categories and design methods.
CO5	Apply acceptance testing to improve software quality with effective testing.
Course Name : OE-I Data Science	
Code :BEIT605T.1	
At the end of course Students will be able to –	
CO1	Apply quantitive modelling and data analysis techniques
CO2	Apply principle of data science techniques to the analysis of business problem
CO3	Use of Numpy libries and Pandas Libries for Data Analysis
CO4	Display data graphical way by using Libries matplotlib and seaborn
CO5	Build machine learning intelligence
Course Name : OE-I Computer Animation	
Code :BEIT605T.2	
At the end of course Students will be able to –	
CO1	Classify, identify,and design art relating to that particular artwork in the given time frame.
CO2	Implement the concept of animation using maya.
CO3	Classify and implement 3D animation concept.
CO4	Summarize various formats and effects of motion capture.
Course Name : Mini Project and Industrial Visit	
Code :BEIT606P	
At the end of course Students will be able to –	
CO1	Summarize past research in the field through literature review

CO2	Analyze user requirements and design the system as per the requirements
CO3	Develop, test and deploy the system in the user environment.
Course Name :Economics in IT Industries	
Code :BEIT607T	
At the end of course Students will be able to –	
CO1	Distinguished between Micro and Macro Economics.
CO2	Relate economic concept with IT industry.
CO3	Identify the key trend in IT industry.
CO4	Understand the key economic drivers of IT industry.
B.Tech.Seventh Semester	
Course Name : Data Warehousing and Mining	
Code : BTIT701T	
At the end of course Students will be able to –	
CO1	Students will able to understand concept of data warehouse ,architechture ,business analysis and tools.
CO2	To summarize data preprocessing methods and data techniques.
CO3	To classify different OLAP models and Tools.
CO4	Students will be able understand the Architecture of a Data Mining system and algorithms and summarizing interesting patterns in data.
CO5	Students will be able to understand frequent Item sets of data mining and various kinds of Association Rules and Algorithms.
Course Name : Data Warehousing and Mining	
Code : BTIT701T	
At the end of course Students will be able to –	
CO1	Apply fundamental concept of Weka Tools and data mining techniques
CO2	Apply basic concept of data preprocessing an evaluate operations for Numerical Data.
CO3	Apply and execute the classification rule for various algorithms.
CO4	Analyze and apply Association rules on data set, evalute the efficiency of algorithms.
Course Name :Elective IV:Deep Learning	
Code : BTIT702T.1	
At the end of course Students will be able to –	
CO1	Understand basuc of deep learning algorithm
CO2	Represent feed forward Neaural Network
CO3	Evaluate the performance of different deep learning models with respect to the optimization , bias variance trade-off,over fitting and under fitting
CO4	Apply the convolution networks in context with real world problem solving
CO5	Apply recurrent neural network in context with real world problem solving.
Course Name :Elective IV: Cryptography & Network Security	
Code : BTIT702T.2	
At the end of course Students will be able to –	
CO1	Students will be able to classify the different cryptographic techniques and identify Block Ciphers such as DES, AES, Triple DES crypto-systems.
CO2	Students will be able to implement IDEA, Blowfish, RC5 Algorithms.
CO3	Students will be able to select and use the principles of number theory and compare various cryptographic techniques.
CO4	Students will be able to use hash function and digital signatures to implement authentication protocols.
CO5	Students will be able to demonstrate digital certificate.
CO6	Students will be able to select the role of firewall in implementing trusted systems.
Course Name : Elective-IV -Compiler Design	

Code : BTIT702T.3	
At the end of course Students will be able to –	
CO1	Define the compiler along with the phases and Basic program in LEX.
CO2	Understand the parser and its types i.e. Top -down and Bottom-up parsers and construction of parsing table.
CO3	Implement program based on concept of type checking ,parameter passing and overloading.
CO4	Implement the concept of Code Optimization and code Generations.
CO5	Understand the concept of Object Oriented in Compilers.
Course Name : Elective-IV-Salesforce	
Code : BTIT702T.4	
At the end of course Students will be able to –	
CO1	Build skills in configuring and managing Salesforce orgs.
CO2	Journalize Salesforce Data Management:
CO3	Implement automation, security and debugging data.
CO4	Build programming skills in Apex.
CO5	Extend and customize Salesforce to meet specific business requirements.
Course Name : Elective-V : Natural Language Processing	
Code : BTIT703T.1	
At the end of course Students will be able to –	
CO1	Explain basic concepts and applications of NLP
CO2	Identify challanges in NLP and evaluate the solutions to these challanges
CO3	Analyze and preprocess the text data for NLP
CO4	Apply different NLP techniques and algorithms
CO5	Evaluate and compare different NLP techniques and algorithms such as text classification,information retrieval and extraction,syntactic and semantic analysis ,deep learning models
Course Name : Elective-V :Big data Analytics	
Code : BTIT703T.2	
At the end of course Students will be able to:	
CO1	Understand Concept ,characteristics, types of big data
CO2	Build and maintain reliable ,scalable, distributed systems with Apache Hadoop.
CO3	Apply Hadoop ecosystem components to solve real world problems
CO4	Apply machine learning algorithm for big data analysis.
CO5	Implement Big Data Activities using Hive
Course Name : Elective-V: Mobile Computing	
Code : BTIT703T.3	
At the end of course Students will be able to:	
CO1	To Understand the basic concepts of Wireless Communication with cellular system
CO2	To learn about GSM system with Cell Layout,radio, Network Switching and Operation subsystem,HLR & VLR.
CO3	To learn Wireless LAN with its Architecture and MAC layer.
CO4	To Learn Mobile IP,Dynamic Host Configuration Protocol, Mobile Ad hoc networks.
CO5	To learn about TCP over Wireless Network with Wireless Application Protocol.
Course Name : Open Elective II : Python Programming	
Code : BTIT704T.1	
At the end of course Students will be able to –	
CO1	Explain and implement the basic concept of python programming language
CO2	Develop code and test conditional statement of moderate size using the python language
CO3	Implement the concept of Function and modules in programming language.

CO4	Implement the concept of object oriented programming in python programming language.
CO5	Acquire and demonstrate the working of files for good program design using python language.
Course Name : Open Elective II : Java Programming	
Code : BTIT704T.2	
At the end of course Students will be able to –	
CO1	Understand the fundamentals of Java programming language and its application in software development.
CO2	Implement java programming construct such as variable,operators,control statements,loops and arrays.
CO3	Design and implement object oriented programs using inheritance,polymorphism,encapsulation, and abstraction concepts in Java
CO4	Create and use classes,objects, and methods in Java programs.
CO5	Handle exceptions and use input output techniques in java programs.
Course Name : Open Elective II: Data base Management system	
Code : BTIT704T.3	
At the end of course Students will be able to –	
CO1	Understand the basis of DBMS to analyze an information problem in the form of an Entity relation diagram and design an appropriate data model for it.
CO2	Demonstrate basics of File organizations and its types.
CO3	Interpret functional dependencies and various normalization forms.
CO4	Perform basic transaction processing and management
CO5	Demonstrate SQL queries to perform CRUD(create,Receive,Update,Delete)operations in database.
B.Tech. Eighth Semester	
Course Name : Elective-VI: Social Networks	
Code : BEIT801T.1	
At the end of course Students will be able to:	
CO1	Learn social networks,its type and representation
CO2	Undesrtand weak ties,strong and weak relationships,holophily and calculae
CO3	Analyze links
CO4	Understand power laws and Rich get richer phenomena
CO5	Understand small world phenomena
Course Name :Elective-VI: Reinforcement Learning	
Code : BEIT801T.2	
At the end of course Students will be able to:	
CO1	To analyze Bandit algorithm and its mathematical Formulation
CO2	To analyze and apply dynamic programming for reinforcement learning
CO3	To perform function approximation and applu LSM
CO4	To fit Q,DQN & Policy gradient for Full RL
CO5	Analyze and apply combinatorial models for complex problems
Course Name :Elective-VI: GPU Architectures and Programming	
Code : BEIT801T.3	
At the end of course Students will be able to –	
CO1	Understand conventional CPU architectures,their extensions for single instruction multiple data processing (SIMD)
CO2	Program about CUDA about data space and synchronization

CO3	Apply optimization in kernels,threads etc.
CO4	Learn Basics of OpenCL
CO5	Design an application using Neural Network
Course Name : Elective-VII : Predictive Analytics -Regression and Classification	
Code :BTIT802T.1	
At the end of course Students will be able to –	
CO1	To analyze predictive models,LSM,Normal equations and GMT
CO2	To analyze regressions models and infer its statistical inference
CO3	To check model assumptions and bias variance tradeoff
CO4	To perform regression analysis in various programming languages
CO5	Apply regression models and classification for predictive analysis
Course Name : Elective-VII : Data Analytics with Python	
Code :BTIT802T.2	
At the end of course Students will be able to –	
CO1	Understand data analytics and python fundamentals
CO2	Perform sampling using various methods and perform hypothesis test or ANOVA test
CO3	Fit linear regression model and calculate various errors
CO4	Apply ROC
CO5	Apply clustering and classification using python programming
Course Name : Elective-VII : Computer Vision	
Code :BTIT802T.3	
At the end of course Students will be able to –	
CO1	Understand 2-D Projective Geometry ,Homography
CO2	Understand camera and stereo geometry
CO3	Detect and match features
CO4	Process color and range in images
CO5	Apply clustering ,classification and deep learning models.

Course Outcomes of

B. Tech (EC)

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COURSE OUTCOMES

B.Tech. III Sem

Course Name : Mathematics-III	
Code : BEEC-301T	
Upon completion of this course, students will demonstrate the ability to: –	
CO1	Apply Laplace Transform to solve ordinary differential equations, Integral equations and Integro-differential Equations.
CO2	Apply fourier series in the ananlysis of periodic functions in terms sine and cosine encountered in engineering problems and fourier transform to solve integral equations.
CO3	Learn the concept of differentiating, integrating and expanding of analytic functions in complex numbers and their applications such as evaluation of integrals of complex functions.
CO4	Solve partial differential equations of first order, higher order with constant coefficients and of second order using method of separation of variables.
CO5	Analyze real world scenarios to recognize when matrices are appropriate, formulate problems about the scenarios, creatively model these scenarios in order to solve the problems using multiple approaches.

Course Name : Components for Electronic Circuit Design	
Code : BEEC-302T	
Upon completion of this course, students will demonstrate the ability to: –	
CO1	Summarize the principles of semiconductor physics by describing electron behavior in periodic lattices and energy band diagrams.
CO2	Evaluate principles of semiconductor diodes, its characteristics and study different applications.
CO3	Study BJTs characteristics, their biasing methods, configurations and explore their application as amplifiers.
CO4	Examine JFET and MOSFET characteristics, including biasing and small-signal models.
CO5	Explain the processes involved in integrated circuit fabrication also study twin-tub CMOS and design resistors.

COURSE OUTCOMES

B.Tech. III Sem

Course Name : Digital System Design	
Code : BEEC-303T	
Upon completion of this course, students will demonstrate the ability to: –	
CO1	Develop various combinational digital circuits by using logic gates and simplifying logic expressions using number systems and Boolean algebra and classifydigital logic family.
CO2	Design different arithmetic , logic circuits ,code converters and-Construct basic combinational circuits and verify their functionalities.
CO3	Illustrate and apply the knowledge of different flip flops to build sequential logic circuits
CO4	Apply the fundamental knowledge about digital electronics so as to design and analyze counters and sequence generator
CO5	Demonstrate and apply programming proficiency using the various addressing modes and instructions of the 8085 microprocessor

Course Name : Network Theory	
Code : BEEC-304T	
Upon completion of this course, students will demonstrate the ability to: –	
CO1	Apply mesh and node voltage method to model and analyze electrical circuts.
CO2	Apply network theorems for the analysis of networks.
CO3	Obtain the transient and steady-state response of electrical circuits.
CO4	Synthesize waveforms and apply Laplace transforms to analyze networks.
CO5	Evaluate different Network Functions and Analyze two port network behavior

COURSE OUTCOMES

B.Tech. III Sem

Course Name : Signals and Systems	
Code : BEEC-305T	
Upon completion of this course, students will demonstrate the ability to: –	
CO1	Understand mathematical description and representation of continuous and discrete time signals and systems
CO2	Develop input output relationship and concept of Linear Time Invariant (LTI) system and its properties.
CO3	To familiarize andAnalyze continuous time periodic and aperiodic signals.
CO4	To familiarize and Analyze continuous time systems using Laplace Transform.
CO5	To familiarize and Analyze DT signals and Understand and resolve the signals in frequency domain using Fourier series and Fourier transform.

Course Name : Measurements and Instrumentation	
Code : BEEC-306T	
Upon completion of this course, students will demonstrate the ability to: –	
CO1	Gain the knowledge to select and use precise/accurate instrument for measurement of various electrical Parameters and paraphrase its technical specifications.
CO2	Acquire knowledge of Identifying and minimize errors in electrical/electronic measurement.
CO3	Gain the knowledge about analog and digital measurement.
CO4	Interpret of Measured power and frequency with the help of function generators and different analyzers.
CO5	Acquire knowledge of modern trends in telemetry systems.

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COURSE OUTCOMES

B.Tech. III Sem

Course Name : Components for Electronic Circuit Design Lab	
Code : BEEC-302P	
After completion of the practical students will be able to: –	
CO1	Explain the basic concepts of different semiconductor components.
CO2	Understand the use of semiconductor devices in different electronic circuits.
CO3	Calculate different performance parameters of various circuits.
CO4	Plot and study the characteristics of semiconductor devices.

Course Name : Digital System Design Lab	
Code : BEEC-303P	
After completion of the practical students will be able to: –	
CO1	Demonstrate the different Boolean Laws & basics of K-map to realize combinational & sequential circuits
CO2	Identify the various digital ICs & understand their operation.
CO3	Describe the operation & timing constraints for latches, registers, different sequential circuits.
CO4	Solve basic binary math operations using microprocessor & explain the internal architecture & its operation within the area of manufacturing & performance.
CO5	Select programming strategies & proper mnemonics & run their program on the training boards

Course Name : Electronics Workshop I	
Code : BEEC-307P	
After completion of the practical students will be able to: –	
CO1	Explainthe basic concepts of different semiconductor components with their usage physically as per their types
CO2	Use semiconductor devices in different electronic circuits and projects.
CO3	Calculate different performance parameters of active and passive devices and their datasheets.
CO4	Plot and study the characteristics of semiconductor devices.

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COURSE OUTCOMES

B.Tech. IV Sem

Course Name : Microcontroller and Applications	
Code : BEEC-401T	
Upon completion of this course, students will demonstrate the ability to: –	
CO1	Demonstrate the programming model of various microcontrollers.
CO2	Design and implement 8051 microcontroller-based systems for various applications
CO3	Illustrate and program AVR / RISC microcontrollers in Integrated Development Environment
CO4	Design and implement advanced processor/controllers-based systems for various applications
CO5	Design and develop Arduino based embedded system applications.

Course Name : Analog and Digital Communication	
Code : BEEC-402T	
Upon completion of this course, students will demonstrate the ability to: –	
CO1	Explain the need of modulation and analyze various types of analog modulation.
CO2	Classify and describe AM and FM receivers and list various types of noise in electronic communication.
CO3	Explain various types of pulse modulation techniques.
CO4	Discuss various digital modulation techniques and analyze various coding algorithms.
CO5	Analyze different encoding and decoding algorithms and describe spread spetrum modulation techniques.

COURSE OUTCOMES

B.Tech. IV Sem

Course Name : Analog System Design	
Code : BEEC-404T	
Upon completion of this course, students will demonstrate the ability to: –	
CO1	Explain & Describe the basic differential amplifier using transistor and its operation & basic concepts of OPAMP.
CO2	Design OPAMP circuit for various linear applications.
CO3	Design and construct OPAMP for various non-linear applications.
CO4	Design of DC Power supply Power Supply in electronics circuit.
CO5	Design various types of sinusoidal oscillators and filters .

Course Name : Data Structure and Algorithms	
Code : BEEC-405T	
Upon completion of this course, students will demonstrate the ability to: –	
CO1	Define data structure and compare the different basic data structures such as arrays, linked lists, stacks and queues. Understand asymptotic notation and calculate complexity of algorithm
CO2	Apply the concept for solving problems like sorting, searching , insertion and deletion of data and apply the different linear data structures like stack and queue to various computing problems to select and apply stack and queue concept also
CO3	Create Linked list, doubly Linked List, circular queue, priority queue.Student will be able to handle operations like searching, insertion, deletion, traversing mechanism on Linked list
CO4	Evaluate Tree non linear data structure, Implement different types of trees and apply them to problem solutions , Students will be able to Discuss graph structure and understand various operations on graphs and their applicability .
CO5	Explain important algorithmic design paradigms Advanced algorithms based on the data structures. Shortest-Path Algorithms, , Graphs based algorithm

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COURSE OUTCOMES

B.Tech. IV Sem

Course Name : Numerical Mathematics & Probabilityusing MATLAB	
Code : BEEC-406T	
Upon completion of this course, students will demonstrate the ability to: –	
CO1	Learn and use MATLAB effectively in various applications as a simulation tool.
CO2	Find an approximate solution of algebraic and transcendental equations, system of linear equations by various numerical methods and MATLAB commands.
CO3	First order ordinary differential equations by various numerical methods and MATLAB commands.
CO4	Apply Z- transform to solve difference equations with constant coefficients.
CO5	Analyze real world scenarios to recognize when probability is appropriate, formulate problems about the scenarios.

Course Name : Programming for Problem Solving	
Code : BEEC-407T	
Upon completion of this course, students will demonstrate the ability to: –	
CO1	Recognise the basic concepts of Object-Oriented Programming and design simple java programs.
CO2	Summarise the concept of overloading and implement simple program
CO3	Acquire the knowledge of Inheritance in program development and develop programs using polymorphism.
CO4	Recognise the basic concepts of packages and interface and develop simple programs.
CO5	Summarise and implement concepts on exception handling and file streams in java programming for a given application programs.

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COURSE OUTCOMES

B.Tech. IV Sem

Course Name : Universal Human Values	
Code : BEEC-408T	
Upon completion of this course, students will demonstrate the ability to: –	
CO1	Become more aware about themselves, and their surroundings (Family, Society, Nature)
CO2	Become more responsible in life, and in handling problem with sustainable solutions, while keeping human relationships and human nature in mind.
CO3	They would have better critical ability.
CO4	Become Sensitive to their commitment towards that have understand (Human Values, Human Relationship, and Human Society.)

Course Name : Microcontroller and Applications Lab	
Code : BEEC-401P	
After completion of the practical students will be able to: –	
CO1	Demonstrate the concept of Assembly languages and higher level language programming.
CO2	Interface various peripherals with 8051,Atmega 32, MSP 430 and Arduino.
CO3	Simulate the programs on different software platforms.

Course Name : Analog and Digital Electronics Lab	
Code : BEEC-403P	
After completion of the practical students will be able to: –	
CO1	Explain the practical aspects of linear and non-linear applications of OP-AMP.
CO2	Design the various wave-shaping circuits, oscillators, signal conditioners and various application based circuits using OP-AMP and Transistors
CO3	Demonstrate various concepts of analog communication
CO4	Demonstrate various concepts of analog communication .
CO4	Develop an application based project using industry based OPAMP.

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COURSE OUTCOMES

B.Tech. IV Sem

Course Name : Programming for problem solving Lab	
Code : BEEC-407P	
After completion of the practical students will be able to: –	
CO1	To choose appropriate data structure based on the specified problem definition and analysis the algorithm.
CO2	To handle operations like searching, insertion, deletion and traversing mechanism etc. on various data structures.
CO3	Apply the knowledge of Inheritance in program development.
CO4	Develop programs using polymorphism and interfaces.
CO4	Handle various exceptions using concepts of exception handling

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COURSE OUTCOMES

B.Tech. V Sem

Course Name : Embedded System Design	
Code : BEETC-501T	
Upon completion of this course, students will demonstrate the ability to: –	
CO1	Summarise and organise the requirements & Design issues of embedded systems design. To recognise the challenges construct while designing of embedded system and processor selection.
CO2	Summarise the technical aspects of embedded system in terms of architecture, operating modes and interrupt structure for development of simple applications.
CO3	Get the knowledge of programming instruction set and utilize it to perform specific task. Describe and demonstrate the interfacing of various peripherals with ARM Processor.
CO4	Explain the concept of Real Time Operating System for embedded system design. To summarise the kernel architecture and its uses.
CO5	Explore knowledge of Real Time Operating System in terms of Resource Management, Semaphore, Mailbox, Message queues, Pipes and Events.

Course Name : Electromagnetic Waves	
Code : BEETC-502T	
Upon completion of this course, students will demonstrate the ability to: –	
CO1	Discuss different coordinate system and analyze theorems of electric field.
CO2	Explain theorems and laws of magnetic field and anayze Maxwe's equations to solve problems in electromagnetic field theory.
CO3	Analyze the propagation of wave in different transmission media.
CO4	Compare transmission line with waveguide and analyze various parameters and characteristics of rectangular waveguide.
CO5	Explain principle of radiation and define various antenna terminologies.

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COURSE OUTCOMES

B.Tech. V Sem

Course Name : Digital Signal Processing	
Code : BEETC-503T	
Upon completion of this course, students will demonstrate the ability to: –	
CO1	Use the sampling theorem to discrete time signals, demonstrate the sampling process,reconstruct sampled data and study discrete time signals and systems.
CO2	Study discrete time systems in frequency domain, Compute the Discrete Fourier Transform (DFT),Inverse DFT, Circular convolution and FFT using radix-2 algorithm.
CO3	Process the signal in Z domain for various discrete time systems and design digital filters using different realization forms.
CO4	Design IIR digital filters using various transformations (Bilinear, Impulse Invariant) and to determine parameters affecting its response.
CO5	Design FIR filters using windowing techniques (Rectangular, Hann, Hamming, Blackmann, Bartlett, and Kaiser) and frequency sampling technique.

Course Name : Industrial Economics & Entrepreneurship Development	
Code : BEETC-504T	
Upon completion of this course, students will demonstrate the ability to: –	
CO1	To understand the process of central as well commercial banks
CO2	Comprehend the process to set startups with the help of entrepreneurship projects.
CO3	Identify the sources of finance
CO4	Describe the problems of small-scale industries and role of TCO.

COURSE OUTCOMES

B.Tech. V Sem

Course Name : Sensors and Systems	
Code : BEETC-505PE (Program Elective-1)	
Upon completion of this course, students will demonstrate the ability to: –	
CO1	Explain fundamental physical and technical base of sensors ,Choose an appropriate sensor for various applications and evaluate performance characteristics of different types of sensors.
CO2	Describe basic laws and phenomena that define behavior of sensors used in automobile applications.
CO3	Analyze various approaches, procedures and results related to Sensors used in Automation Industries and Selection of appropriate model & types of sensors.
CO4	Create analytical design and development solutions for various sensors used in IoT smart city project.
CO5	Interpret the acquired data and measured results of various actuators and motors used in robotics field.

Course Name : Electronic Design Technique with HDL	
Code : BEETC-505PE(Program Elective-1)	
Upon completion of this course, students will demonstrate the ability to: –	
CO1	Summarize digital system design process with its basic elements and different level of abstraction
CO2	Design digital systems through HDL language by using Behavioural Modeling Technique.
CO3	Design digital systems through HDL language by using Data flow and Structural Modeling Technique.
CO4	Develop Finite State Machine and design VHDL representation.
CO5	Describe Synthesis process for dataflow and structural models.

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COURSE OUTCOMES

B.Tech. V Sem

Course Name : Embedded System Design Lab	
Code : BEETC-501P	
After completion of the practical students will be able to: –	
CO1	Apply the knowledge of Instruction skill for the Development of Simple and Complex Programs.
CO2	Apply the programming skill for the Development of Simple application.
CO3	Apply and Demonstrate the Concept of Interfacing for the Development of Embedded System

Course Name : Digital Signal Processing Lab	
Code : BEETC-503P	
After completion of the practical students will be able to: –	
CO1	Demonstrate the sampling and reconstruction of discrete time signal & perform different signal operation in developing discrete time system.
CO2	Analyze different properties of Z-transform.
CO3	Analyze different properties of discrete Time Fourier transform.
CO4	Analyze and process the signals in the discrete domain.
CO4	Design the filters to suit requirements of specific applications.
CO4	Apply the techniques, skills, and modern engineering tools like MATLAB

Course Name : Electronic Workshop II Lab	
Code : BEETC-507P	
After completion of the practical students will be able to: –	
CO1	Interface various sensors to arduino and raspberry-Pi
CO2	Implement and simulate various electronic circuits using simulation tool
CO3	Trace PCB layout for electronic circuits manually and using PCB design softwares.
CO4	Implement mini-project using Raspberry-Pi, Arduino or any other processor.

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COURSE OUTCOMES

B.Tech. VI Sem

Course Name : Computer Communication Networks	
Code : BEETC-601T	
Upon completion of this course, students will demonstrate the ability to: –	
CO1	Describe the basics of Computer Network, Data Communication, Network topologies, transmission media and switching techniques.
CO2	Analyze the services and features of various protocols of Data Link Layer and MAC sub-layer
CO3	Apply the concept of IP Addressing techniques and its various protocols of Network Layer
CO4	Describe the transport layer, Application Layer services and its protocol Headers and analyze the congestion control protocols
CO5	Explain the function of Application Layer and Presentation layer paradigm and protocols

Course Name : Internet of Things	
Code : BEETC-602T	
Upon completion of this course, students will demonstrate the ability to: –	
CO1	Describe the fundamentals of IoT and explore different design levels of IoT.
CO2	Study IoT architecture and review real-world design constraints and IoT reference model.
CO3	Compare M2M and IoT, summarize their concepts, value chains and connect M2M to IoT architecture and design principles.
CO4	Demonstrate network and communication aspect and assess IoT network issues, protocols, deployment and data management
CO5	Introduce IoT tools, Arduino and Raspberry Pi with basic programming ability and explore application of IoT in Real time scenario.

COURSE OUTCOMES

B.Tech. VI Sem

Course Name : Wireless Sensor Networks	
Code : BEETC-603T	
Upon completion of this course, students will demonstrate the ability to: –	
CO1	Summarize Commercial and Scientific Applications of Wireless Sensor Networks, Basic Wireless Sensor Technology.
CO2	Demonstrate Physical layer and Medium Access Control Protocols.
CO3	Outline Transport Control Protocols for Wireless Sensor Networks.
CO4	Explain Middleware ,its protocols and Network Management for Wireless Sensor Networks.
CO5	Illustrate Operating Systems and Hardware for Wireless Sensor Networks.

Course Name : Computer Architecture (Elective-II)	
Code : BEETC-604T	
Upon completion of this course, students will demonstrate the ability to: –	
CO1	Demonstrate the basics of Computer Organization, concepts of program as sequences and operation of computers.
CO2	Illustrate various arithmetic and logical operations on different types of numbers to design an arithmetic and logic unit. Design arithmetic and logical operations with signed integer operands.
CO3	Demonstrate the organization of various parts of the hierarchical memory system
CO4	Compare the different I/O data transfer techniques, and describe the different ways of communication among I/O devices and standard I/O interfaces
CO5	Explain the basic processing unit and Pipelining

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COURSE OUTCOMES

B.Tech. VI Sem

Course Name : Antenna and Wave Propagation (Elective-II)	
Code : BEETC-604T	
Upon completion of this course, students will demonstrate the ability to: –	
CO1	Describe the concept of transmission line characteristics, transmission line equation and standing wave ratio.
CO2	Calculate antenna parameters and analyse wire antennas like monopoles, dipoles, and loops.
CO3	Analyse and design all array antenna and Describe the operation of broadband and traveling wave antennas
CO4	Analyse and design the Microstrip antennas and Reflector antenna and Describe the operation of aperture and reflector antennas.
CO5	Recognise the concept of antenna measurement and Summarise the concept of wave propagation.

Course Name : Consumer Electronics (Open Elective-1)	
Code : BEETC-605T	
Upon completion of this course, students will demonstrate the ability to: –	
CO1	Describe various audio gadgets used in domestic and commercial applications
CO2	Discuss various video gadgets used in domestic and commercial applications
CO3	Explain satellite communication technology along with DTH for day to day application
CO4	Categorize various types of home appliances used in domestic life like washing machine, oven RO plant, Mixer, grinder, vaccume cleaner etc
CO5	Recognize various types of home appliances used in domestic life like printers, food processors, Induction devices, scanner and fax machines etc.

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COURSE OUTCOMES

B.Tech. VI Sem

Course Name : Computer Communication Networks Lab	
Code : BEETC-601P	
After completion of the practical students will be able to: : –	
CO1	To analyze and select various cables and Connectors used for networking with computer network security.
CO2	To verify the implementation results on software like NS2 and simulate different networking models and implement different networking protocols.
CO3	To understand different data transmission techniques using TCP and UDP Protocol for evaluating the different IP addresses for various systems.

Course Name : Internet of Things Lab	
Code : BEETC-602P	
After completion of the practical students will be able to: –	
CO1	Demonstrate the usage of Arduino / Raspberry Pi and install the IDE.
CO2	Interface various sensors to Arduino/Raspberry-Pi
CO3	Configure Arduino and Raspberry-Pi
CO4	Implement Web Server using Node MCU and ESP module.

Course Name : : Wireless Sensor Networks Laboratory	
Code : BEETC-603P	
After completion of the practical students will be able to: –	
CO1	Simulate various wireless sensor network protocols.
CO2	Generate TCL script for various types of nodes.
CO3	Implement routing protocols in NS2
CO4	Work on various network simulators

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COURSE OUTCOMES

B.Tech. VII Sem

Course Name : Audio & Video Engineering (PEC-III)	
Code : BEETC701PE-T	
Upon completion of this course, students will demonstrate the ability to: –	
CO1	Recall the basic principle and fundamentals of Colour Television system.
CO2	Classify working of different colour Television Standard their transmission and reception with greater emphasis on PAL T.V. system.
CO3	Summarize working principle of Digital video broadcasting, MAC signal, and Basic principles of Digital Video compression.
CO4	Illustrate working principle of HDTV, Satellite TV, Set Top Box, CCTV CATV, IP TV Mobile TV 3G mobile systemand DTH.
CO5	Compare working principle of consumer application like TV Digital cameras, Video Display and video players.

Course Name : Web Technologies (PEC-III)	
Code : BEETC701PE-T	
Upon completion of this course, students will demonstrate the ability to: –	
CO1	To learn the various tags of HTML and CSS and able to implement web pages also able to summarise the concept of JavaScript and related validation.
CO2	To learn various methodologies of XML and its schema also able Identify the difference between XML, HTML and PHP.
CO3	To summarise the various concept of servlets, API's and life cycle of servlets.
CO4	To learn various methodologies of Java Database Connectivity and able to set JDBC Drivers.
CO5	To learn various concepts of Java Server Pages and able to summarise the java beans.

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COURSE OUTCOMES

B.Tech. VII Sem

Course Name : Data Science and Cloud Computing (PEC-IV)	
Code : BEETC702PE-T	
Upon completion of this course, students will demonstrate the ability to: –	
CO1	Identify the basic concepts and technologies envolved in dealing with Data science process and demonstrate knowledge of data-related concepts.
CO2	Formulate a comprehensive Data Management for exploring and fixing data, also develop strategies using Application Programming Interfaces (APIs) for data manipulation.
CO3	Use various applied statistical techniques in R to compare different types of statistical data and big data analytics, interpreting and evaluating the results.
CO4	Construct effective data visualizations using conventional methods, retinal variables, and mapping encodings, and justify their importance in conveying insights from data.
CO5	Utilize Python for data visualization and basic numerical operations, demonstrating ability in using relevant libraries and modules for practical data science applications.

Course Name : Microwave & Radar Engineering (PEC-IV)	
Code : BEETC702PE-T	
Upon completion of this course, students will demonstrate the ability to: –	
CO1	Explain the working of microwave tubes and slow wave structure.
CO2	Develop scattering matrix of various Tees & Explain various microwave components
CO3	Recognize the fundamentals of various solid state microwave devices.
CO4	Define, Explain, & measure various microwave measurements.
CO5	Describe the fundamentals of RADARs and discuss its factors influencing radar & solve its problems.

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COURSE OUTCOMES

B.Tech. VII Sem

Course Name : Optical Communication (PEC-V)	
Code : BEETC703T	
Upon completion of this course, students will demonstrate the ability to: –	
CO1	Explain advantages, disadvantages & application of optical fiber and classify about optical fibers.
CO2	Explain optical fiber joints and connection & classify attenuation, absorption, dispersion of optical fiber.
CO3	Classify and explain various optical sources, couplers, Detector and Receiver.
CO4	Explain analog and digital links.
CO5	Explain WDFA and optical amplifier.

Course Name : Biomedical Engineering (PEC-V)	
Code : BEETC703PE	
Upon completion of this course, students will demonstrate the ability to: –	
CO1	Analyze the biomedical signals.
CO2	Describe x-ray, MRI, CT, VR technologies and infra-red imaging.
CO3	Explain Biomedical sensors & understand the measurements
CO4	Describe different medical instruments & their applications.
CO5	Understand hospital information system & relevant training , simulation technologies.

Course Name : Bioengineering (Open Elective)	
Code : BEETC704OE	
Upon completion of this course, students will demonstrate the ability to: –	
CO1	Analyze the biomedical signal
CO2	Explain biomedical sensor and compare the mesurements.
CO3	Describe X-ray, MRI, CT, VR technologies and infra red imaging
CO4	Discuss different medical instruments , their applications.
CO5	Summarize hospital information & recgnize relevant training as well as simulation technologies.

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COURSE OUTCOMES

B.Tech. VII Sem

Course Name : Intellectual Property Rights	
Code : BEETC706A	
Upon completion of this course, students will demonstrate the ability to: –	
CO1	Read about the concepts of Intellectual property rights.
CO2	Distinguish and understand the world of intellectual property.
CO3	Explain why it needs to be protected ? How it is protected?
CO4	Analyze, discuss and debate about the latest egal problems confronting the world and the solutions being offered.
CO5	Consider new and upcoming areas of intellectual property (IP) like biotechnology , domain names , creative commons etc.

Course Name : Audio and Video Engineering Lab	
Code : BEETC-701P	
After completion of the practical students will be able to: –	
CO1	Anayze color TV systems
CO2	Compare different TV standards
CO3	Distinguish advanced TV technology
CO4	Analyze audio and video recording , display and relevant consumer applications.

Course Name : Web Technologies Lab	
Code : BEETC-702P	
After completion of the practical students will be able to: : –	
CO1	Create Web pages using HTML and CSS
CO2	Understand the concept of Javascripts
CO3	Identity difference between JSP and servlet
CO4	Design web application.

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COURSE OUTCOMES

B.Tech. VII Sem

Course Name : Microwave and Radar Engineering Lab	
Code : BEETC-702P	
After completion of the practical students will be able to: : –	
CO1	Understand the use of active and passive microwave devices.
CO2	Understand the use of microwave power devices.
CO3	Demonstrate the use of different power distribution Tees.
CO4	Understand and demonstrate the process of Radar Engineering.

Course Name : Data Science and Cloud Computing Lab	
Code : BEETC-702P	
After completion of the practical students will be able to: : –	
CO1	Identify the basic concepts and technologies involved in Data science
CO2	Apply data management techniques for exploring and fixing data.
CO3	Understand the different types of statistical data analysis.
CO4	Apply and use different technologies for data visualization

Course Name : Project	
Code : BEETC-705P	
After completion of the practical students will be able to: –	
CO1	To choose an appropriate topic for study in his specialization domain and will be able to clearly formulate and state a research problem
CO2	Compile the relevant literature and frame hypotheses for research as applicable
CO3	plan a research design including the sampling, observational, statistical and operational designs if any
CO4	Compile relevant data, interpret and analyze it and test the hypotheses wherever applicable
CO5	Arrive at logical conclusions and propose suitable recommendations on the research problem
CO6	Create a logically coherent project report and will be able to defend his / her work in front of a panel of examiners

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COURSE OUTCOMES

B.Tech. VIII Sem

Course Name : CMOS VLSI Design (PEC-VI)	
Code : BEETC801PE	
Upon completion of this course, students will demonstrate the ability to: –	
CO1	Describe and interprete the basic concepts of MOS Transistors.
CO2	Construct the ability to design a system, component or process as per needs and specifications.
CO3	Analyze inverter design, characteristics and applications and performance parameters of CMOS Circuits.
CO4	Evaluate circuits using different CMOS styles and measure performance of the complex logic structures.

Course Name : Artificial Intelligence (PEC-VI)	
Code : BEETC801PE	
Upon completion of this course, students will demonstrate the ability to: –	
CO1	Develop an understanding what is involved in AIML.
CO2	Understand learning algorithms of AIML.
CO3	Understand the deep learning.
CO4	Apply the knowledge for the selection of tool and languages for problem solving
CO5	Understand the use of AIML for real world problems.

Course Name : MEMS (PEC-VI)	
Code : BEETC801PE	
Upon completion of this course, students will demonstrate the ability to: –	
CO1	Apply the principles behind the operation of MEMS devices
CO2	Choose a micromachining technique for a specific MEMS fabrication process
CO3	Understand recent advancements in the field of MEMS and devices

COURSE OUTCOMES

B.Tech. VIII Sem

Course Name : VLSI Signal Processing (PEC-VII)	
Code : BEETC802T	
Upon completion of this course, students will demonstrate the ability to: –	
CO1	Learn various methodologies to optimize power delay and area of VLSI design
CO2	Build Real Time processing system.
CO3	Design of algorithm structure for DSP algorithms based on algorithm transformation

Course Name : Android Mobile Application Development (PEC-VII)	
Code : BEETC802T	
Upon completion of this course, students will demonstrate the ability to: –	
CO1	Identify various concepts of mobile programming that make it unique from programming for other platforms.
CO2	Critique mobile applications on their design pros and cons
CO3	Utilize rapid prototyping techniques to design and develop sophisticated mobile interfaces
CO4	Program mobile applications for the Android operating system that use basic and advanced phone features.
CO5	Deploy applications to the Android marketplace for distribution.

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COURSE OUTCOMES

B.Tech. VIII Sem

Course Name : Satellite Communication (PEC-VII)	
Code : BEETC802T	
Upon completion of this course, students will demonstrate the ability to: –	
CO1	Do research with capabilities in the design, development and manufacture of satellite communication systems used in a wide spectrum of applications.
CO2	Experience real world experience from household appliances to sophisticated satellite communication, from electronic ignition to neural networks and signal processing chips & to integrate academic discipline with project-based engineering applications, classroom learning theory
CO3	Able for Acquisition of technical competence in specialized areas of Satellite Communication engineering.
CO4	Able to identify, formulate and model problems and find Satellite Communication engineering solutions based on a system approach.

Course Name : Project Phase II	
Code : BEETC803P	
Upon completion of this course, students will demonstrate the ability to: –	
CO1	Analyze or Design the Electronics /telecommunication /allied Engineering problems by using appreciate methodology in a team work.
CO2	Interpret the communication skills of team members.
CO3	Use of Modern tools in the field of Electronics Engineering

Course Outcomes of B. Tech (CIVIL)

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Department of Civil Engineering
Course Outcomes
B.Tech. Third Semester

Course Name : Applied Mathematics-III	
Code : BTCVE301T	
At the end of course Students will be able to –	
CO1	Apply Laplace Transform to solve ordinary differential equations, Integral equations and Integro-differential Equations.
CO2	Apply Fourier series in the analysis of periodic functions in terms sine and cosine encountered in engineering problems and Fourier Transform to solve integral equations.
CO3	Learn the concept of differentiating, integrating and expanding of analytic functions in complex numbers and their applications such as evaluation of integrals of complex functions.
CO4	Solve partial differential equations of first order, higher order with constant coefficients and of second order using method of separation of variables.
CO5	Analyze real world scenarios to recognize when matrices are appropriate, formulate problems about the scenarios, creatively model these scenarios in order to solve the problems using multiple approaches.

Course Name : Fluid Mechanics	
Code : BTCVE302T	
At the end of course Students will be able to –	
CO1	Understand the importance and practical significance of various fluid properties .
CO2	Comprehend and estimate various forces acting on partially and fully submerged bodies .
CO3	Evaluate the importance of various parameters on the fluid motion.
CO4	Know various flow measuring devices with their practical applications .
CO5	Illustrate the concept of impulse momentum principle, dimensional analysis and model analysis of a fluid phenomenon .

Course Name : Solid Mechanics	
Code : BTCVE303T	
At the end of course Students will be able to –	
CO1	Comprehended the behaviour of materials under different stress and strain conditions.
CO2	Appraise and draw shear force diagram and bending moment diagram and their relation.
CO3	Formulate the bending and shear stresses equations and able to draw bending and shear stress diagrams.
CO4	Formulate slope and Deflection equations for beams subjected to various loads by Macaulay's method
CO5	Scrutinize and evaluate the torsion in circular section, Direct and Bending Stresses.

Course Name : Geotechnical Engineering	
Code : BTCVE304T	
At the end of course Students will be able to –	
CO1	Find the index and engineering properties of the soil.
CO2	Determine properties & demonstrate interaction between water and soil.
CO3	Analyze and compute principles of compaction and consolidation settlements of soil.
CO4	Ability to analyze to calculate bearing capacity, earth pressure and foundation settlement.
CO5	Study and identify different type's natural materials like rocks & minerals and soil.

Course Name : Building Construction & Elementary Building Drawing	
Code : BTCVE305T	
At the end of course Students will be able to –	
CO1	Identify components of a building
CO2	Identify types of building materials and differentiate them
CO3	Select appropriate material for building construction.
CO4	Plan various construction related activities and their quality control.
CO5	Distinguish & identify the latest techniques and materials used.

Course Name : Effective Technical Communication	
Code : BTCVE306T	
At the end of course Students will be able to –	
CO1	Overcome barriers of Communication.
CO2	Students will acquire public speaking skills and handle group situations professionally.
CO3	To comprehend passage and compose paragraph.
CO4	To construct errors free and meaningful sentences in English.

B.Tech. Fourth Semester

Course Name : Concrete Technology	
Code : BTCVE401T	
At the end of course Students will be able to –	
CO1	Think logically for development Concrete technology application in field of Civil Engineering .
CO2	Gain an experience in the implementation of Concrete Materials on Engineering concepts which are applied on Construction Fields .
CO3	Understand the process of mix design of concrete.
CO4	Differentiate special concrete from conventional concrete .
CO5	Analyze causes of deterioration of concrete components .

Course Name : Structural Analysis	
Code : BTCVE402T	
At the end of course Students will be able to –	
CO1	To explain and determinate and indeterminate structure using various method.
CO2	Analysze of beam and frame using slope deflection method and moment distribution method.
CO3	To decribe the concept of Influence line diagram and analyse structural element of rolling loads.
CO4	To explain the beams and frame using direct stiffness method.
CO5	To describe the concept beams and frame using direct stiffness method and fromulation to analyse the plane truss.

Course Name : Environmental Engineering	
Code : BTCVE403T	
At the end of course Students will be able to –	
CO1	Have knowledge of characteristics of water,drinking water standards and necessity of treatment.
CO2	Design various units of conventional water treatment plant.
CO3	Understand the characteristics of waste water, necessity of treatment, types of treatment processes .
CO4	Equip with the basic knowledge related to design of waste water treatment .
CO5	Understand of significance of air pollution, solid waste , climate change, geo environment etc .

Course Name : Transportation Engineering	
Code : BTCVE404T	
At the end of course Students will be able to –	
CO1	Define and describe different objectives and requirements of Highway Development and Planning, Alignments
CO2	Explain, Discriminate and Design various Geometric Features of Highways & Pavement Design
CO3	Understand, analyze, apply and evaluate the parameters of Traffic Engineering
CO4	Explain and describe various terms in railway engineering and should be able to explain, discriminate and design various geometric features of railway track
CO5	Build the knowledge of the aircraft characteristics and terminal area functions, analyze, and evaluate the basic runway length, orientation of runway.

Course Name : Surveying & Geomatics	
Code : BTCVE405T	
At the end of course Students will be able to –	
CO1	Find the length and bearing of lines using various instruments and calculate area of given field
CO2	Find the angle and distance for traversing using theodolite for identify and correct the errors in traverse. Design and layout the various types of curves.
CO3	Determine the volume of earthwork using levelling and contouring.
CO4	Apply modern instrument like Total station, GPS, DGPS for surveying and able to prepare maps in CAD
CO5	Make use of Remote Sensing and Geographical Information System(GIS), UAV Drone and LiDAR Survey

B.Tech. Fifth Semester

Course Name : Hydraulic Engineering	
Code : BTCVE501T	
At the end of course Students will be able to –	
CO1	To know the boundary layer theory and concept of drag and lift .
CO2	To understand the various losses occurring in pipe flow, various phenomenon occurring in this case.
CO3	To compute uniform flow through open channel and understand the concept of specific energy.
CO4	To analyse the gradual varied flow and hydraulic jump concept.
CO5	To understand the design principle of various hydraulic machines likes turbines and pumps.

Course Name : Reinforced Cement Concrete Design	
Code : BTCVE502T	
At the end of course Students will be able to –	
CO1	Explain the fundamental concepts of working stress method as per IS 456- 2000 and Pre-stressed concrete method.
CO2	Apply the fundamental concepts of limit state method on limit state of serviceability
CO3	Analyze the fundamental concepts of limit state of collapse in flexure, Shear & Bond as per IS 456-2000
CO4	Evaluate the fundamental concepts of limit state of collapse in compression and design of footing as per IS 456-2000
CO5	Design of Simply supported Two-way slab

Course Name : Civil Engineering Material, Testing & Evaluation	
Code : BTCVE503T	
At the end of course Students will be able to –	
CO1	Classify the role of various materials use in Civil Engineering construction.
CO2	Understand the mechanical behavior and properties of steel and concrete by standard testing procedures.
CO3	Understand special materials, composite materials and use of new techniques in constructions for satisfying the future needs of industry.
CO4	Explain to a variety of established material testing procedures/techniques and the relevant codes of practice.
CO5	Evaluate and write a technical laboratory report

Course Name : Professional Practice, law & Ethics	
Code : BTCVE504T	
At the end of course Students will be able to –	
CO1	Understand basic purpose of profession, professional ethics and various moral and social issues.
CO2	Analyse various moral issues and theories of moral development.
CO3	Realize their roles of applying ethical principles at various professional levels.
CO4	Identify their responsibilities for safety and risk benefit analysis.
CO5	Understand their constructive roles in dealing various global issues.

Course Name : Advanced Structural Analysis	
Code : BTCVE505T (Elective 1)	
At the end of course Students will be able to –	
CO1	Compute deflection in twon dimentional structures using stain energy method.
CO2	To Explain analysis of buckling of column and two hinge arch using various method.
CO3	To explain approximate method for analysis of multistoried frame structure.
CO4	To describe flexibility matrix method and application of column analogy.
CO5	To determine concepts regarding to structural dynamics and finite element method.

Course Name : Advanced Building Material	
Code : BTCVE505T (Elective 1)	
At the end of course Students will be able to –	
CO1	Explain the structural, physical and long term performance of building materials used in construction
CO2	Illustrate special mortars and admixtures used in Civil engineering applications.
CO3	Describe the properties of Ceramic materials in construction projects.
CO4	Explain the uses of polymeric materials in construction.
CO5	Define green building & explain the concept and materials.

Course Name : Earth Retaining Structure (Elective-II)	
Code : BTCVE506T	
At the end of course Students will be able to –	
CO1	Interpret the mechanism of earth retaining structures.
CO2	Understand the engineering concepts of stability for different types of retaining walls.
CO3	Understand about sheet pile, cofferdam and best suitable techniques for construction.
CO4	Improve in knowledge form historical failures of geotechnical structures.
CO5	Understand the effect of water table on slopes.

Course Name : Organizational Behaviour	
Code : BTCVE508AU	
At the end of course Students will be able to –	
CO1	Comprehend the concept and importance of organizational behaviour.
CO2	Acquire the knowledge of interpersonal behaviour and transaction analysis
CO3	Intuit different traits and theories of personality
CO4	Scrutinize the importance of motivation in organization and types of leadership

B.Tech. Sixth Semester

Course Name : Estimating & Costing	
Code : BTCVE601T	
At the end of course Students will be able to –	
CO1	Compile the preliminary estimate for administrative approval & technical sanction for a civil engineering project.
CO2	Create the tender documents, fill the contracts and make use of knowledge of different contract submission & opening in awarding the work to the contractor.
CO3	Develop the specification of the work and use the concept of SD, EMD, MAS, Running Bill, Final Bill during the entire project Schedule the project for its timely completion.
CO4	Apply the technique of Rate analysis in estimating the exact cost of material & manpower and hence the entire project.
CO5	Analyse the exact value of the asset (movable & immovable) using different Valuation techniques.

Course Name : Construction Engineering Management	
Code : BTCVE602T	
At the end of course Students will be able to –	
CO1	To explain various economic and managerial aspects of construction industry
CO2	To discuss tools and techniques of economic analysis for improving their decisions making skills.
CO3	Analyze the structure of market and effect of inflation with special reference to the construction industry.
CO4	To describe the importance of marketing management and its effect on construction industry.
CO5	Acquire financial acumen for construction business.

Course Name : Water Resource Engineering	
Code : BTCVE603T	
At the end of course Students will be able to –	
CO1	Understand occurrence, movement and distribution of water and estimate water abstractions, runoff and hydrographs .
CO2	Illustrate different systems and methods of irrigation and estimate the quantity of water required by crops and estimate the quantity of water required by crops.
CO3	Estimate reservoir capacity and analyse and design earth dams .
CO4	Design and analyse gravity dams and illustrate types of Spillways and energy dissipators .
CO5	Design unlined and lined channels and illustrate concepts of other irrigation structures .

Course Name : Repairs and Rehabilitation of Civil Engineering Structures	
Code : BTCVE604T	
At the end of course Students will be able to –	
CO1	Explain deterioration of concrete in structures .
CO2	Carryout analysis using NDT and evaluate structures .
CO3	Assess failures and causes of failures in structures .
CO4	Carryout Physical evaluation and submit report on condition of the structure .
CO5	Carryout analysis of structures and take preventive action as per conditions & Requirement .

Course Name : Environmental Engineering (Open Elective-I)	
Code : BECVE605T	
At the end of course Students will be able to –	
CO1	Explore the components of biosphere and impact of human activity on environment.
CO2	Summarize the causes and sources of pollutants, and their impact on global environment.
CO3	Develop ethics and scientific awareness about waste generation and treatment.
CO4	Identify sources and types of wastes and its management.
CO5	To comprehend noise, noise pollution and control.

B.Tech. Seventh Semester

Course Name : Design of Steel Structures	
Code : BTCVE701T	
At the end of course Students will be able to –	
CO1	Use the knowledge of structural properties in assessing its strength and understand design philosophy.
CO2	Apply the knowledge of various techniques in analysing and design the members subjected to axial loading.
CO3	Make use of knowledge of analysis in structural planning and design of various components of building subjected to bending.
CO4	Apply engineering concept to design members subjected to complex nature of loading
CO5	Make use of knowledge to design footings.

Course Name : Advance Traffic Engineering & Management (Elective-IV)	
Code : BTCVE702T	
At the end of course Students will be able to –	
CO1	Define and describe various traffic studies and traffic characteristics.
CO2	Describe terms related to highway capacity and explain various theories related to traffic flow.
CO3	Describe the various factors involve in traffic fatalities and able to suggest the traffic safety measures
CO4	Explain parking studies and design traffic signals and rotary
CO5	Have knowledge of statistical tools in traffic engineering.

Course Name : Advanced RCC Design (Elective-IV)	
Code : BTCVE702T	
At the end of course Students will be able to –	
CO1	Understand the conceptual design of overhead circular service reservoirs.
CO2	Analysis and design of Highway Bridge: Slab type and Girder type .
CO3	Analyze and Design building frames using Limit state Method.
CO4	Select the parameters in beam theory for design cylindrical shells .
CO5	Design Silos using Limit state Method.

Course Name : Pavement Analysis & Design (Elective-IV)	
Code : BTCVE704T	
At the end of course Students will be able to –	
CO1	Analyze the stresses and strains in a flexible pavement using multi-layered elastic theory.
CO2	Design a flexible pavement using IRC, and AASHTO methods
CO3	Analyze stresses and strains in a rigid pavement using Westergaard's theory
CO4	Design a rigid pavement using IRC, and AASHTO methods
CO5	Illustrate the concept of strengthening of existing pavements and pavement management system.

B.Tech. Eighth Semester

Course Name : Construction Method and Equipment Management	
Code : BTCVE 801T	
At the end of course Students will be able to –	
CO1	To have knowledge about construction industry and construction projects.
CO2	To know about project organization
CO3	To understand construction planning methods.
CO4	To understand construction labour and equipment management
CO5	To have knowledge about construction materials management.

Course Name : Digital Land Surveying & Mapping	
Code : BTCVE802T	
At the end of course Students will be able to –	
CO1	Know the basics of digital land surveying and its applications.
CO2	Handle the GPS for surveying and plot the details on map
CO3	Know the use of DGPS and its applications and advantages
CO4	Use total station for land surveying and plotting the details.
CO5	Use advance software for mapping.

Course Name : Project Work Phase-II	
Code : BTCVE804P	
At the end of course Students will be able to –	
CO1	Analyze or Design the Civil Engineering problems by using appreciate methodology in a team work.
CO2	Interpret the communication skills of team members
CO3	Use of Modern tools in the field of Civil Engineering

Course Outcomes of

B. Tech

(MECHANICAL)

Lokmanya Tilak Jankalyan Shikshan Sanstha's
PRIYADARSHINI BHAGWATI COLLEGE OF ENGINEERING
Harpur Nagar, Umred Road (Near Bada Tajbagh), Nagpur-24
(Approved by AICTE, New Delhi, Govt. of Maharashtra
and affiliated to Rashtrasant Tukdoji Maharaj Nagpur University)
Email: principalpbcoe@gmail.com, Website: www.pbcoe.edu.in
NAAC Accredited

Department of Mechanical Engineering

Course Outcomes

B. Tech. Third Semester (CBCS)

Course Name: Mathematics – III	
Code: BTME301T	
At the end of the course student will be able to :	
CO1	Apply Laplace Transform to solve ordinary differential equations, Integral equations and Integro-differential Equations.
CO2	Apply Fourier series in the analysis of periodic functions in terms sine and cosine encounteredin engineering problems and Fourier Transform to solve integral equations.
CO3	Learn the concept of differentiating, integrating and expanding of analytic functions in complex numbers and their applications such as evaluation of integrals of complex functions
CO4	Solve partial differential equations of first order, higher order with constant coefficients and ofsecond order using method of separation of variables.
CO5	Analyze real world scenarios to recognize when matrices are appropriate, formulate problems about the scenarios, creatively model these scenarios in order to solve the problems using multiple approaches. .

Course Name: Manufacturing Processes	
Code: BTME302T	
At the end of the course student will be able to :	
CO1	Understand the importance of manufacturing processes, techniques of pattern making and molding with their properties. Design gating system along with selection of different types of melting furnaces and special casting process.
CO2	Get acquainted with the basic concept of joining process, welding process and its types, defects and application.
CO3	Get acquainted with the forming process for metal, mechanics of forming process along with different types of rolling machine.
CO4	Understand and define press working process along with its classification, types and terminology, different types of dies and introduction to shaping operation.
CO5	Understand introduction to plastics, ceramics and glasses, its properties, application, forming and its shaping.

Course Name: Fluid Mechanics	
Code: BTME303T	
At the end of the course student will be able to :	
CO1	Analyze fluid behaviors based on properties and identify fluid flow types in practical

	applications.
CO2	Apply fluid statics principles to assess pressure distributions, determine buoyancy, and analyze stability.
CO3	Demonstrate proficiency in solving fluid dynamics problems using the Navier-Stokes equation, Bernoulli's equation, and related principles in various engineering scenarios.
CO4	Differentiate laminar and turbulent flows, apply dimensional analysis techniques, and interpret dimensionless parameters.
CO5	Calculate energy losses in pipes, understand fluid behavior in series and parallel configurations, and analyze lift and drag forces.

Course Name: KINEMATICS OFMACHINES	
Code: BTME304T	
At the end of the course student will be able to :	
CO1	Perform kinematic and dynamic analysis (Displacement, Velocity, acceleration, Inertia forces)of a given mechanism using graphical method.
CO2	Understand the concept of compliant mechanisms.
CO3	Contrive or synthesize new mechanisms for specific requirements .
CO4	Construct cam profiles and analysis the follower motion.
CO5	Understand Geometry of gear, its types, analysis of forces and motions of gear teeth. Studyof gear trains.

Course Name: Material Science and Engineering	
Code: BTME306T	
At the end of the course student will be able to :	
CO1	Student will be capable to distinguish micro structure and analyze the effect to crystalline nature of metals, construct and analyze Iron-Iron carbide equilibrium diagram.
CO2	Student will be able to study the commercial steels with their applications and properties.
CO3	Student will be able to analyze and implement suitable heat treatment processes.
CO4	Student will be able to analyze the Cast Iron and their properties.
CO5	StudentwillbeabletoperceivethebasicsofpowderMetallurgyforpowdermetallurgical components.

Course Name: Manufacturing Processes	
Code: BTME302P	
At the end of the course student will be able to :	
CO1	Think in core concept of their engineering application by studying various topics involved in branchspecific applications.
CO2	Understand the relevance and importance of the Different manufacturing techniques and real lifeapplication in industry.
CO3	Design the gating and riser system needed for casting and requirements to achieve defect free casting.
CO4	Analyze the welding process behavior and requirements to achieve sound welded joint while weldingdifferent similar and dissimilar engineering material
CO5	Understand the plastic, glass and ceramic Processing

Course Name: Machine Drawing and Solid Modeling
Code: BEME305P
At the end of the course student will be able to :

CO1	Interpret and describe basic elements of standard machine drawing like lines, dimensions, tolerances, symbols etc.
CO2	Create 2-D detailing, sectional views of machine elements from given isometric view.
CO3	Understand and apply concepts of GD&T for creating part and assembly drawing.

Course Name: Skill Development- (Basics of ComputerAided Drafting)	
Code: BTME307P	
At the end of the course student will be able to :	
CO1	Students will learn - how to create simple parts, assemblies and drawings. - how to use different feature-based tools to build, review and modify a model. - how to create and analyze assemblies and how to produce a drawing with differentviews. - learn how to dimension the drawing and annotate the views.

B. Tech. Fourth Semester (CBCS)

Course Name: Machining Processes	
Code: BEME401T	
At the end of the course student will be able to :	
CO1	Understand fundamentals of metal cutting
CO2	Understand basic construction and operations of lathe shaping, planning
CO3	Understand basics of milling and milling cutters. slotting
CO4	To know about the surface finishing processes.
CO5	Understand the basic of drilling, boring, reaming and broaching.

Course Name: Machining Processes	
Code: BEME401P	
At the end of the course student will be able to :	
CO1	Understand basic cutting tools.
CO2	Working of lathe and turning operation
CO3	Shaping and planning operation
CO4	Milling and drilling operation
CO5	Grinding and surface finishing

Course Name: Fluid Mechanics & Hydraulic Machines	
Code: BEME402T	
At the end of the course student will be able to :	
CO1	Classify and explain fluid their properties, fluid in rest condition, types of flow & flow measuring devices and mathematical application of equations on hydraulic components.
CO2	Explain behavior of fluid in motion condition and application of Bernoullie's equation to fluid flow measuring devices.
CO3	Apply dimensional analysis to design hydraulic machines and different losses of fluid flow through pipes.

CO4	(i) classify different layout of hydro-electric power plant and (ii) analyze design characteristics of hydraulic machines i.e. turbines (impulse andreaction), Pelton turbine , Francis turbine, propeller turbine and Kaplan turbine
CO5	Explain the working principle & design of Centrifugal and reciprocating pump & practical application of similitude & model testing.

Course Name: FLUID MECHANICS &HYDRAULIC MACHINES	
Code: BEME402P	
At the end of the course student will be able to :	
CO1	Explain what is Stability condition of floating bodies, Law of conservation of Energy.
CO2	Apply Frictional losses and Hydraulic co-efficient in the pipe flow.
CO3	Estimate the Performance characteristics of Pelton Turbine
CO4	Estimate the Performance characteristics of Francis Turbine & Kaplan Turbine.
CO5	Estimate the Performance characteristics of Centrifugal Pump & Reciprocating Pump.

Course Name: Material Science& Engineering	
Code: BEME403T	
At the end of the course student will be able to :	
CO1	Student will be capable to distinguish microstructure and analyze the effect of Crystalline nature of metals, construct and analyze Iron-Iron carbide equilibrium diagram.
CO2	Student will be able to study the commercial steels.
CO3	Student will be able to analyze and implement suitable heat treatment processes.
CO4	Student will be able to analyze the Cast Iron.
CO5	Student will be able to perceive the basics of powder Metallurgy for powder metallurgical

Course Name: MECHANICS OFMATERIAL	
Code: BEME404T	
At the end of the course student will be able to :	
CO1	Demonstrate fundamental knowledge about various types of loading and stresses induced
CO2	Draw the SFD and BMD for different types of loads and support conditions.
CO3	Estimate the strain energy in mechanical elements. And analyse the deflection in beams.
CO4	Can design shaft for various loading conditions.
CO5	Understand theory of failure and effective designing of column and struct.

Course Name: Material TestingLab	
Code: BEME404T	
At the end of the course student will be able to :	
CO1	Analyze the Microstructure and investigate various properties of ferrorous and Non ferrousMaterials . Analyse the stress strain behaviour of materials
CO2	Analyse the effect of tensile, shearing force and can utilized the gained while tackling real lifeengineering problems for different types of Materials
CO3	Understand Microstructures and their Applications for various uses

CO4	Measure torsional strength , hardness of material
CO5	Incorporate the various important concepts learnt while designing components

Course Name: Professional Ethics	
Code: BEME405T	
At the end of the course student will be able to :	
CO1	Understand basic purpose of profession, professional ethics and various moral and social issues
CO2	Analyze various moral issues and theories of moral development
CO3	Realize their roles of applying ethical principles at various professional levels
CO4	Identify their responsibilities for safety and risk benefit analysis.
CO5	Understand their roles in dealing various global issues

B. Tech. Fifth Semester (CBCS)

Course Name: Heat Transfer	
Code: BTME501T	
At the end of the course student will be able to :	
CO1	Students will be able to define and compare the different modes of heat transfer and calculation of thermal resistance and heat transfer through plane and composite wall, cylinder and sphere with and without thermal contact resistances.
CO2	Students will be able to apply the concept of internal heat generation for the calculation of heat transfer for plane wall, cylinder and sphere and also learn about various types of fins and their significance in steady state conduction heat transfer calculations. It will also help them tounderstand the concept of unsteady state heat transfer.
CO3	Students will be able to select and apply appropriate empirical correlations to estimate forcedconvection and free convection heat transfer, for internal and external flows.
CO4	Students will be able to evaluate heat transfer rate by radiation from ideal and actualsurfaces and enclosures of different geometries.
CO5	Students will be able to evaluate heat exchanger performance for the given geometry and boundary conditions and design suitable heat exchanger geometry to deliver a desired heat transfer rate.

Course Name: Energy Conversion-I	
Code: BTME502T	
At the end of the course student will be able to :	
CO1	Explain, classify, analyze the steam generators (i.e. Boilers), boiler mountings & accessories. Also evaluate the performance parameters of boiler.
CO2	Explain the concepts of fluidized bed boilers and various draught system and evaluate performance parameters of natural draught system (i.e. chimney).

CO3	Explain the importance of steam nozzle and determine its throat area, exit area, exit velocity. Also compare impulse and reaction steam turbines and explain the concept ofgoverning of steam turbine.
CO4	Explain the methods of compounding of steam turbine, various energy losses in steamturbine and able to draw velocity diagrams of steam turbine blades to analyze the angles of the blades, work done, thrust, power, efficiencies of turbine.
CO5	Explain, classify the steam condensers, cooling towers and evaluate performance parametersof surface condenser.

Course Name: Design of Machine Elements	
Code: BTME503T	
At the end of the course student will be able to :	
CO1	Apply principals of static loading for design of Cotter joint, Knuckle joint
CO2	Design bolted, welded joints, power screws & pressure vessels
CO3	Design the power transmission shaft & coupling
CO4	Design components subjected to fatigue or fluctuating stresses. Also, will be able to apply principles for determining bending stresses for design of curved beams e.g. crane hook, C-Frame.
CO5	Design clutches, brakes and springs

Course Name: Industrial Economics &Management	
Code: BTME504T	
At the end of the course student will be able to :	
CO1	Understand the concept of demand and supply and its relationship with the price
CO2	Relate various factors of production with reference to different economic sectors
CO3	Analyze the causes and effects of inflation and understand the market structure
CO4	Acquire knowledge of various functions of management and marketing management
CO5	Perceive the concept of financial management for the growth of business

Course Name: Mechanical Measurement and Metrology	
Code:BTME505T	
At the end of the course student will be able to :	
CO1	Students will be able to analyze statistical characteristic of systems.
CO2	Students will be able asses the system response.
CO3	Students will be able to understand the instrumentation process.
CO4	Students will be able to understand limits fits and tolerance.
CO5	Students will learn the basics of various metrology measurement terms and techniques.

Course Name: Heat Transfer Lab	
Code:BTME501P	
At the end of the course student will be able to :	
CO1	Understand common design patterns in the context of incremental/iterativedevelopment.
CO2	Exploit well-known Creational design patterns.
CO3	Distinguish between different types of structural design patterns.
CO4	Remember the appropriate design patterns, purpose and methods and use ofBehavioral Design Pattern to solve object oriented design problems.
CO5	Demonstrate and understanding of Behavioral and other useful design patterns

Course Name: Mechanical Measurement and Metrology	
Code:BTME505P	
At the end of the course student will be able to :	
CO1	Students will be able to perform the instrumentation.
CO2	Students will be able to use the instrumentation for measurement of thermal properties.
CO3	Students will be able obtain the response from the instruments also can be able to calibrate theinstruments.
CO4	Students will be able to calculate the limits and allowances to obtain the proper fit.
CO5	Students will able to identify the surface roughness using optical flat.

Course Name: Industrial Visit	
Code:BTME506P	
At the end of the course student will be able to :	
CO1	Opportunity to interact with Industry Experts
CO2	Learning experience.
CO3	Enhanced employability and PPO's.
CO4	Interpersonal skills enhancement.
CO5	Acquire in depth knowledge about industries & innovative technologies employed.

Course Name: Performing Art	
Code: BTME507P	
At the end of the course student will be able to :	
CO1	An Arts and Science course helps the students to empower themselves with problem solving skills. The ability to analyze things and communicate them in the right way is taught. Theseskills are very much essential to get employed in reputed companies and most of the companies prefer candidates with the mentioned skills. The students also have a variety of career options to choose for the future

B. Tech. SixthSemester (CBCS)

Course Name: AUTOMATION INPRODUCTION	
Code: BEME601T	
At the end of the course student will be able to :	
CO1	Get Acquainted With Automation, Its Type's ,Strategies , Assembly Line Balancing And Its Analysis, Methods Of Work Part Transport
CO2	Recognize fundamentals and constructional features of N.C, CNC and D.N.C machines and prepare a CNC program for given part.
CO3	Get Acquainted With The Robotic Configuration, Types Of Links, Joints, Grippers, Industrial Robotics And Robot Applications.
CO4	Cultivate Information About Automated Material Handling Systems, Automated Storage And Retrieval System (AGVS,AS/RS) Its Analysis
CO5	Get Acquainted With Automated Inspection (CAPP, CAQC, CMM) And Technology.

Course Name: AUTOMATION INPRODUCTION	
Code: BEME601P	
At the end of the course student will be able to :	
CO1	Recognize automation, corroborating this knowledge with case studies on automation systems. study and analyze the material handling systems, robots and GT
CO2	Demonstrate NC programming (manual/apt)
CO3	Simulate program on CNC milling/ lathe
CO4	Work on CNC milling/ lathe
CO1	Recognize automation, corroborating this knowledge with case studies on automation systems. study and analyze the material handling systems, robots and GT

Course Name: Energy Conversion-II	
Code: BEME602T	
At the end of the course student will be able to :	
CO1	Classify various types of I.C. Engines and explain the working of its various components and systems.
CO2	Analyze the effect of various operating variables on engine performance
CO3	Understand the working of Gas Turbine and Jet propulsion system
CO4	Analyze the vapour compression refrigeration system and psychometric process.
CO5	Understand the working of various types of compressors

Course Name: Energy Conversion-II Lab	
Code: BEME602P	
At the end of the course student will be able to :	
CO1	**Identify** different components of IC engine, type of compressor , VCR system
CO2	**Demonstrate** and **Determine** performance of I,C, engine ,compressor and VCR system
CO3	**Construct** Heat balance sheet for single/multi cylinder CI and SI engine.
CO4	**Apply** Mores Test on Multi cylinder S.I. Engine
CO5	**Analyze** the thermodynamic performance of Gas turbine

Course Name: Dynamics ofMachines	
Code: BEME603T	
At the end of the course student will be able to :	
CO1	Comprehend the machine dynamics through basic principles to interpret their application
CO2	Analyze dynamic force conditions in planer linkages and cams to determine required driving torque condition (graphically/ analytically).
CO3	Estimate the unbalanced forces due to rotating and reciprocating masses in a mechanicalsystem and calculate (graphically/ analytically) the balancing masses required for safe/ smooth operation of these mechanical systems.
CO4	Identify the requirement of flywheel, brakes, and dynamometers in a mechanical systemand calculate inertia of flywheel and braking condition to be incorporated in engines and machines.
CO5	Recognize and interpret the concept of vibration in various mechanical systems anddistinguish vibration characteristics for 1 & 2 DOF systems to evaluate the conditions for its control/ use.

Course Name: Operation Research (Elective-I)	
Code: BEME604T	
At the end of the course student will be able to :	
CO1	Recognize the importance and value of Operations Research and mathematical modelingin solving practical problems in industry
CO2	convert given situation to mathematical form and determine optimal settings.
CO3	understand Operations Research models and apply them to real-life problems;
CO4	manage projects for minimum total cost and smooth level of resources.
CO5	make decisions related to age of replacement of equipment

Course Name: Production Planning and Control (Elective-I)	
Code: BEME604T	
At the end of the course student will be able to :	
CO1	Understand need of various functions in production planning and control for better management of manufacturing and/or service systems.
CO2	Use qualitative and quantitative forecasting techniques for short, medium, and long range forecasting.
CO3	Develop material requirements plans (MRP) as part of resource requirements planning systems.
CO4	Use heuristic decision rules to make lot-sizing decisions.
CO5	Develop capacity requirements plans as part of resource requirements planning systems.
CO6	Develop quantitative models to manage independent demand inventory systems.

Course Name: Advanced ManufacturingTechniques (Elective II)	
Code: BEME605T	
At the end of the course student will be able to :	
CO1	Understand and compare the different Non-Traditional machining process with their need, economics and application as well as historical development. Understand the basics of High speed grinding, Hot and Cold machining.
CO2	Understand the basics of Abrasive Jet Machining (AJM), Ultrasonic Machining process and Water Jet Machining.
CO3	Get acquainted with the Electro-Chemical Machining, Electrochemical Grinding, ElectricDischarge Machining. Get acquainted with the Electron Beam, Laser Beam and Plasma Arc Machining.
CO4	Know the basics of unconventional welding techniques and Solid Phase welding techniques.
CO5	Get acquainted with the basics of advance casting processes.

Course Name: CNC & Robotics (Elective-II)	
Code: BEME605T	
At the end of the course student will be able to :	
CO1	Understand fundamentals of NC, CNC and DNC.
CO2	Understand basic drives and work holding devices used in CNC
CO3	Understand NC programming.
CO4	Understand history and classification of robots
CO5	Understand Robot end effectors, motion control, programming languages applications

Course Name: Advance IC Engines [Elective – II]	
Code: BEME603P	
At the end of the course student will be able to :	
CO1	Demonstrate the concept of gyroscopic effect through the working model.
CO2	Analyze the performance of mechanisms and Perform dynamic force analysis of linkages and cams.
CO3	Demonstrate record and interpret data of vibration characteristics of mechanical vibratory systems.
CO4	Perform analysis of brakes, dynamometers and flywheels.
CO5	Identify the importance of safety, team work and effective communication for conduction of activity.

B. Tech. Seventh Semester (CBCS)

Course Name: Elective – III: Computer Aided Design	
Code: BTME701T	
At the end of the course student will be able to :	
CO1	To design graphic system by selecting appropriate input output devices for any graphical applications. Also, develop a logic for various geometrical entities used in modeling software by giving appropriate mathematical treatment, put it into an algorithm and convert an algorithm into a computer program.
CO2	To develop a logic for various transformations on any 2D & 3D geometric objects giving appropriate mathematical treatment, put it into an algorithm and convert an algorithm intoa computer program
CO3	To Explain the different geometric modeling techniques, synthetic curves & methods of assembly modeling. Also understand parametric representation of space curves and surfaces.
CO4	To understand numerical analysis technique called finite element method and apply it on one dimensional problem to determine various field variances.
CO5	Apply finite element method on truss and beams to determine various fields variancessuch as nodal displacement, reaction force, element stress etc.

Course Name: Elective – III: Computer Aided Design	
Code: BTME701P	
At the end of the course student will be able to :	
CO1	Write logic in the form of an algorithm to construct geometric entities and generate a computer program for the same.
CO2	Develop finite element model of an engineering problem, apply loading conditions and boundary conditions, and solve it for analysis of its performance in simulated condition using Analysis software
CO3	Write computer program for 2D and 3D Transformation on any object.
CO4	Generate 2-D and 3-D geometric model of Engineering object using construction and modifying commands using CAD software.

CO1	Write logic in the form of an algorithm to construct geometric entities and generate a computer program for the same.

Course Name: Elective – III: Advancements in Automobile Engineering	
Code: BTME701T	
At the end of the course student will be able to :	
CO1	Classify and identify the main components of automobile. Explain the construction and working of I. C.Engine, fuel supply systems, cooling systems and lubrication systems used in automobile.
CO2	Illustrate the functions of different types of automobile clutches and gear boxes and their applications.Explain the working of transmission system, its components such as propeller shaft, drives, differential and axles.
CO3	Describe the working of different steering systems, steering gear boxes and suspension systems. Identify the different components of steering, suspension and brake systems with their comparisons andapplications.
CO4	Demonstrate the importance of safety considerations in automobiles and outline the recent technologicaldevelopment in automotive safety. Describe the automobile maintenance, Trouble shooting, service procedures, Overhauling and Engine tune up.
CO5	Explain the working of Electric Car, Hybrid Electric vehicles and Fuel cell vehicles. Describe the importance of Alternative energy sources,Vehicle Pollution norms and different methods of pollutioncontrol

Course Name: Elective – III: Advancements in Automobile Engineering Lab	
Code: BTME701P	
At the end of the course student will be able to :	
CO1	Make students understand the basic concepts, requirement and working of various components of automobile.
CO2	Make students understand the assembling and disassembling procedure of Engine.clutch,brakes and the process of wheel alignment, balancing and battery testing.
CO3	Enable students to understand and identify components of transmission system, brakes, steering and suspension systems.
CO4	Aware students about automotive electronics and recent technologiesused in automobiles.
CO5	Aware students about the importance of safety considerations in automobiles, automobile maintenance and overhauling.

Course Name: Energy Conversion-III	
Code: BTME702T	
At the end of the course student will be able to :	
CO1	Students will be able to analyze the gas turbine and jet propulsion system on varied operating conditions.
CO2	Students will be able to recognize the hydraulic pumps and valves and can able to logically design thehydraulic circuit.
	Students will be able to recognize the air compressors and pneumatic control valves and can

CO3	able to logicallydesign the pneumatic circuit.
CO4	Students will be able to understand solar power and future opportunities in solar power systems.
CO5	Students will learn the basics of various non-conventional energy sources and their applications.

Course Name: Open Elective – II: Waste management	
Code: BTME703T	
At the end of the course student will be able to :	
CO1	Understand different aspects of solid waste, its sources and effects on man and material etc.
CO2	Understand problems arriving in handling large amount of solid waste generated ,its collection andtransportation, processing and will able able to design safe collection and disposal methods
CO3	Design methods and equipments for solid waste management to reduce its impact on environment.
CO4	Evaluate and Analyze hazardous waste.
CO5	Design the appropriate disposal systems for hazardous wastes management.

Course Name: Design of TransmissionSystems	
Code:BTME704T	
At the end of the course student will be able to :	
CO1	Design journal and thrust bearings and selection of standard rolling contact bearings.
CO2	Design flexible transmission drives like belts, chains and rope
CO3	Design the positive transmission drives like gears as spur and Helical Gear.
CO4	Design the positive transmission drives like gears as worm and Bevel Gears
CO5	Design the energy storing components like Flywheels for various applications.

Course Name: Project Phase I	
Code: BTME706P	
At the end of the course student will be able to :	
CO1	Convert their conceptual ideas into working projects .
CO2	Explore the possibility of publishing papers in journal.
CO3	Enhance their knowledge through an on-line collection of evidence, work and other information.
CO4	Ultimately promotes for inter-personal communication, punctuality, demonstration of appropriatewritten and oral communication skills with overall Work-Integrated-Learning.
CO5	Develop an understanding of social, cultural, professional, ethical, global and environmentalresponsibilities of the professional Engineer.

B. Tech. Eighth Semester (CBCS)

Course Name: Industrial Engineering	
Code: BTME801T	
At the end of the course student will be able to :	
CO1	Understanding the concept of productivity and method study.
CO2	Ability to measure work time and design ergonomic system.
CO3	To understand the concept of forecasting and breakeven analysis.
CO4	To analysis maintenance and reliability of equipments.
CO5	To understand various quality control tools and techniques.

Course Name: Elective – IV: Finite Element Method	
Code: BTME802T	
At the end of the course student will be able to :	
CO1	Understand the application of fundamentals of solid mechanics for evaluation of structural problems for evaluation of Point load, body force, traction and torsional loads.
CO2	Analyze the application and formulation of the basic finite elements for static and truss.
CO3	Analyze the beam subjected to transverse loading condition.
CO4	Apply the mathematical models for the solution of common engineering problems using finite element methods i.e., formulation of simple & complex problems using finite elements and to develop the ability to generate the governing finite element equations for systems regulated by partial differential equations.
CO5	Remember the significance and difference between the formulation and application of thermal engineering problems using 1D & 2D finite elements.

Course Name: Elective – IV: Finite Element Method	
Code: BTME802P	
At the end of the course student will be able to :	
CO1	Analyze the finite element problems using commercial software and understand the fundamental use of finite element preprocessor, solver and post-processor.
CO2	Demonstrate the ability to evaluate and interpret Finite Element Analysis results for the design and evaluation of 1D and 2D finite element formulations.
CO3	Understand the Finite Element Modeling aspects of the Frequency response problem for solving engineering design problems.

Course Name: Elective – IV: Computer Integrated Manufacturing	
Code: BTME802T	
At the end of the course student will be able to :	
CO1	To understand integration of business function with manufacturing planning and control.
CO2	To apply fundamentals of robotics or industrial applications.
CO3	To develop CNC programs for manufacturing applications.

CO4	To understand the process of Group technology for Flexible manufacturing system.
CO5	Get Acquainted With Automated Inspection (CAPP, CAQC, CMM) And Group Technology.

Course Name: Elective – IV: Computer Integrated Manufacturing	
Code: BTME802P	
At the end of the course student will be able to :	
CO1	Ability to Recognize automation and CIM ,CIM wheel, hardware, software, components of CIM
CO2	The student will have ability to apply fundamentals of G.T and FMS
CO3	The student will have ability to apply fundamentals of CAPP and CAQC
CO4	The student will have ability to develop CNC programs for manufacturing applications.
CO1	Ability to Recognize automation and CIM ,CIM wheel, hardware, software, components of CIM

Course Name: Elective – IV: Refrigeration & Air-conditioning	
Code: BTME802T	
At the end of the course student will be able to :	
CO1	Understand the basics concepts of refrigeration, and Analyze refrigeration cycle and refrigerants.
CO2	Understand the concept of vapour absorption refrigeration, air refrigeration system andcryogenics.
CO3	Understand the concept of psychrometry and analyze heat load calculations.
CO4	Understand the concept of air- distribution and air handling units
CO5	Understand the design and selection of AC System. Control devices for air-conditioning systems.

Course Name: Elective – IV: Refrigeration & Air-conditioning	
Code: BTME802P	
At the end of the course student will be able to :	
CO1	Evaluate the performance of vapour compression refrigeration systems.
CO2	Analyse the components of refrigeration system and Absorption Refrigeration System.
CO3	Synthesize the concept of compound refrigeration system.
CO4	Understand the maintenance and analysis of refrigeration system.
CO5	Indentify the concept of Psychometry and comfort air conditioning.

Course Name: Elective – IV: CNC & Robotics	
Code: BTME802T	
At the end of the course student will be able to :	
CO1	Apply basic concepts of NC, CNC and DNC

CO2	Apply programme using manual part programming technique and APT for CNC lathe and machine.
CO3	Identify the basic fundamentals of industrial robots
CO4	Design kinematics of 2 DOF and 3 DOF of 2D manipulators
CO5	Select of appropriate robot for particular application

Course Name: Elective – IV: CNC & Robotics	
Code: BTME802P	
At the end of the course student will be able to :	
CO1	Understand the programming of CNC and Robotic system.
CO2	understand advanced material handling system
CO3	Recognize automation, sensors and controller technology

Course Name: Elective – V: Heating Ventilation and Air-conditioning	
Code: BTME803T	
At the end of the course student will be able to :	
CO1	Explain the most important concepts about HVACR and operation of HVAC systems.
CO2	Estimate the heating and cooling load of a building.
CO3	Analyse and design different air and water distribution systems related to HVAC systems
CO4	Evaluate the performance of an HVAC system and the energy use of a building.
CO5	Estimate Building Energy and Modeling Methods

Course Name: Elective – V: Electric & Hybrid Vehicles	
Code: BTME803T	
At the end of the course student will be able to :	
CO1	Explain the basics of electric and hybrid electric vehicles, their architecture, technologies andvehicle dynamics fundamentals.
CO2	Analyze the use of different power electronics converters in hybrid electric vehicles.
CO3	Interpret the working of different electrical equipment in electric vehicles and hybrid vehicleconfigurations
CO4	Explain the use of different energy storage systems used for hybrid electric vehicles, their controltechniques, and select appropriate energy balancing technology
CO5	Understand the control and configurations of HEV charging stations

Course Name: Elective – V: Design of Material Handling System	
Code: BTME803T	
At the end of the course student will be able to :	
CO1	Constructional and operational characteristics and design of trolley.
CO2	Constructional and operational characteristics and design of ropeway.
CO3	Constructional and operational characteristics and design of cranes.
CO4	Concept of AGV bulk solid conveying system.
CO5	Concept of Gravity ,powered and vibrating conveying system.

Course Name: Elective – V: Total Quality Management	
Code: BTME803T	
At the end of the course student will be able to :	
CO1	To develop understanding of Quality concepts.
CO2	practically implement the Total Quality Principles to employees and supplier partnership.
CO3	Understanding of Statistical Process Control and Process Capability for enhancement of quality.
CO4	practically implement the tools for Total Quality Principles .
CO5	Develop Understanding of Quality System , Quality Audits, Leadership & quality council & overview of software used for TQM.

Course Name: Elective – VI: Industrial Internet of Things (IOT)	
Code: BTME804T	
At the end of the course student will be able to :	
CO1	To select sensors as per the industry based IoT applications including in-sensor processing, dataconditioning, mounting methods etc.
CO2	To design communication technologies on the basis of data transfer rate, power/energy requirementsand throughput requirements.
CO3	To implement the key enablers of industrial IoT systems such as AR, VR, cloud computing,application softwares in the field of industrial IoT.
CO4	To design predictive maintenance strategy for the critical processes of the industry by using IoTconcept to reduce the production loss of the industry.
CO5	To apply the IoT concepts in building solutions to industrial problems.

Course Name: Elective – VI: Additive Manufacturing	
Code: BTME804T	
At the end of the course student will be able to :	
CO1	Explain the evolution of additive manufacturing (AM) and its importance in digital manufacturing. Also, create AM process chain for product.
CO2	Create and pre-process a model for additive manufacturing.

CO3	Explain liquid based and solid based additive manufacturing processes
CO4	Explain powder based additive manufacturing process
CO5	Post process the additive manufactured parts.

Course Name: Elective – VI: Energy Conservation & Management	
Code: BTME804T	
At the end of the course student will be able to :	
CO1	Identify and classify areas of energy conservation in industries.
CO2	Know the duties and responsibilities of an energy manager and energy auditor.
CO3	Analyze and modify existing working of the energy utilizing and generating machines.
CO4	Know how to use instruments in energy audit process.
CO5	Implement proper energy saving techniques in boiler, furnaces etc.

Course Name: Elective – VI: Green & Sustainable Manufacturing	
Code: BTME804T	
At the end of the course student will be able to :	
CO1	Get acquainted with the current global and Indian manufacturing scenario and challenges with respect to environment
CO2	Get acquainted with the green manufacturing concept and its need in global and Indian context
CO3	Get conversant with the various Key GM Operational Technologies, approaches, strategies, and Elements
CO4	Get acquainted with International and National Green regulations,. International Treaties supporting GM
CO5	Get conversant with the Conceptual GM model. Performance measurement tools & Green economics for GM, Analytical Tools for Sustainability Assessment, Life Cycle Assessment

Course Name: Project Phase II	
Code: BTME805P	
At the end of the course student will be able to :	
CO1	Convert their conceptual ideas into working projects .
CO2	Explore the possibility of publishing papers in journal.
CO3	Enhance their knowledge through an on-line collection of evidence, work and other information.
CO4	Ultimately promotes for inter-personal communication, punctuality, demonstration of appropriate written and oral communication skills with overall Work-Integrated- Learning.
CO5	Develop an understanding of social, cultural, professional, ethical, global