Program Outcomes, Program-Specific Outcomes, Course Outcomes of all programs offered by the Institution
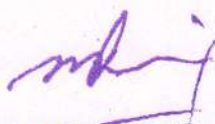
Electronics & Communication Engineering

Program Outcomes:

PO1. Apply the knowledge of Mathematics, Science and Engineering fundamentals to solve complex problems related to Electronics, Communication Engineering and Information Technology.

PO2. Identify, formulate & review research literature and analyze complex Electronics, Communication Engineering and Information Technology problems.

PO3. Design solutions for complex Electronics, Communication Engineering and Information Technology problems and design system components or processes that meet the specified needs with appropriate consideration for public health and safety and cultural and social considerations.

PO4. Design and conduct experiments, as well as to analyze and interpret data.

PO5. Apply appropriate techniques, resources and modern engineering & IT tools for computing practice.

PO6. Analyze the local and global impact of computing on individuals, organizations and society.

PO7. Knowledge of contemporary issues to understand the impact of engineering solutions in a global, economic, environmental, and societal context.

PO8. An understanding of professional, ethical, legal, security and social issues and responsibilities.

PO9. An ability to function effectively individually and on teams, including diverse and multidisciplinary, to accomplish a common goal.

PO10. An ability to communicate effectively with engineering community and society at large.

PO11. An understanding of engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects.

PO12. Recognize of the need for and an ability to engage in continuing professional development.

Program-Specific Outcomes:

PSO1. Ability to design and solve problems in the field of Electronics & Communication Engineering by applying the knowledge acquired from Analog Devices and Circuits, DCLD, VLSI, Embedded systems, Analog& Digital communication and other allied subjects.

PSO2. Provide with quality technical education & professional skills for preparing students effectively for solving real time industrial needs and higher studies.

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Course Outcomes:

Course code: BTEC-301
Course Title: Analog Devices & Circuits

This course aims to expose the students to the principles of Analog Devices and basic circuits to acquaint beginners to various Technical concepts, in the core of Design, Implementation, and Research & Invention of various Electronic Systems

Course code: BTEC-302
Course Title: Digital Circuits and Logic Design

1).Students will be able to represent numerical values in various number systems and perform number conversions between different number systems.
2) Students will demonstrate the knowledge of:
   - operationof logic gates (AND, OR,NAND,NOR, XOR,XNOR) using IEEE/ANSI standard symbols
   - Boolean algebra including algebraic manipulation/simplification, and application of De Morgan's theorems
   - Karnaugh map reduction method.

3) Students will demonstrate the knowledge of operation of basic types of flip-flops, registers, counters, decoders, encoders, multiplexers, and de-multiplexers.
4) Students will be able to analyze and design digital combinational circuits including arithmetic circuits (half adder, full adder, and multiplier).

Course code: BTCS-305
Course Title: Object Oriented Programming using C++

1) Gain knowledge on basics of object oriented programming.
2) Understand template, file handling, exception handling concepts.

Course code: BTEC-401
Course Title: Analog Communication Systems

1) To develop the concept of analog communication System.
2) To understand different types of noise and predict its effect on various analog communication systems.
3) To design the major building blocks of communication system

Course code: BTEC-402
Course Title: Signals & Systems

1) Classify signals and systems and perform operations like folding, shifting, scaling etc. on them.
2) Apply Fourier series and Fourier transform to represent continuous and discrete time signals.
3) Solve and apply DTFT and Z transform to analyze linear time invariant discrete time system:
4) Explain the behavior of random signals in terms of probability functions

Course code: BTEC-403
Course Title: Electromagnetic & Antenna

1) Recognize the need of electromagnetic wave theory including the Maxwell equations in different form, Waveguides and Transmission Lines analogy with waveguide..
2) Explain the various type of antennas and application in the field of communication engineering.
3) Aware of different wave propagation including free space equation, Surface and Space wave propagation and ionosphere propagation

Course code: BTEC-404
Course Title: Electronics Measurement & Instrumentation

1) Identify electronics/electrical instruments, their use, peculiar errors associated with the instruments and how to minimize such errors.
2) Explain the industrial and laboratory applications of such instruments.
3) Understand the basic design techniques of electronic equipments.

Course code: BTEC-405
Course Title: Pulse Wave Shaping & Switching

1) The students will be able to know the applications of clipping and clamping circuits in communication.
2) The students will be able to design multivibrators for various purposes.
3) The students will be able to understand the basics with ching concepts and their applications to pulse circuits.

Course code: BTEC-501
Course Title: Digital Communication Systems

1) Analyze the performance of a base band and pass band digital communication system in terms of error rate and spectral efficiency.
2) Perform the time and frequency domain analysis of the signals in digital Communication system.
3) Select the blocks in a design of digital communication system.

4) Analyze Performance of spread spectrum communication system.

Course code: BTEC-502
Course Title: Digital Signal Processing

1) Apply the concept of discrete time signals and various manipulations on them.
2) Analyze the Discrete time system using Z-transform and Discrete Fourier Transform
3) Learn and understand realizations of various forms of structures' for discrete time systems

4) Develop the capability to design FIR and IIR filters depending upon the specific application
5) Analyze the effects of finite word length on filter performance
6) Describe the architecture and characteristics of digital signal processors.

Course code: BTEC-502
Course Title: Linear Integrated Circuits

1) Students will be able to understand the basic concepts of Linear Integrated Circuits.

2) Students will be able to apply the knowledge of operational amplifiers and design various op-amp circuits.

3) Students will be able to complete accurate and comprehensive analysis of Linear Integrated Circuits.

4) Students will be able to demonstrate the working of various circuits using741C and 555ICs

Course code: BTEC-504
Course Title: Microprocessor & Microcontrollers

1) To understand the detailed architecture of 8085-microprocessor&8051microcontrollers.

2) The students will be able to apply the knowledge of addressing modes and instruction sets for writing assembly language programmers for problem solving.

3) The students will be able to compare microprocessors and microcontrollers.

4) The students will be able to demonstrate the interfacing of various peripheral devices to microcontroller and design of interfacing systems.

Course code: BTEC-601
Course Title: Microwave & Radar Engineering

1) The students will be able to know the basics of Microwave Range and its advantages and disadvantages.
2) They will be able to understand the importance of various microwave components
3) They will be able to measure various microwave parameters to judge the performance of the Microwave systems.

Course code: BTEC-602
Course Title: VLSI Design

1) To understand mathematical methods and circuit analysis model in analysis of CMOS digital electronics circuits, including logic components.
2) To create models of moderately sized CMOS circuits that realizes specified digital functions and interconnect and to verify the functationality, timing, power and parasitic effects.

Course code: BTEC-603
Course Title: Wireless Communication System

1) This course is designed to provide students with an overview of Wireless communication Systems, one of the fastest growing fields in the Engineering world.

2) This course provides students understanding many practical and theoretical concepts that form the basis of wireless communication and knowledge of Elements of cellular system design and various Wireless Systems and standards.

CO1: The students shall have the understanding of basics of Wireless communication.

CO2: The students will be able to understand the cellular concept, Co-channel Interference and frequency Reuse concept

CO3: Upon completion of the course, the students shall have the ability to understand the concept of fading and Diversity and design some model to reduce these effects.

CO4: Upon completion of the course, the students shall have the ability to understand the concept of multiple access techniques and the cellular systems which are using these techniques.

CO5: Students shall be able to understand various wireless systems and standards GSM, CDMA, UMTS, 4G,LTE

Course code: BTCS-403
Course Title: Computer Networks

1) Students will be able to understand basic networking concepts.
2) Students will be able to compare the data link protocols and networking layer protocols.
3) Students are able to design new protocols for data link layer and routing algorithms.

Course code: BTEC-701
Course Title: Embedded Systems

1) Get in sight of design metrics of embedded systems to design real time applications to match recent trends in technology.
2) Understand Real times systems concepts.
3) Apply interfacing of devices using LPC2148

Course code: BTEC-702
Course Title: Optical Communication Systems

1) The students will learn the need of optical communication system with basic knowledge to elements of optical fiber transmission link, fiber modes configurations and structures

2) The student will understand the different kind of losses, signal distortion in optical wave guides and other signal degradation Factors

3) The student will become skilled at the various optical source materials, LED & Laser structures, quantum efficiency of optical source as well as photo detector, fiber optical receivers such as PIN, APD diodes, noise performance in photo detector, receiver Operation and configuration

4) The student will gain knowledge of the fiber optical network components, variety of optical communication system & network aspects

Course code: BTEC-912
Course Title: Speech & Image Processing

1) After studying this course, the students will be able to understand the basics of image and speech processing
2) Students will be able to analyze image tools on image enhancement, segmentation and color image models.
3) Students will conceptualize the basics of speech production, speech synthesis ,music theory and filters used for practical applications.

Course code: BTEC-920
Course Title: Wireless Sensor Network

1. Students will be introduced to sensor networks and their characteristics
2. Students will be introduced to some existing applications of wireless sensor networks
3. Students will get an overview of the various network level protocols for MAC, routing, time synchronization, aggregation, consensus and distributed tracking.
4. Students will earn to program sensor network platform susing Tiny OS, NS2 Java and will get an opportunity to have hands on training in developing applications on wireless motes, smart phones and other embedded platforms
5. Students will understand what research problems sensor network spouse indiscipline such as signal processing, wireless communications and even control systems

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Computer Science & Engineering

Program Outcomes:

After the completion of undergraduate course in Computer Science &Engineering , graduates will be able to:

PO1 Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization for the solution of complex engineering problems.

PO2 Identify, formulate, research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3 Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for public health and safety, and cultural, societal, and environmental considerations.

PO4 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.

PO5 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.

PO6 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.

PO7 Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8 Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9 Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10 Communicate effectively on complex engineering activities with the engineering community and with the 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.

PO11 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.

PO12 Recognise the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change."

Program-Specific Outcomes:

Students will be able to:

PSO1: Apply the knowledge of computer system and design principles in building the software and hardware components.

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PSO2: Apply knowledge of layered network models, protocols, technologies and topologies as well as incorporating security policies for building network and internet based applications.

PSO3 : Apply the theoretical foundations of computer science in modelling and developing solutions to the complex and real world problems as well as designing and developing the application software systems along with the database design and management that meet the automation needs of industry and society.

Course Outcomes:

Course Code: BTCS 401 – 18
Course Title: Discrete Mathematics

1. To be able to express logical sentence in terms of predicates, quantifiers, and logical connectives
2. To derive the solution for a given problem using deductive logic and prove the solution based on logical inference
3. For a given a mathematical problem, classify its algebraic structure
4. To evaluate Boolean functions and simplify expressions using the properties of Boolean algebra
5. To develop the given problem as graph networks and solve with techniques of graph theory.

Course Code: EVS101-18
Course Title: Environmental Studies

Students will develop strong natural familiarity with humanities along with right understanding enabling them to eliminate conflict and strife in the individual and society. Students shall be able to relate philosophy to literature, culture, society and lived experience can be considered.

Course Code: HSMC122-18
Course Title: Universal Human Values 2

By the end of the course, students are expected to become more aware of themselves, and their surroundings (family, society, nature); they would become more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind. They would have better critical ability. They would also become sensitive to their commitment towards what they have understood (human values, human relationship and human society). It is hoped that they would be able to apply what they have learnt to their own self in different day-to-day settings in real life, at least a beginning would be made in this direction.

This is only an introductory foundational input. It would be desirable to follow it up by
a) Faculty -student or mentor-mentee programs throughout their time with the institution.
b) Higher level courses on human values in every aspect of living. E.g. as a professional.

Course Code: BTES 401-18
Course Title: Computer Organization & Architecture

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1. Understand functional block diagram of microprocessor;
2. Apply instruction set for writing assembly language programs;
3. Design a memory module and analyze its operation by interfacing with the CPU;
4. Classify hardwired and micro programmed control units; &
5. Understand the concept of pipelining and its performance metrics.

Course Code: BTCS 402 – 18
Course Title: Operating Systems

1. Explain basic operating system concepts such as overall architecture, system calls, user mode and kernel mode.
2. Distinguish concepts related to processes, threads, process scheduling, race conditions and critical sections.
3. Analyze and apply CPU scheduling algorithms, deadlock detection and prevention algorithms;
4. Examine and categorize various memory management techniques like caching, paging, segmentation, virtual memory, and thrashing.
5. Design and implement file management system.
6. Appraise high-level operating systems concepts such as file systems, disk-scheduling algorithms and various file systems.

Course Code: BTCS403-18
Course Title: Design and Analysis of Algorithms

1. For a given algorithms analyze worst-case running times of algorithms based on asymptotic analysis and justify the correctness of algorithms.
2. Explain when an algorithmic design situation calls for which design paradigm (greedy / divide and conquer/backtrack etc.).
3. Explain model for a given engineering problem, using tree or graph, and write the corresponding algorithm to solve the problems.
4. Demonstrate the ways to analyze approximation/randomized algorithms (expected running time, probability of error).
5. Examine the necessity for NP class based problems and explain the use of heuristic techniques.

Course Code: BTES 402-18
Course Title: Computer Organization & Architecture Lab

1. Assemble personal computer.
2. Implement the various assembly language programs for basic arithmetic and logical operations.
3. Demonstrate the functioning of microprocessor/microcontroller based systems with I/O interface.

Course Code: BTCS 404 – 18
Course Title: Operating Systems Lab

1. Understand and implement basic services and functionalities of the operating system.

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2. Analyze and simulate CPU Scheduling Algorithms like FCFS, Round Robin, SJF, and Priority.
3. Implement commands for files and directories.
4. Understand and implement the concepts of shell programming.
5. Simulate file allocation and organization techniques.
6. Understand the concepts of deadlock in operating systems and implement them in multiprogramming system.

Course Code: BTCS405-18
Course Title: Design and Analysis of Algorithms Lab

1. Improve practical skills in designing and implementing complex problems with different techniques.
2. Understand comparative performance of strategies and hence choose appropriate, to apply to specific problem definition.
3. Implement various trees and graph based algorithms and become familiar with their design methods.
4. Design and Implement heuristics for real world problems.

Course Code: BTCS601-18
Course Title: Compiler Design

1. Build concepts on lexical analysis.
2. Understand strategies of syntax analysis.
3. Learn techniques of Intermediate code generation.
4. Understand code design issues and design code generator.
5. Design and develop optimized codes.

Course Code: BTCS602-18
Course Title: Artificial Intelligence

1. Build intelligent agents for search and games
2. Solve AI problems by learning various algorithms and strategies
3. Understand probability as a tool to handle uncertainty.
4. Learning optimization and inference algorithms for model learning
5. Design and develop programs for an reinforcement agent to learn and act in a structured environment.

Course Code: BTCS 612-18
Course Title: Elective - Cloud Computing

1. Understand the core concepts of the cloud computing paradigm
2. Understanding importance of virtualization along with their technologies
3. Analyze various cloud computing service and deployment models and apply them to solve problems on the cloud.
4. Implementation of various security strategies for different cloud platform

Course Code: BTCS616-18
Course Title: Elective- Data Science

1. understand of the basics of the ethical use of data science
2. Build skills in transformation and merging of data for use in analytic tools
3. Perform linear and multiple linear regression analyses.
4. Evaluate outcomes and make decisions based on data

Information Technology

Program Outcomes:

After the successful completion of undergraduate course IT Engineering, Graduates will be able to:

PO1. Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization for the solution of complex engineering problems.

PO2. Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for public health and safety, and cultural, societal, and environmental considerations.

PO4. 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.

PO5. 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.

PO6. 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.

PO7. Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communicate effectively on complex engineering activities with the engineering community and with the 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.

PO11. 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.

PO12. Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program-Specific Outcomes:

PSO1 Apply standard practices for software project development using hands-on programming skills for analysis, design and creation of software solutions.

PSO2 Design networks and also aware of network security related issues

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PSO3 Create and maintain database for providing back-end support to IT applications.

Course Outcomes:

Course Code: BTCH-101
Course Title: Engineering chemistry

1. Analyze the need, design and perform a set of experiments.
2. Identify the structure of unknown/new compounds with the help of spectroscopy.
3. Differentiate hard and soft water; solve the related numerical problems on water purification and its significance in industry and daily life
4. Apply the principles of green chemistry in designing alternative reaction methodologies to minimize hazards and environmental degradation.
5. Explain the properties, separation techniques of natural gas and crude oil along with potential applications and role of petrochemicals in national economy.
6. Explain the properties, separation techniques of natural gas and crude oil along with potential applications and role of petrochemicals in national economy.
7. Acquire Basic knowledge of Nanochemistry to appreciate its applications in the field of Medicine, data storage devices and electronics.
8. Equipped with basic knowledge of polymer reinforced composites, applications of semiconductor photochemistry in energy harnessing and optical sensors

Course Code: BTCH-102
Course Title: Engineering Chemistry laboratory

1 Analyze & generate experimental skills
2 Enhance the thinking capabilities in the modern trends in Engineering & Technology.
3 Learn and apply basic techniques used in chemistry laboratory for preparation, purification and identification.
4. Employ the basic techniques used in chemistry laboratory for analyses such as Chromatography, Spectroscopy, Volumetric titrations, Conductometric, Pensky-Martens apparatus and Stalagmometer.
5. learn safety rules in the practice of laboratory investigations

Course Code: BTPH-101
Course Title: Engineering physics

1. Understand the importance of Applied Physics in describing physical phenomena.
2. Employ the knowledge of crystallography and X-Rays to understand the structure-property relationship of materials.
3. Implement the concept of Theory of relativity and Quantum mechanics for research applications.
4. Recognize the use of Laser, Magnetic materials, Superconductors and optical fibers in various fields.
5. Acquire Basic knowledge of EMFT in communication and Nanophysics for its applications in the field of medicine, data storage devices and electronics

Course Code: BTPH-102

Course Title: Engineering physics laboratory

1. Develop skills to impart practical knowledge in real time solutions.
2. Understand principle, concept, working and application of new technology and comparison of results with theoretical calculations.
3. Design new experiments/instruments with practical knowledge
4. Gain knowledge of new concept in the solution of practical oriented problems and to understand more deep knowledge about the solution to theoretical problems.
5. Understand measurement technology, usage of new instruments and real time applications in engineering.

Course Code: BTAM- 101
Course Title: Engineering mathematics-I

After Successful completion of the course the students are expected to:

1. Understand the fundamentals of the mathematics to apply while designing technology and creating innovations
2. Compute limits and derivatives of functions of two and three variables, develops skill of higher derivative, expansion of functions in ascending power of variable & value of the function in neighborhood of some points.
3. Analyze multidimensional functions to find derivatives, tangent lines to level curves, and to solve optimization problems using extremum value of a given function related to engineering application.
4. Find integrals, arc length, double and triple integrals for finding area, volume, centre of mass and various other engineering applications
5. Represent vectors analytically and geometrically, and compute dot and cross products for presentations of lines and planes and Differentiate vector fields, Determine gradient, Divergence & Curl of vector fields and Evaluate line & surface integrals directly and by the fundamental theorems which is useful to represent conservation principles for physical vector fields important in gravitation and electric fields
6. Develops the ability to understand basics of geometry, find radius of curvature & torsion of given curve which is helpful to trace the curve for a given equation of a curve & its nature

Course Code: BTAM-102
Course Title: Engineering Mathematics-II

1. Classify differential equations according to certain features and willbeabletoapplytechniquestosolvefirstorderandfirstdegree differential equations and apply them in engineering applications involving the Kinematics and Kinetics of Resisted Gravitational, Simple Harmonic & Vibratory Motion, Electric circuits
2. Solve higher order & first degree linear non homogenous differential equation arising in various branches of engineering and related mathematical model develops arising to form mathematical modeling of RealWorld Problems involving rate of growth of population & Electricoscillators
3. Use ideas of matrices and their applications in solving problems involving systems of linear equations and linear programming problems; Also they will be capable of representing geometric transformations by means of matrices and to express the volume of certain figures and equation of line usingdeterminants.

4. Show skills in computations and applications of infinite sequences and sums (infinite series). Students will show familiarity with the properties of infinite series to either converge to a finite value or diverge to an infinite value, and will learn about methods to determineconvergence
5. Express Complex Numbers in Cartesian, Polar, Trigonometric, Exponential and Logarithmic form, and use the theory of complex numbers to solve various practical problems in Engineering andSciences.

Course Code: BTHU-101
Course Title: Communicative English

After the Completion of the Course the students will be able to:
1. Demonstrate an understanding of written English language of varied complexity on most topics including some abstract topics
2. Write grammatically correct English in diverse situations
3. Produce on their own texts which are clear and coherent. They must show awareness of appropriate format and a capacity for explaining their views in a rational manner.
4. Exhibit an ability to draft documents effectively to apply forvarious job Interviews and to conduct business in general.
5.Display the ability to analyze data and present it in the form of a concise written document
6. Show an ability to generally read the stance or the point of view of the writer and present it in the form of a summary

Course Code: EVSC-101
Course Title: Environmental sciences

After the completion of the course the student will be able to:
1. Develop critical thinking skills in relation toenvironmental affairs
2. Acquire knowledge about natural resources and their effective management
3.Expand awareness of self in a global society and effectively engage diverse perspectives, values, and cultures, ranging from local to global, in dealing with environmental and socialissues
4. Interpret and propose solutions to variousenvironmental pollution
5. Formulate an action plan for sustainable alternatives thatintegrate science, humanist, and socialperspectives

Course Code: HPVE-101
Course Title: Human Values and Professional Ethics

After the completion of the course the student will be able to:
1. Recognize what is valuable to human being and what are thebasic aspirations oflife.
2. Understand the importance of mutually satisfying human behavior and enriching interaction withnature.
3. Develop appropriate technologies and management patterns to create harmony inNature/Existence

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4. Implement the understanding of value education in solvingthe various practical problems of professional and personallife.

5. Acquire basic knowledge of harmony in existence andtounderstand existence as coexistence.

Course Title: FCPIT
Course Code: BTCS-101

1. To understand the basic building blocks of general purpose digital computer system like computer hardware/software, memory and peripheral devices, internet applications andservices.
2. To understand the program development life cycle using various tools like flowcharts and algorithms andpseudo-code.
3. To classify operators, expressions, character set, data types and controlstructures.
4. To understand the concept of modular programming and code reusability using libraryfunctions.
5.To write programs using object oriented concepts like classes and objects, filehandling.

B.Tech IT 3rd Semester

Course Code: BTCS301
Course Title: Computer Architecture

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

1. Understand basic concepts of computer architecture including, syntax of register transfer language, micro operations, instruction cycle, and controlunit.
2. Understand the various various representation codes for both numeric and non-numeric data and perform different arithmetic operations on them.
3. Understand the impact of instruction set architecture on cost- performance trade-off computerdesign.
4. Compare and Contrast various memory management techniques like associate memory, cache memory, virtual memory etc.inC++.
5. Analyze the concept of pipelining, multiprocessors, andinterprocessor Communicationand hence evaluation of different contemporary advancedarchitectures.
6.Implement interfacing of computer with input and output devices.

Course Code: BTAM302
Course Title: Engg. Mathematics-III

1. Perform operations on various discrete structures such as sets, functions, relations, and sequences.
2. Ability to solve problems using Counting techniques, Permutation and Combination, Recursion and generating functions.
3. Apply algorithms and use of graphs and trees as tools to visualize and simplifyProblems.
4. Use of K-Maps and Truth Tables to construct and verify correctness of a

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Booleanexpression.
5. Understand the various properties of algebraic systemslike Rings, Monoids andGroups.

Course Code: BTCS303
Course Title: Digital Circuits and Logic Design

1. Apply the principles of number system, binary codesand Boolean algebra to minimize logicexpressions
2. Develop K-maps to minimize and optimize logicfunctions up to 5variables
3. Acquire knowledge about various logic gates and logic families and analyze basic circuits of thesefamilies.
4. Design various combinational and sequential circuits such as encoders , decoders and counters using multiplexers, and flip -flops
5. Describe and compare various memory systems, shift registers and analog to digital and digital to analog conversioncircuits.

Course Code: BTCS304
Course Title: Data Structures

1. Understand the concept of Dynamic memory management, data types, algorithms, Big Onotation.
2. Understand basic data structures such as arrays, linked lists, stack andqueues.
3. Describe the hash function and concepts of collision and its resolutionmethods
4. Solve problem involving graphs, trees andheaps
5. Apply Algorithm for solvingproblems like sorting, searching, insertion and deletion of data

Course Code: BTCS305
Course Title: Object Oriented Programming Using++

1. Will have sufficient knowledge of object orientedprogramming
2. Will be able to map and solve real world problems using C++ programming.
3. Will be able to store and retrieve data from files through C++ programming.
4. Will have thorough knowledge about run time exceptions and they will be able to handle thempractically.

Course Code: BTCS306
Course Title: Data Structures Lab

1. Implement basic data structures such as arrays and linked list.
2. Programs to demonstrate fundamental algorithmic problems including Tree Traversals, Graph traversals, and shortest paths.
3. Implement various searching and sortingalgorithms.
4. Programs to demonstrate the implementation of various operations on stack andqueue.

Course Code: BTCS308
Course Title: W Lab-I Digital Circuits and Logic Design

1. Study of logic gates and realization of OR,AND,NOT AND XOR Functions using universalgates
2. Design and implement combinational circuits like half adder/full adder, half subtractor/full subtractor, code converters, comparators,MUX/DEMUX
3. Design and implement sequential circuits like flip-flops, counters and shiftregisters
4. Study of 8-bit DAC and 8-bitADC.

Course Code: BTCS309
Course Title: Software Lab-II (OOPS)

1. Develop solutions for a range of problems using objects and classes.
2. Programs to demonstrate the implementation of constructors, destructors and operator overloading.
3. Apply fundamental algorithmic problems including type casting, inheritance, and polymorphism.
4. Understand generic programming, templates, filehandling.

B. Tech IT 4th Semester
Course Code: BTCS401
Course Title: Operating Systems

1. Identify the functions, structure and design issues associated with operatingsystems.
2. Familiarize with different concepts of process management like inter-process communication, semaphore, message passing, classical IPC problems, CPU scheduling, deadlock detection andprevention.
3. Understand and analyze the theory and implementationofphysical and virtual memory, memory management policies, I/O system and secondary storage structure.
4. Implement the different CPU scheduling, page replacement and device algorithms inC++.
5. Install the various types of operating systems including UNIX, Windows.
6. Contrast and compare the various file systems and their corresponding protection and securitymechanisms.

Course Code: BTCS402
Course Title: Discrete Structures

1. Perform operations on various discrete structures such as sets, functions, relations, and sequences.
2. Ability to solve problems using Counting techniques, Permutation and Combination, Recursion and generating functions.
3. Apply algorithms and use of graphs and trees as tools to visualize and simplifyProblems.
4. Apply algorithms and use of graphs and trees as tools to visualize and simplifyProblems.
5. Use of K-Maps and Truth Tables to construct and verify correctness of a Booleanexpression.
6. Understand the various properties of algebraic systems like Rings, Monoids and Groups

Course Code: BTCS403
Course Title: Computer Networks-I

1. Understand the basic of data communication and data transmission.
2. Know about the working of computer networks, various topologies and their use in real wordapplications.
3. Study all seven layers related to OSI model with complete structure, functions and their role in data communication.
4. A comprehensive analysis of security aspect related to computer networks.

Course Code: BTCS404
Course Title: Microprocessor and Assembly Language Processing

1. Understand the taxonomy of microprocessors and knowledge of contemporarymicroprocessors.
2. Describe the architecture, bus structure and memory organization of 8085 as well as higher order microprocessors.
3. Explore techniques for interfacing I/O devices to the microprocessor 8085 including several specific standard I/O devices such as 8251 and8255.
4. Demonstrate programming using the various addressing modes and instruction set of 8085microprocessor
5. Design structured, well commented , understandable assembly language programs to provide solutions to real world controlproblems

Course Code: BTCS405
Course Title: System Programming

1. To understand the basics of system programs like editors, compiler, assembler, linker, loader, interpreter and debugger.
2. Describe the various concepts of assemblers and macro processors.
3. To understand the various phases of compiler and compare its working withassembler.
4. To understand how linker and loader create an executable program from an object module created by assembler and compiler.
5. To know various editors and debuggingtechniques

Course Code: BTCS406
Course Title: Operating System Lab

1. Demonstrate the installation process of various operating systems.
2. Implement virtualization by installing Virtual Machine software.
3. Apply Unix/Linux operating systemcommands.
4. Understand different Unix/Linux shell scripts and execute various shellprograms.

Course Code: BTCS407
Course Title: Computer Networks-I Lab

1. Students can work as network engineer in the industry

Course Code: BTCS408
Course Title: Microprocessor & Assembly Language Programming Lab

1. Solve basic binary math operations using the instructions of microprocessor8085.
2. Apply programming knowledge using the capabilities of the stack, the programcounter
3. Design, code and debugs Assembly Language programstoimplement simple programs
4. Execute a machine code program on the training boards

Course Code: BTCS409
Course Title: System Programming Lab

1. Design, implement, test, debug and document programs in C++.
2. Develop programs to create symbol table for assembly and high level languageprogram.
3. Implement Single PassAssembler.
4. Explore features of debug command.
5. Use of LEX and YACC Tools

B.Tech-IT 5th Semester

Course Code: BTIT-501
Course Title: System Analysis & Design

1. Describe the concepts of systems analysis and information systemsdevelopment
2. Describe the project selection and managementtechniques
3. Develop and analyze the systems requirements documentation
4. Identify use case analysis elements andalternatives
5. Analyze systems process modeling
6. Describe process modelingtechniques
7. Describe data modelingtechniques
8. Analyze design alternatives
9. Describe systems architecturedesign
10. Describe user interfacedesign
11. Describe programdesign
12. Analyze data storagedesign
13. Analyze object orienteddesign
14. Identify system implementation & testingtechniques
15. Analyze techniques for transitioning to a new information system
16. Analyze system security &threats

Course Code: BTIT-503
Course Title: Database Management System Lab

1. Students will have adequate understanding of concepts of data base and data base management system with itsapplications.
2. Students will be able to conceptualize and design data bases using ER modeling for real world application.eg: Online Banking, Air Reservationetc.
3. Students will have sufficient knowledge of concepts related to data base to prepare for professional certification (OCP, OCA etc.) and professional exams (GATE).

Course Code: BTIT- 504
Course Title: Cyber Laws & IPR

1. Will be able to understand the basics of Internet, ISP, domain name and various Network Security techniques.
2. Will understand various IPR Regime in the Digital Society, Copyright and Patents, International Treaties and Conventions, Business Software Patents, Domain Name Disputes and Resolution.
3. Will know the Overview of the Act, Jurisdiction, Role of Certifying Authority, Regulators under IT Act, Cyber Crimes-Offences and Contraventions, Grey Areas of IT Act.

Course Code: BTCS-501
Course Title: Computer Networks

1. Explain the concepts of IPv6 and the need for implementing it.
2. Describe the evolution and History of Wireless Technology 3 Explain the function of Mobile station roaming number
3. Describe the basic operation of GSMGPRS
4. Differentiate between Wireless LAN and Wired LAN
5. Demonstrate use of various private and public key encryption techniques used in modern cryptosystems(IKE)
6. Understand the need, features and applications of Mobile Adhoc Networks.
7. Describe various Routing and MAC protocols used in Mobile Adhoc Networks.

Course Code: BTIT502
Course Title: Programming in Java

1. knowledge of the structure and model of the Java programming language
2. Use the Java programming language for various programming technologies
3. Develop software in the Java programming language.
4. Evaluate user requirements for software functionality required to decide whether the Java programming language can meet user requirements.
5. Propose the use of certain technologies by implementing them in the Java programming language to solve the given problem.

Course Code: BTIT-505
Course Title: Database Management System Lab

1. Students will be able to create, update and implement data base with the help of structured query language on platforms like ORACLE and MYSQL as individual or team.

Course Code: BTCS-507
Course Title: Computer Networks-II Lab

1. Students will be able to work on the packet capturing software like wiireshark.
2. Students will be able to install and design different network scenarios on network simulator CISCO Packet Tracer.

B.Tech-IT 6thSemeter
Course Code: BTIT-602
Course Title: Information Security and Risk Management

1. To select appropriate techniques to tackle and solve problems in the discipline of information securitymanagement
2. To understand why security and its management are important for any modern organization
3. Tounderstandhowaninformationsecuritymanagementsystem should be planned, documented, implemented andimprovedaccording to the information security management.
4. To understand the concept of risk, resolving risks in information technology.
5. To study and write various algorithms used for encryption and decryption incryptosystem.

Course Code: BTIT-603
Course Title: Web Technologies

1. Students will have clear understanding of hierarchy of objects in HTML andXML.
2. Students will be able to validate user input usingJavaScript.
3. Students will have sufficient knowledge of advantagesand applications of different types of CSS.
4. Students will have knowledge of basics of ASP, AJAX and various other aspects of webtechnologies

Course Code: BTCS603
Course Title: Software Engineering

1. Understand the complete Software life cycle models for development of various functionalSoftware's.
2. Know about the working of each phase for software development form feasibility study to final deployment of the software application.
3. Analyze the various software performances metric like effort of development and time for development of a software product which are very critical for softwaredelivery.
4. Focus on the fundamental steps on software development which include rigorous testing at various levels of the product before final installation.
5. Ensure to compile the final product with highest level of quality standards which include ISO, Six Sigma or CMM Levels for complete satisfaction of the client

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matching world Class standards in softwaredelivery.

Course Code: BTCS-912
Course Title: Cloud Computing

1. Understanding the key dimensions of the challenge of Cloud Computing
    1. Compare and Contrast different Cloud Deployment and Service models in order to be able to assess financial, and technological implications in selecting cloud model for ownorganization.
    2. Analyzing the different underlying technologies used in implementing aCloud.
    3. Write comprehensive case studies analyzing and contrasting different cloud computingsolutions.
    4. 5Assessing the need of Security in CloudComputing.

Course Code: BTIT601
Course Title: Network Programming

1. Implement various Inter Process Communication techniquesin Linux/Unixenvironment.
2. Explore various Network APIs available inLinux/Unix environment.
3. Comprehend and compare various communicationprotocols.
4. Understand socket options at differentlayers.

Course Code: BTCS-606
Course Title: Software Engineering Lab

The students can work as Software Engineers in the industry.

Course Code: BTIT-605
Course Title: Web Technologies Lab
Students will be able to make web pages using
    1. HTML and HTML
    2. JavaScript
    3. PHP
    4. AJAX
    5. JQUERY

B. Tech 7th Semester
Course Code: BTIT-701
Course Title: Building Enterprise Application

    1. Introduction to Enterprise & itsapplications
    2. Skills required to build an enterpriseapplication
    3. Inception of enterpriseapplications
    4. Use case modeling, prototyping Concept of Architecture
    6. Construction readiness of enterpriseapplications
    7. Types and methods of testing an enterpriseapplication

Course Code: BTIT-702
Course Title: Software Project Management

COURSE OUTCOMES

1. The student will be able to understand and practice the process of projectmanagement
2. The student will be able to develop the scope of work, provide accurate cost estimates and to plan the variousactivities
3. The student will be able to understand and use risk management analysis techniques that identify the factors that put a project at risk and to quantify the likely effect of risk on projecttimescales
4. The students will be able to identify the resources and people required for a project and to produce a work plan and resource schedule

Course Code: BTCS-905
Course Title: Software Testing and Quality Assurance

1. Analyze different approaches to software testing and quality assurance, and select optimal solutions for different situations andproject.
2. Create test strategies and plans, design test cases, prioritize and executethem
3. Manage incidents and risks within a project andgenerate a risk projection.
4. Contribute to efficient delivery of software solutions and implement improvements in the software development processes.
5. Compare and Contrast the various activities of Quality Assurance, Quality planning and QualityControl.

Course Code: BTIT906
Course Title: Advanced Java

1. Develop Swing-basedGUI
2. Develop client/server applications and TCP/IP socket programming
3. Update and retrieve the data from the databases usingSQL
4. Develop distributed applications using RMI.
5. Develop component-based Java software usingJavaBeans.

Course Code: BTIT-704
Course Title: Building Enterprise Applications Lab

1. Students will be able to generate various diagrams like Class Diagrams, Object Diagrams, Composite Structure Diagrams, Use Case Diagrams, Activity Diagrams, and Sequence Diagrams using softwaretools.
2. Students will be able to learn how to work in a team and work on liveprojects.
3. Students will be able to use various test cases for the given projects.
4. Students will have knowledge to define, formulate and analyze aproblem.
5. Students will have sufficient knowledge of tools to draw various networkingarchitectures.

Course Code: BTIT-703
Course Title: Major Project

1. Students should be able to design and construct a hardware and software system, component, or process to meet desiredneeds.
2. Students are provided to work on multidisciplinaryProblems.
3. Students should be able to work as professionals, with portfolio ranging from data management, network configuration, designing hardware, database and software design to management and administration of entiresystems.

Electrical Engineering

Program Outcomes:

After the successful completion of undergraduate course, Electrical Engineering, Graduates will be able to:

PO1. Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization for the solution of complex engineering problems.

PO2. Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for public health and safety, and cultural, societal, and environmental considerations.

PO4. 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.

PO5. Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modeling to complex engineering activities, with an understanding of the limitations.

PO6. 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.

PO7. Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communicate effectively on complex engineering activities with the engineering community and with the 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.

PO11. 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.

PO12. Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

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Program-Specific Outcomes:

PSO1. Graduates will have knowledge of principles, design and performance & testing of static & dynamic electrical machines.

PSO2. Graduates will gain knowledge and acquire skills for analysis, operation, control and protection of electrical power system for generation, transmission, distribution & utilisation.

PSO3. Graduates will gain knowledge of instrumentation, control & automation and powertronics applicable in core and related fields.

Course Outcomes:

Course code: BTEE-101-18
Course Title: Basic Electrical Engineering

1). Have the knowledge of DC circuits, AC Circuits, basic magnetic circuits, working principles of electrical machines, and components of low voltage electrical installations
2). Be able to analyze of DC circuits, AC Circuits
3). Understand the basic magnetic circuits and apply it to the working of electrical machines
4). Be introduced to types of wiring, batteries, and LT switchgear

Course code: BTEE-101-18
Course Title: Electrical Circuit Analysis

1). Apply network theorems for the analysis of electrical circuits
2). Obtain the transient and steady-state response of electrical circuits
3) Analyze circuits in the sinusoidal steady-state (single-phase and three-phase). Analyze two port circuit behaviors.
4) Synthesize networks and filters. Course code: BTEE-302-18

Course code: BTEE-302-18
Course Title: Analog Electronics

1). Understand the characteristics of transistors.
2). Design and analysis various rectifier and amplifier circuits.
3). Design sinusoidal and non-sinusoidal oscillators.
4). Understand the functioning of OP-AMP and design OP-AMP based circuits.

Course code: BTEE-303-18
Course Title: Electrical Machines-I

1). Understand the concepts of magnetic circuits
2). Understand the operation of DC machines.
3). Analyses the differences in operation of different DC machine configurations.
4). analyses single phase and three phase transformers circuits.

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Course code: BTEE-304-18
Course Title: Electromagnetic Fields

1). To understand the basic laws of electromagnetism.
2). To obtain the electric and magnetic fields for simple configurations under static conditions.
3). To analysis time varying electric and magnetic fields
4). To understand Maxwell's equation in different forms and different media
5. To understand the propagation of EM waves.

Course code: BTEE-305-18
Course Title: Engineering Mechanics

1). Understand the concepts of co-ordinate systems.
2). analyses the three-dimensional motion.
3) Understand the concepts of rigid bodies
4). analyses the free-body diagrams of different arrangements.
5). analyses the free-body diagrams of different arrangements.

Course code: BTEE-401-18
Course Title: Digital Electronics

1). Understand working of logic families and logic gates.
2). Design and implement Combinational and Sequential logic circuits.
3). Understand the process of Analog to Digital conversion and Digital to Analog conversion.
4). Be able to understand memories.

Course code: BTEE-402-18
Course Title: Electrical Machines – II

1). Understand the concepts of rotating magnetic fields.
2). Understand the operation of AC machines.
3). analyses performance characteristics of AC machines.
4). To understand the difference between the synchronous machines and asynchronous machines.

Course code: BTEE-403-18
Course Title: Power Electronics

1). Understand the differences between signal level and power level devices.
2). analyses controlled rectifier circuits.
3). analyses the operation of DC-DC choppers
4). analyses the operation of voltage source inverters

Course code: BTEE-404-18
Course Title: Signals and Systems
1). Understand the concepts of continuous time and discrete time systems.
2). analyses systems in complex frequency domain.
3). Understand sampling theorem and its implications.
4). Understand mathematical tools to be able to apply in state variable modelling

Course code: BTAM-302-18
Course Title: Mathematics-III (Probability and Statistics)

1. Have basics knowledge about measure of central tendency, skewers, kurtosis and moments and their applications in engineering fields.
2). Familiarize the student with expectations of discrete and continuous random variable.
3). Familiarize probability techniques and random variables and detailed knowledge of probability dilution with so as to use it with any date of engineering problem formulation.
4). Have basic idea about statistics including correlation, regression and then up to advanced level with testing of large samples that is important in solving problems related to engineering.
5). To fit the given data into curves by various methods which forms an important application in engineering.

Course code: BTEE-501-18
Course Title: Power Systems-I (Apparatus and Modeling)

1). Understand the concepts of power systems.
2). Understand the various power system components.
3). Evaluate fault currents for different types of faults.
4). Understand the generation of over-voltages and insulation coordination.
5). Understand basic protection schemes.
CO6. Understand concepts of HVDC power transmission and renewable energy generation.

Course code: BTEE-502-18
Course Title: Control Systems
1). Understand the modelling of linear-time-invariant systems using transfer function and state-space representations.
2). Understand the concept of stability and its assessment for linear-time invariant systems. Design simple feedback controllers.

Course code: BTEE-503-18
Course Title: Microprocessors

Course Outcomes:
1). Study of 8085 and 8086 Microprocessors
2). Do assembly language programming.
3). Do interfacing design of peripherals like 8255, 8253, 8279,8251 etc.
4). Develop systems using different microprocessors.

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Course code: BTEE-504A-18
Course Title: Electrical Engineering Materials – PE-1

1). To Understand the basic concepts of materials.
2). To use simplified materials selection concepts for design purposes
3). To Understand the properties of Materials.

Course code: BTEE-504B-18
Course Title: Switchgear and Protection – PE-1

1). Understand power system protection.
2). Understand the main components used in power system protection for electric machines, transformers.
3). Understand the bus bars, overhead and underground feeders.
4). Understand the earthling protection.

Course code: BTEE-504C-18
Course Title: Electrical Machine Design – PE-1

1). Understand the construction and performance characteristics of electrical machines.
2).Understand the various factors which influence the design: electrical, magnetic and thermal loading of electrical machines
3). Understand the principles of electrical machine design and carry out a basic design of an ac machine.
4). Use software tools to do design calculations.

Course code: BTEE-404-18
Course Title: Renewable Energy Sources – PE-1
1) To Understand the Need, importance and scope of non-conventional and alternate energy resources.
2). To understand role significance of solar energy and wind energy
3). To understand the role of ocean energy in the Energy Generation.
4). To get the utilization of Biogas plants and geothermal energy
5). To understand the concept of energy Conservation

Course code: BTEE-601-18
Course Title: Power Systems – II (Operation & Control)

1). Use numerical methods to analyze a power system in steady state.
2). Understand stability constraints in a synchronous grid.
3). Understand methods to control the voltage, frequency and power flow.
4). Understand the monitoring and control of a power system.
5). Understand the basics of power system economics.

Course code: BTEE-602-18
Course Title: Power Generation and Economics

1). Understand the load curves, load-duration Curve.
2). Understand the power plant economics and tariff
3). Explore the significance of economic operation of steam plants

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4). Understand the hydro-thermal coordination.

Course code: BTEE-603A-18
Course Title: Electromagnetic Waves – PE-2

1). Analyses transmission lines and estimate voltage and current at any point on transmission line for different load conditions.
2). Provide solution to real life plane wave problems for various boundary conditions.
3). analyses the field equations for wave propagation in special cases such as loss and low loss dielectric media.
4). Visualize TE and TM mode patterns of field distributions in a rectangular wave-guide.
5). Understand and analysis radiation by antennas.

Course code: BTEE-603B-18
Course Title: Power System Dynamics and Control – PE-2

1). Understand the problem of power system stability and its impact on the system.
2). analyses linear dynamical systems and use of numerical integration methods
3). Model different power system components for the study of stability.
4). Understand the need and plan the methods to improve stability.

Course code: BTEE-603C-18
Course Title: Electrical Drives – PE-2

1). Understand the characteristics of dc motors and induction motors.
2). Understand the principles of speed-control of dc motors and induction motors.
3. Apply the knowledge of power electronics to understand the working of dc-dc converters.
4). Apply the knowledge of control system for the speed control of electrical machines.
5). Understand the working of AC and DC drives

Course code: BTEE-603D-18
Course Title: Wind and Solar Energy Systems – PE-2

1). Understand the global energy scenario and the consequent growth of the power generation from renewable energy sources.
2). Understand the basic physics of wind and solar power generation
3). Apply the knowledge of electrical machines to generate electrical power from wind
4). Understand the power electronic interfaces for wind and solar generation.
5). Understand the issues related to the grid-integration of solar and wind energy systems.

Course code: BTEE-604A-18
Course Title:High Voltage Engineering – PE-3

1). Understand the basic physics related to various breakdown processes in solid, liquid, and gaseous insulating materials.
2). Knowledge of generation and measurement of D.C., A.C., & Impulse voltages.
3). Knowledge of tests on H. V. equipment and on insulating materials, as per the standards.

4). Knowledge of how over-voltages arise in a power system, and protection against these over-voltages.

Course code: BTEE-604B-18
Course Title: Power System Reliability – PE-3

1). Understand the basic quantitative reliability analysis
2). Understand the reliability modeling and analysis of electric power systems.
3). Knowledge of reliability assessment for elements of transmission system.
4). Understand the risk analysis in power system planning.

Course code: BTEE-102-18
Course Title: Basic Electrical Engineering Laboratory

1). the ability to use common electrical measuring instruments and understand the fundamentals of electrical engineering.
2). the ability to make electrical connections, and measure power, power factor using appropriate equipment's.
3). Have the knowledge of electrical machines, components and their ratings.
4). Understand the operation of transformers and electrical machines.

Course code: BTEE-311-18
Course Title: Analog Electronics Laboratory

1). Understand the use and importance of various types of equipment's used in the laboratory.
2. Ability to make circuits on bread-board.
3). Analyze, take measurements to understand circuit behavior and performance under different conditions.
4). Troubleshoot, design and create electronic circuits meant for different applications
5). Evaluate the performance electronic circuits and working small projects employing semiconductor devices.

Course code: BTEE-312-18
Course Title: Electrical Machines – I Laboratory

1). Analyze three-phase transformer/system connections.
2). Evaluation of equivalent circuit parameters, efficiency and voltage regulation by performing various tests on transformer.
3). Analyze parallel operation of transformers.
4). Analyze performance characteristics of DC generator

Course code: BTEE-411-18
Course Title: Measurements and Instrumentation Laboratory

1). Design and validate DC and AC bridges.
2). Analyze the dynamic response and the calibration of few instruments.
3). Learn about various measurement devices, their characteristics, their operation and their limitations.

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4). Understand statistical data analysis.

5). Understand computerized data acquisition.

Course code: BTEE-401-18
Course Title: Digital Electronics Laboratory

1). To understand of basic electronic components and circuits

2). Understanding verify truth tables of TTL gates

3). Design and fabrication and realization of all gates and basic circuits

4). Design the truth tables and basic circuits

5). Testing of basic electronics circuits Course code: BTEE-413-18

Course code: BTEE-402-18
Course Title: Electrical Machines-II Laboratory

1). Construct equivalent circuits induction motors by routine tests.

2). Comprehend the requirement of starting and speed control methods of induction motors in the various applications of industry.

3). Construct equivalent circuits of synchronous generator and motor.

4). Apply knowledge to show utility of alternator, synchronous motors and synchronous condenser for various applications in power system.

5). Construct characteristic curves for induction and synchronous machines

6). Understand the concept of parallel operation of three phase alternators.

Course code: BTEE-414-18
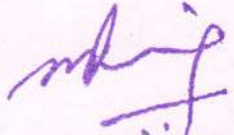### Course Title: Power Electronics Laboratory

1). Understand the properties and characteristics of thrusters

2). Understand the different types of waveforms of inverter and chopper circuits.

3). Analyze speed and direction control of single phase and three phase electric motors using ac and dc drive.

4). Understand the effect of free-wheeling diode on pf with RL load.

5). Check the performance of a choppers, and inverter

Course code BTEE-511-18
Course Title: Power Systems – I Laboratory

Hands-on experiments related to the course contents of BTEE501-18.

1). Understand the concepts of power systems.

2). Understand the various power system components.

3). Evaluate fault currents for different types of faults.

4). Understand the generation of over-voltages and insulation coordination.

5). Understand basic protection schemes.

6). Understand concepts of HVDC power transmission and renewable energy generation.

Visits to power system installations (generation stations, EHV substations etc.) are Exposure to fault analysis and Electro-magnetic transient program (EMTP) and Numerical Relays are suggested.

Course code BTEE-512-18
Course Title: Control Systems Laboratory

1)Hands-on experiments related to the course contents of BTEE502-18 CO1. Understand the modelling of linear-time-invariant systems using transfer function and state-space representations.

2). Understand the concept of stability and its assessment for linear-time invariant systems. Design simple feedback controllers.

Course code: BTEE-513-18
Course Title: Microprocessors Laboratory

Hands-on experiments related to the course contents of BTEE503-18
1). Study of 8085 and 8086 Microprocessors
2). Do assembly language programming.
3). Do interfacing design of peripherals like 8255, 8253,8279,8251 etc.
4) Develop systems using different microprocessors.

Course code: BTEE-611-18
Course Title: Electronics Design Laboratory

1). Understand the practical issues related to practical implementation of applications using electronic circuits.
2). Choose appropriate components, software and hardware platforms.
3). Design a Printed Circuit Board, get it made and populate/solder it with components.
4). Work as a team with other students to implement an application

Course code: BTEE-612-18
Course Title: Power Systems-II Laboratory

Hands-on and computational experiments related to the course contents of BTEE-601-18. This should include programming of numerical methods for solution of the power flow problem and stability analysis
1). Use numerical methods to analyze a power system in steady state.
2). Understand stability constraints in a synchronous grid
3). Understand methods to control the voltage, frequency and power flow.
4). Understand the monitoring and control of a power system.
5). Understand the basics of power system economics. Visit to load dispatch center is suggested.

Course code: BTEE-513-18
Course Title: Project -1

1). Apply and verify basic scientific principals and technologies.
2). Identify the scope of interdisciplinary knowledge CO3. Make and design a prototype which is preferably a working model

Mechanical Engineering

Program Outcomes:

PO1. Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization for the solution of complex engineering problems.

PO2. Identify, formulate, research literature, and analysis complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for public health and safety, and cultural, societal, and environmental considerations.

PO4. 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.

PO5. 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.

PO6. 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.

PO7. Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communicate effectively on complex engineering activities with the engineering community and with the 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.

PO11. 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.

PO12. Recognise the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program-Specific Outcomes:

PSO 1: Able to apply learned principles in the various domains of manufacturing, design, thermal and fluid sciences to solve engineering problems utilizing conventional and modern technology.

PSO 2: Able to conceive and develop new ideas on product design and development with the help of modern tools.

PSO 3: Equipped with requisite managerial and technical skills for accomplishing efficient and safe industrial practices.

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Course Outcomes:

Course code: BTME613-18
Course Title: COMPUTER AIDED DESIGN

1. Create the different wireframe primitives using parametric representations.
2. Create surface primitives using parametric modeling.
3. Create the different solid primitives using the different representation schemes.
4. Apply geometric transformations on the created wireframe, surface and solid models.

Course Code: BTME 603-18
Course Title: Automobile Engineering

1. Identify the different parts of the automobile.
2. Explain the working of various parts like engine, transmission, clutch, brakes, steering and the suspension systems.
3. Develop a strong base for understanding vehicle safety systems and future developments in the automobile industry.

Course code: BTME504-18
Course Title: Management and Engineering Economics

1. Explain the development of management and the role it plays at different levels in an organization.
2. Comprehend the process and role of effective planning, organizing and staffing for the development of an organization.
3. Understand the necessity of good leadership, communication and coordination for establishing effective control in an organization.
4. Understand engineering economics demand supply and its importance in economics decision making and problem solving.
5. Calculate present worth, annual worth and IRR for different alternatives in economic decision making.
6. Understand the procedure involved in estimation of cost for a simple component, product costing and depreciation, its methods

Course code: BTME404-18
Course Title: Materials Engineering

CO1. Understand the significance of structure-property-correlation for engineering materials including ferrous and nonferrous.
CO2. Explain the use and importance of various heat treatment processes used for engineering materials and their practical applications.
CO3. Understand the various structural changes occurred in metals with respect to time temperature transformations.
CO4. Understand the significance of Fe-C and TTT diagram for controlling the desired structure and properties of the materials.

Course code: BTME405-18
Course Title: Theoryof Machines-II

1. Understand the basic concepts of inertia forces & couples applied to reciprocating parts of a machine.
2. Understand balancing of rotating and reciprocating parts of machines.
3. Select suitable type of gears for different application and analyze the motion of different elements of gear trains.
4. Understand the concept and application of gyroscopic effect.
5. Gain knowledge of kinematic synthesis.

Course code: BTME401- 18
Course Title: Applied Thermodynamics

1- Learn the functioning and performance evaluation of reciprocating air compressors.
2 Analyse the combustion phenomenon in boilers and I.C. engines.
3 Use of Steam Tables and Mollier Chart to solve vapour power cycle problems.
4Recognize the constructional features and working of major components of steam power plant
5 Analyse the performance of various components of steam power plant using Property tables and velocity triangle diagrams.

Course code: BTME602-18
Course Title: Mechanical Measurement and Metrology

1. Interpret characteristics of measuring instruments.
2. Describe various industrial metrological instruments for measuring linear, angular, screw thread and gear profiles.
3. Apply the fundamental principles for measurement of various mechanical quantities like Force/torque etc.
4. Develop an ability of problem solving and decision making by identifying and analyzing the cause for variation and recommend suitable corrective actions for quality measurements.

Course code: BTME 403-18
Course Title: Strength of Materials II

1. Apply the basics to find stresses in various applications (shells, curved beams and rotating discs).
2. Analyze the change in dimensions of shells, curved beams and rotating discs under operation.
3. Determine stresses, deflection and energy stored in various kinds of springs subjected to load and twist.
4. Understand the concept of failure theories and strain energy.
5. Evaluate shearing stress variation in beams of different cross-section and materials.

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Course code: BTME302-18
Course Title: Theory of Machines -I

1. Understand constructional and working features of important machine elements.
2. Design belt, rope and chain drives for transmission of motion from one shaft to another.
3. Identify different Cam and follower pairs for different applications and construct cam profile for required follower motion.
4. Understand the function of brakes, dynamometers, flywheel and governors.

Course code: BTME-803
Course Title: Mechanical Vibrations

1. Students will be able to construct the equations of motion for free-body diagrams and solve for natural frequency of free vibration of a single degree of freedom damped or undamped system.
2. Students will be able to analyze and solve problems of vibration regarding motion and natural frequency for forced vibration of a single degree of freedom damped or undamped system.
3. Students will be able to solve vibration problems that contain two and multi degrees of freedom.
4. Students will be able to obtain design parameters and indicate methods of solution for a complicated vibratory problem.

Course code: BTME501-18
Course Title: Heat Transfer

1. Understand the basic laws of heat transfer.
2. Analyze and develop solutions for problems involving steady / transient state heat conduction in simple geometries.
3. Understand the fundamentals of convective heat transfer process and evaluate heat transfer coefficients for natural, forced convection.
4. Analyze heat exchanger performance by using log mean temperature difference and heat exchanger effectiveness.
5. Calculate radiation heat transfer between black body, gray body surfaces.

Course code: BTME502-18
Course Title: Design of Machine Elements

1. Demonstrate recalling and applying knowledge of Basic Sciences, Graphics & Drawing, Basic Manufacturing Processes and Material Science, for design procedures of various Mechanical components.
2. Comprehend the effect of different stresses and strains under various loading conditions on the mechanical components and identify the mechanism/mode of failure.
3. Examine and solve design problems involving machine elements on the basis of various theories of failure.

4. Synergize forces, moments and strength information to develop ability to analyze, design and/or select machine elements aiming for safety, reliability, and sustainability.

Course code: BTME304-18
Course Title: Strength of Materials-I

1. Understand the concepts of stress and strain at a point, in the members subjected to axial, bending, torsional loads and temperature changes.
2. Determine principal stresses, maximum shearing stress and their angles, and the stresses acting on any arbitrary plane within a structural element.
3. Find bending moment and shear force over the span of various beams subjected to different kinds of loads.
4. Calculate load carrying capacity of columns and struts and their buckling strength.
5. Evaluate the slope and deflection of beams subjected to loads.

Course code: DE/ME3.6
Course Title: Industrial Tribology

1- Understand the fundamentals of tribology and associated parameters.
2- Apply concepts of wear mechanism for the performance analysis and design of components experiencing relative motion.
3- Select proper bearing materials and lubricants for a given tribological application.
4- Analyze the requirements and design of bearings for a given application.
5- Apply the principles of surface engineering for different applications of tribology.

Course code: BTME305-18
Course Title: Basic Thermodynamics

1. 1Apply energy balance to Systems and Control Volumes in situations involving heat and work interactions.
2. Evaluate changes in thermodynamic properties of substances.
3. Evaluate performance of energy conversion devices.
4. Explain and apply various gas power and vapor power cycles.

Course code: BTME 801
Course Title: Industrial Engineering & Management

1. .Understand the role of industrial engineering department in an organization
2. .Understand the concepts of management and organizational structure
3. Understand and develop plant layout
4. Perform time study and method study for work analysis
5. Understand the concept of value engineering

Civil Engineering

Program Outcomes:

PO1. Apply the knowledge of mathematics, science, and engineering fundamentals to provide the solution to the civil Engg. problems.

PO2. Analyze and interpret data to identify / formulate problems through critical thinking and familiarity with the computational procedure essential to the field.

PO3. Design a system, component, or process to meet desired needs within realistic constraints such as economic, social, ethical, health and safety.

PO4. Function effectively as an individual and as a member or leader in multi disciplinary team.

PO5. Understand the impact of engineering solutions in societal and environmental context and apply the knowledge for sustainable development.

PO6. Apply ethical principles and commit to professional ethics and responsibilities during Engineering practice.

PO7. Communicate effectively with the Engineering community and society at large.

PO8. Demonstrate knowledge and understanding of engineering and management principles and apply these to one's own work, as a member and leader in a team.

PO9. Recognize the need for, and the ability to engage in life-long learning in the context of technological change.

PO10. Use the appropriate techniques, resources, and tools for modern engineering practice.

PO11. Use research based knowledge and methods to provide valid conclusions and sustainable solutions to complex problems.

PO12. Apply reasoning through contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

Program-Specific Outcomes:

PSO1. The programme graduates will apply knowledge of mathematics and physical sciences to analyse and solve the problems in core areas of civil engineering such as structural engineering, geotechnical engineering, environmental engineering and surveying.

PSO2. The programme graduates will design a system, component or process in structural, geotechnical and environmental engineering to meet desired needs within realistic constraints such as, economic, environmental, social, health and safety, and sustainability.

PSO3. The programme graduates will function and communicate effectively in multi-disciplinary team environment, and implement principles of project management with an understanding of professional and ethical responsibility.

Course Outcomes:

Course Code: BTCE – 301
Course Code: Fluid Mechanics-I

1. To apply the knowledge of the basic principles of fluid mechanics for analysis and design of type of flow regime in a given engineering system, to construct an appropriate (fixed, deforming, or moving) control volume for a given engineering system and apply the principles of conservation of mass, momentum, and energy to the control volume.

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2. Ability to calculate the hydrostatic forces and moments on planar and curved submerged and floating surfaces to analyze fluid flow problems with the application of the momentum and energy equations.
3. Ability to present data or governing equations in non-dimensional form, design experiments, and perform model studies and to decide when appropriate to use ideal flow concepts and the Bernoulli equation.
4. Ability to solve for internal flow in pipes and channels through simple solutions of the Navier-Stokes equations, Moody chart and head-loss equations.
5. Ability to solve for external flow, evaluate lift and drag, know when there is possibility of flow separation, apply streamlining concepts for drag reduction by using experimental correlations.
6. An understanding of how fluid mechanics applies to mechanical, biological and environmental systems.

Course Code: BTCE-302
Course Code: Rock Mechanics & Engineering Geology

1. Students will be able to critically review the importance of Engg. Geology and their applications to Civil Engineering practices.
2. Students will be able to identify and classify common minerals and rocks using basic geological classification system.
3. Students will be able to know about Geological structures (Joint, veins, crack, faults, and fold), reasons of formation for each type and their side effects on the engineering projects.
4. Students will be able to know the characteristics of earthquake and measures taken to construct structures like tunnels, highways, dams etc. in rocks.
5. Students will be able to determine physical and mechanical properties of rock in term of density, porosity, permeability, and hardness.
6. Students will have knowledge of Field and laboratory test procedures and be able to interpret test results needed to estimate intact and rock mass properties.
7. Students will be to identify problems in rock mass and able to provide improvement in the properties of rock mass.
8. Students will be able to understand the role of Geology in the design and construction process of underground opening in Rock.
9. Students will be able to apply geological concepts and approaches on rock engineering projects.

Course Code: BTCE-303
Course Title: Strength of Materials

1. Concepts of free body diagrams of structures and to check stability (Beams and frames)
2. Concepts of stress and strain of axially loaded members, mechanical and thermal properties.
3. Concepts of shear force and bending moment diagrams of different beams with different loading conditions and relation between loads, shear force and bending moment.

4. Concepts of straight beams, bending stress of beams, flitched beams, shear stress formula for beams and shear stress distribution in beams.
5. Concepts of crippling load of an axially loaded column under different end conditions.
6. Concepts of torsion and failure theories.

Course Code: BTCE-304
Course Title: Surveying

1. Understand the principles and objective of surveying.
2. Calculate the horizontal distance on plane and sloping surface.
3. Do angular and elevation measurements with different types of equipments.
4. Analyze the closed traverse and will be able to balance it.
5. Design simple circular curves for horizontal and vertical alignments.
6. Plot the topographical map of an area.

Course Code: BTCE-305
Course Title: Building Materials and Construction

1. Students will have sufficient knowledge of materials in construction
2. Students will be able to design the concrete mixes according to the situations
3. Students will have sufficient knowledge to think critically in terms of achieving the goals of "Shelter for all".
4. Students will have knowledge of the revolutionary materials in constructions

Course Code: BTCE-401
Course Title: Geometrics Engineering
1. Get a brief idea about history of Photogrammetry and its advancement in the field of surveying
2. To aware students the different methods of survey measurements using EDM
3. To aware students to different types of Total station and make them able to use it in field.
4. To aware students the different components, uses, and operations involved in Remote Sensing
5. To introduce the concept of GIS, Its different Components and application in the field of Civil Engineering field.
6. To aware students to different types of GPS Receivers.

Course Code: BTCE 402
Course Title: Construction Machinery and Works Management

1. Design the bar charts and milestone charts for residential construction buildings.
2. Apply the PERT and CPM techniques to the various complex civil engineering projects
3. Solve the optimistic time and minimum cost for the various projects by applying various methods.
4. Design and use the different construction machinery in order to get the maximum output.
5. Understand the operations of concrete batching and bitumen plants.

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Course Code: BTCE-403
Course Title: DESIGN OF CONCRETE STRUCTURES -1

1. Identify and utilize the cement, steel, aggregates and admixtures to obtain the desired reinforced cement concrete.
2. Prepare concrete mixture having desired properties and assess its quality in fresh and hardened state using Indian standard methods.
3. Analyze a reinforced concrete member under flexure, shear and torsion using limit state design philosophy.
4. Design the reinforced concrete beams and slabs using limit state design guidelines of Indian standards.
5. Access the structural safety and serviceability of reinforced concrete beams and slabs as per Indian standards for Limit state design.

Course Code: BTCE- 406
Course Title: Structural Analysis-I

1. Differentiate between determinate and indeterminate structures
2. Evaluate deflections in structures using various methods. (Beams, frames and trusses)
3. Examine the causes for additional stresses in arches, trusses and cables.
4. Draw ILD for various forces in determinate structural systems

Course Code: BTCE-501
Course Title: DESIGN OF STEEL STRUCTURES -1

1. Recognize the properties of structural steel and permissible stresses under different types of loading conditions as per Indian standards for limit state design.
2. Estimate safe load carrying capacity and efficiency of different steel fasteners like rivets, bolts & welds.
3. Select safe and economical steel sections for different structural members under various loading/stress conditions
4. Analyze forces and stresses in tension, compression, flexural members and roof truss members of structural steel.
5. Design steel structural members i.e. ties, struts, beams, columns, bases, roof trusses, other associated components and connections under different conditions of limit states.
6. Evaluate structural safety, stability and economy of various steel structural members to achieve sustainability

Course Code: BTCE - 502
Course Title: Geotechnical Engineering

1. Comprehend the various geotechnical field challenges and understand their fundamental properties and then use (apply) the soil as an engineering material.
2. Apply the various specifications of compaction of soils in the construction of highways and earthen dams.
3. Able to apply the knowledge of consolidation, soil deformation parameters, and calculate settlement magnitude and rate of settlement.

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4. Investigate and write the laboratory reports for soil design properties and parameters by apply the concept of total and effective stress approaches in soil strength determination
5. Design the embankment slopes and check the stability of finite slopes.

Course Code: BTCE-503
Course Title: Structural Analysis-Ii

1. Identify determinate and indeterminate structures and compute the indeterminacies of those structures.
2. Predict the response of structures ((Beams, frames and trusses) in terms of bending moments, shear forces and displacements using classical methods.
3. Apply methods for analysis to indeterminate structures i.e. conventional methods and approximate methods to various structures.
4. Understand the causes of additional stresses in beams, arches, trusses & frames and draw the ILD of various force quantities.
5. Suggest suitable method for analysis of different types of multi-storied frames.

Course Code: BTCE-505
Course Title: Environment Engineering-I

1. Understand the different water demands their estimation and forecasting.
2. Understand sources of water and their development. 3. Analyze water quality parameters.
3. Understand and design water treatment processes.
4. Design Water conveyance systems.
5. Develop and design drinking water system for rural areas

Course Code: BTCE 601
Course Title: Design of Concrete Structures-2

1. Analyze and Design different types of R.C.C Stair Case.
2. Analyze and Design different types of R.C.C Foundation Systems.
3. Analyze and Design different types of R.C.C Compression Members.
4. Analyze and Design different types of R.C.C Continuous and Curved Beams.
5. Analyze and Design different types of R.C.C Domes
6. Analyze and Design different types of Water Tanks.

Course Code: BTCE 602
Course Title: Elements of Earthquake Engineering

1. Understand the phenomenon of occurrence and history of earthquakes and classify their kinds and effects.
2. Recognize source and types of structural vibrations.
3. Evaluate and analyze Degree of Freedom, Spring action, Damping, Equations of motions, Lateral Force analysis, Floor Diaphragm action, Moment resisting frames and Shear walls.
4. Design structure for seismic forces having adequate Lateral Strength, Stiffness, ductility.

5. Appraise and implement provisions of IS 13920 and IS 4326.

Course Code: BTCE-603
Course Title: Foundation Engineering

1. Apply fundamental concept of mathematics, statics and mechanics to understand the essentials of the methods of soil exploration stability analysis
2. Analyse and design a variety of geotechnical engineering structures including foundations, piles, retaining walls, slopes and interpret data.
3. Recognize behavior of soils in slopes, behind retaining structures and phenomena affecting foundation capacity and settlement.
4. Determine allowable bearing pressures and load carrying capabilities of different foundation systems.
5. Evaluate appropriate bearing capacity correction factors and apply related equations in design. Evaluate effects of water and layered soil systems on foundation performance.
6. Identify the appropriate deep foundation type for different soil profiles.
7. Specify pile material types for various applications and calculate side/tip capacity of driven piles in clay.

Course Code: BTCE 605
Course Title: Professional Practice

1. Apply different types of estimates in order to estimate any type of structure
2. Calculate unit cost per cubic meter of a reinforced concrete structure, earthen embankment and unit cost per square meter for a given highway project.
3. Carry out the analysis of rates and bill preparation for different materials and components of the project.
4. Develop a detailed quantity survey reports and abstract summary of the project. Prepare a bid analysis and inv

Business Administration

Program Outcomes:

PO1. Management knowledge: Apply the knowledge of management and communication skills.

PO2. Problem analysis: Identify and formulate research problems and analyze complex managerial issues.

PO3. Design/development of solutions: Design solutions for complex managerial problems keeping in mind cultural, societal and environmental considerations.

PO4. Conduct investigations of complex problems: Conduct research-based knowledge and research methods (market survey) for analysis and interpretation of data and provide valid conclusions.

PO5. Application of modern tools: Apply appropriate techniques, resources and IT tools for solving business problems.

PO6. The manager and society: Give due consideration to social-cultural, ethical and legal issues.

PO7. Environment and sustainability: Understand the impact of the professional managerial solutions on society and environment.

PO8. Ethics: To adopt and commit to professional ethics and responsibilities.

PO9. Individual and team work: Function effectively as an individual and as a member/leader of a group.

PO10. Communication: Communicate effectively with fellow members and with the society at large so as to prepare an effective report and presentation.

PO11. Project management and finance: Demonstrate knowledge and understanding of management principles and apply these to one's own work.

PO12. Life-long learning: Recognize the need for and have the preparation and ability to engage in independent and life-long learning.

Program-Specific Outcomes:

PSO1. To provide knowledge in the areas of marketing, finance, human resource, economics and business laws.

PSO2. Assimilation of business knowledge and management techniques in solving the business problems.

Course Outcomes:

MBA 1st Semester
Course Code: MBA 101-18
Course Title: Foundations of Management

1. Understand the key management concepts, principles and contribution by different Management thinkers
2. Plan, forecast and make rational decisions
3. Analyze and design organization for effective management
4. Apply controlling and modern management techniques.

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Course Code: MBA 102-18
Course Title: Managerial Economics
1. Understand the roles of managers in firms.
2. Analyze the demand and supply conditions and assess the position of a company.
3. Design competition strategies, including costing, pricing, product differentiation, and market environment according to the natures of products and the structures of the markets.
4. Analyze real-world business problems with a systematic theoretical framework.
5. Make optimal business decisions by integrating the concepts of economics, mathematics and statistics.

Course Code: MBA 103-18

Course Title: Quantitative Techniques

1. Demonstrate their understanding of the various measures of central tendency
2 Demonstrate their understanding of the symmetry of the various frequency distributions and the concept of moments and their relation with frequency distribution.
3 Classification of Correlation and regression of variables and relation of its Coefficients
4 Generate various coefficients of correlation and regression lines from the data.
5 Compile Probability distributions from the frequency distributions.
6. Illustrate various examples from daily life related to transportation, game theory and PERT/CPM.
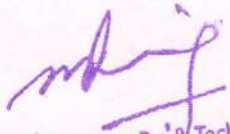
Course Code: MBA 104-18
Course Title: Accounting for Management and Reporting

1   Understand the role of different branches of accounting i.e. Cost, Management and Financial Accounting. The importance of accounting standards and the balance sheets of Public Limited, Banking and Insurance companies.
2   Analyze the financial statements using various tools such as common size statement, comparative statements, ratio analysis, fund flow and cash flow statements.
3   Understand various types of costs, break even analysis, Variance analysis and budgeting techniques.
4   Illustrate latest developments in accounting such as HRA, ABC, Life Cycle Costing, Target Costing, Inflation Accounting and Financial Reporting.

Course Code: MBA 105-18
Course Title: Business Environment and Indian Economy

1. Understand the business environment and its impact on business.
2. Analyze the constituents of micro and macro environment.
3. Illustrate the knowledge of public sector and consumerism in India.
4. Understand the Indian economy and development strategies

MBA 3rdSemester
Course Code: MBA -301
Course Title: Applied Operation Research

1 To have the knowledge of role of O.R. in solving industrial problems.

2 To introduce the important ideas in operations research which are both fundamental and long lasting

3 To provide those students not going beyond a single introductory course with enough understanding and confidence to appreciate the strengths and inherent limitations of the operations research approach.

4 To prepare and motivate future specialists to continue in their study by having an insightful overview of operations research.

5 To demonstrate the cohesiveness of operations research methodology.

Course Code: MBA-302
Course Title: Corporate Legal Environment (Cle)

1   Acquire a sound understanding of the legal aspects of various laws affecting businesses and apply basic principles of law to various problems which business faces.

2   Develop an understanding of Sale of Goods Act, various negotiable instruments, Insurance Laws and Law relating to Carriers.

3   Explain and apply the fundamental Principles of Company Law.

4   Develop basic understanding of Direct tax and Indirect Tax Laws i.e.GST

Course Code: MBA -922
Course Title: Management of Financial Services (MFS)

1   To make student understand the role, scope and growing contribution of financial services in the service sector of the economy.

2   Student will be able to comprehend the role of online depository system, dematerialization and re-materialization of the securities.

3   Student will define the role, types of mutual funds and comutaption of NAV

4   Student will know the impact and role of Credit rating in the corporate world language.

5   Student will analyze the contribution of leasing, merchant banks and venture capital in the promotion of the business.

6   Student will understand the benefits of Plastic Money, Factoring and forfeiting and debt securitization.

Course Code: MBA-921
Course Title: Security Analysis and Portfolio Management (SAPM)

1: Understand the basic structure and working of primary and secondary financial markets in India and conversant with computation of risk and return measures for financial instruments.

2: Understand secondary market trading

3: Understand and appreciate the Fundamental and Technical analysis tools for analyzing financial securities.

4: Well versed with the concept of a Portfolio and understand the principle portfolio theories.

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5: Acquaint and understand portfolio analysis, portfolio evaluation and portfolio revision techniques.

6: Understand the basic concept of Derivates.

Course Code: MBA 961

Course Title: Social Security & Labour Welfare

1 Students will have sufficient knowledge of basic Acts pertaining to labour welfare as applicable in India.

2 Students will have sufficient knowledge of basic Acts pertaining to social security as applicable in India.
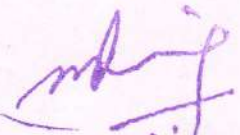
Course Code: MBA-962

Course Title: Training & Development

1 The historical and theoretical basis of organisation design and development and their context in terms of value and contribution to organisational life.

2 Available design options regarding organizational structures and relationships. The importance of the HR role in advising on design and development choices and supporting their implementation.

3 Develop, analyze and apply advanced training strategies and specifications for the delivery of training programs and evaluate training programs using appropriate design and data collection procedure.

Course Code: MBA 901

Course Title: Consumer Behaviour

1 Understand the consumer behaviour and its role in the corporate world.

2 Apply the knowledge about individual determinants of consumer behaviour

3 Analyze the external influences on consumer behaviour.

4 Illustrate the consumer decision making process.

Computer Application:

Program Outcomes:

PO1. Computational Knowledge: Apply knowledge of computing fundamentals, computing specialization, mathematics, and domain knowledge appropriate for the computing specialization to the abstraction and conceptualization of computing models from defined problems and requirements.

PO2. Problem Analysis: Identify, formulate, research literature, and solve complex computing problems reaching substantiated conclusions using fundamental principles of mathematics, computing sciences, and relevant domain disciplines.

PO3. Design /Development of Solutions: Design and evaluate solutions for complex computing problems, and design and evaluate systems, components, or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.

PO4. Conduct investigations of complex Computing 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.

PO5. Modern Tool Usage: Create, select, adapt and apply appropriate techniques, resources, and modern computing tools to complex computing activities, with an understanding of the limitations.

PO6. Professional Ethics: Understand and commit to professional ethics and cyber regulations, responsibilities, and norms of professional computing practices.

PO7. Life-long Learning: Recognize the need, and have the ability, to engage in independent learning for continual development as a computing professional.

PO8. Project management and finance: Demonstrate knowledge and understanding of the computing 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.

PO9. Communication Efficacy: Communicate effectively with the computing community, and with society at large, about complex computing activities by being able to comprehend and write effective reports, design documentation, make effective presentations, and give and understand clear instructions.

PO10. Societal and Environmental Concern: Understand and assess societal, environmental, health, safety, legal, and cultural issues within local and global contexts, and the consequential responsibilities relevant to professional computing practices.

PO11. Individual and Team Work: Function effectively as an individual and as a member or leader in diverse teams and in multidisciplinary environments.

PO12. Innovation and Entrepreneurship: Identify a timely opportunity and using innovation to pursue that opportunity to create value and wealth for the betterment of the individual and society at large

Program-Specific Outcomes:

PSO1: Problem Solving & Analysis: Apply the theoretical foundations of computer science in modelling and developing solutions to the real world problems.

PSO2: Software Development & Testing: Design and develop the application software systems that meet the automation needs of society and industry.

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PSO3: Network Communication and Applications: Ability to apply knowledge of layered network Models, their protocols and technologies in building network and Internet based applications.

Course Outcomes:

Course   **Code:**   PGCA-B1
Course Name: Computer Programming using C

1. CO1 Student should be able to understand the logic building used in Programming.
2. CO2 Students should be able to write algorithms for solving various real life problems.
3. CO3 To convert algorithms into programs using C.

Course   **Code:**   PGCA-B2
Course Name: Computer Science Essentials

1. CO1 Understanding the concept of input and output devices of Computers
2. CO2 Learn the basic concepts of Operating Systems and Database Systems
3. CO4 Learn basic word processing, Spreadsheet and Presentation Graphics Software skills.

Course   **Code:**   PGCA1917
Course Name: Discrete Structures &Optimization

1. CO1 Apply the operations of sets and use Venn diagrams to solve applied problems; solve problems using the principle of inclusion-exclusion
2. CO2 Apply rules of inference, proof by contradiction, proof by cases, and write proofs using symbolic logic and Boolean Algebra
3. CO3 Solve counting problems by applying elementary counting techniques using the product and sum rules, permutations, combinations, the pigeon-hole principle.
4. CO4 Determine if a given graph is simple or a multigraph, directed or undirected, cyclic or acyclic, and determine the connectivity of a graph

Course   **Code:**   PGCA1951
Course Name: Programming in Python

1. CO1 Familiar with Python environment, data types, operators used in Python.
2. CO2 Compare and contrast Python with other programming languages.
3. CO3 Learn the use of control structures and numerous native data types with their methods.
4. CO4 Design user defined functions, modules, and packages and exception handling methods.
5. CO5 Create and handle files in Python and learn Object Oriented Programming Concepts.

Course   **Code:**   PGCA1952
Course Name: Advanced Data Structures

1. CO1 Choose appropriate data structures and algorithms and use it to design solution for a specific problem.
2. CO2 Execute the operations of hashing to retrieve data from data structure.
3. CO3 Design and analyze programming problem statements
4. CO4 Come up with analysis of efficiency and proofs of correctness

5. CO5 Comprehend and select algorithm design approaches in a problem specific manner.

Course Code: PGCA 1953

Course Name: Advanced Database Management System

1. CO1 Express the basic concepts of DBMS and RDBMS.
2. CO2 Apply normalization theory to the normalization of a database
3. CO3 Apply the concept of Transaction Management & Recovery techniques in RDBMS.
4. CO4 Analyze various advanced databases prevailing in market, Big Data, Temporal Databases, Parallel and Distributed Databases, XML Database and multidimensional Databases
5. CO5 Demonstrate No SQL databases (Open Source)

Course Code: PGCA1905

Course Name: Technical Communication

1. CO1 The objective of the course is to help the students become the independent users of English language.
2. CO2 Students will acquire basic proficiency in reading & listening, comprehension, writing and speaking skills.
3. CO3 Students will be able to understand spoken and written English language, particularly the language of their chosen technical field.

Course Code: PGCA1954

Course Name: Data Structures using Python Laboratory

1. CO1 Understand the concept of data structures, python and apply algorithm for solving problems like Sorting, searching, insertion and deletion of data.
2. CO2 Implement linear and non-linear data structures for processing of ordered or unordered data.
3. CO3 Analyze various algorithms based on their time and space complexity.

Course Code: PGCA1955

Course Name: Advanced Database Management System Laboratory

1. CO1 Implement query a database using SQL DML/DDL commands.
2. CO2 Analyze integrity constraints on a database
3. CO3 Develop PL/SQL programs including stored procedures, stored functions, cursors
4. CO4 Design new database and modify existing ones for new applications and reason about the efficiency of the result.
5. CO5 Implement various DBA roles/techniques

Course Code: PGCA1908

Course Name: Technical Communication Laboratory

1. CO1 The objective of the course is to help the students become the independent users of English language.
2. CO2 Students will acquire basic proficiency in listening and speaking skills.
3. CO3 Students will be able to understand spoken English language, particularly the language of their chosen technical field.
4. CO4 They will be able to converse fluently
5. CO5 They will be able to produce on their own clear and coherent texts.

Course Code: PGCA1909

Course Name: Web Technologies

1. CO1 Understand the basics of Internet and Web Services.
2. CO2 Describe and differentiate Programming Language and Markup Language.
3. CO3 Connect various web pages and web sites together.
4. CO4 Capture user input from the remote users.
5. CO5 Learn connectivity concepts of Front End and Back End.

Course Code: PGCA1920

Course Name: Design & Analysis of Algorithms

1. CO1 Categorize problems based on their characteristics and practical importance
2. CO2 Develop Algorithms using iterative/recursive approach
3. CO3 Design algorithm using an appropriate design paradigm for solving a given problem
4. CO4 Classify problems as P, NP or NP Complete

Course Code: PGCA1918 Course Name: Advanced Java

1. CO1 Learn the advanced features of Java and write the programs.
2. CO2 Work with API and implement Serialization concept of Java.
3. CO3 Learn Java Generics and develop Projects.

Course Code: PGCA1956

Course Name: Linux Administration

1. CO1 Understand the technical details of Linux operating system
2. CO2 Work with various Linux command and understand file hierarchical structuring
3. CO3 Administrate user, manage and configure packages in Linux
4. CO4 Know and configure the various internet services.

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Course Code: PGCA1932

Course Name: Information Security and Cyber Law

1. CO1 Acquire knowledge about various Information Systems.
2. CO2 Understand the key security requirements of Confidentiality, Integrity &Availability.
3. CO3 Demonstrate the concept of Intrusion Detection & Intrusion Prevention.
4. CO4 Apply Symmetric Encryption techniques.
5. CO5 Describe the concept of Security policies and Cyber Laws.

Course Code: PGCA1914

Course Name: Web Technologies Laboratory

1. CO1 Understand Static and Dynamic concepts of web designing.
2. CO2 Develop ability to retrieve data from a database and present it online.
3. CO3 Design web pages that apply various dynamic effects on the web site.
4. CO4 Solve complex and large problems using Scripting Language & Markup Language.

Course Code: PGCA1922

Course Name: Advanced Java Laboratory

1. CO1 Learn the advanced features of Java and write the programs.
2. CO2 Work with API and implement Serialization concept of Java.
3. CO3 Learn Java Generics and develop Projects.
4. CO4 Understand to use digital marketing for developing effective digital and social media strategies

Course Code: PGCA1957

Course Name: Linux System Administration Laboratory

1. CO1 Install Linux desktop and Linux server operating system.
2. CO2 Use various commands for performing different operations
3. CO3 Work with various Linux administration commands
4. CO4 Install and configure various servers in Linux environment

Course Code: PGCA1925

Course Name: Advanced Computer Networking

1. CO1 Familiar with the different Network Models.
2. CO2 Understand different protocols working at Medium Access Sub layer.
3. CO3 Learn the concept of network routing through algorithms.
4. CO4 Learn and understand Internet protocols and network security.

Course Code: PGCA1926

Course Name: Artificial Intelligence & Soft. Computing

1. CO1 Understand the significance and domains of Artificial Intelligence and knowledge representation.
2. CO2 Examine the useful search techniques; learn their advantages, disadvantages and comparison.
3. CO3 Develop the skills to gain a basic understanding of neural network theory and fuzzy logic theory.

Course Code: PGCA1927

Course Name: Theory of Computation

1. CO1 Use basic concepts of formal languages of finite automata techniques.
2. CO2 Design Finite Automata's for different Regular Expressions and Languages.
3. CO3 Construct context free grammar for various languages.
4. CO4 Solve various problems of applying normal form techniques, push down automata and Turing Machines.
5. CO5 Solve computational problems regarding their computability and complexity .andprove the basic results of the theory of computation.

Course Code: PGCA1928

Course Name: Advanced Computer Networking Laboratory

1. CO1 Familiarize themselves with the different Network Models.
2. CO2 Understand working of different devices used to set up LAN.
3. CO3 Learn the concept of network routing.
4. CO4 Learn and understand Internet protocols and network security.

Course Code: PGCA1929

Course Name: Artificial Intelligence & Soft. Computing Lab

1. CO1 Develop the skills to gain a basic understanding of neural network theory and fuzzy logic theory.
2. CO2 Apply artificial neural networks and fuzzy logic theory for various problems.
3. CO3 Determine the use of Genetic algorithm to obtain optimized solutions to problems.

Course Code: PGCA1930

Course Name: Software Project Management

1. CO1Understand and practice the process of project management
2. CO2 Develop the scope of work, provide accurate cost estimates and to plan the various activities.
3. CO3 Understand and use risk management analysis techniques that identify the factors that put a project at risk and to quantify the likely effect of risk on project timescales
4. CO4 Identify the resources and people required for a project and to produce a work plan and resource schedule.

Course Code: PGCA1971

Course Name: Optimization Techniques

1. CO1 Formulate and solve linear programming problems
2. CO2 Frame and resolve the transportation and assignment problems
3. CO3 Understand the Project Management problems using CPM
4. CO4 Find solution to two person zero-sum games

Course Code: PGCA1972

Course Name: Data Mining and Business Intelligence

1. CO1 Understand basic concepts of data warehouse and business intelligence
2. CO2 Perform various data warehouse-related problems
3. CO3 Analyze data and relate to real-world scenario
4. CO4 Deriving intrinsic facts from data

Course Code: PGCA1973

Course Name: Enterprise Resource Planning

1. CO1 Analyse a business processes of different functional areas
2. CO2 Understand ERP & Related Technologies
3. CO3 ERP Implementation Strategies
4. CO4 Use and apply this knowledge in E Commerce & E Governance related applications.
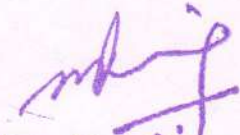
Course Code: PGCA1933

Course Name: Mobile Application Development

1. CO1 Know the components and structure of mobile application development frameworks for Android and iOS based mobiles
2. CO2 Understand how to work with various mobile application development frameworks.
3. CO3 Design and implement the user interfaces of mobile applications.
4. CO4 Develop useful mobile applications using Google Android and Eclipse simulator.

Course Code: PGCA1934

Course Name: Mobile Application Development Laboratory

1. CO1 Understand how to work with various mobile application development frameworks.
2. CO2 Develop mobile applications using GUI and Layouts
3. CO3 Learn the basic and important design concepts and issues of development of mobile applications.
4. CO4 Analyze and discover own mobile app for simple needs.

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Course Code: PGCA1935

Course Name: Simulation & Modelling

1. CO1 Identify the paradigms and approaches used to design the simulation.
2. CO2 Understand the various types of simulation, techniques and methods.
3. CO3 Apply concepts of computer simulation for types of inputs, system models, output behavior and performance estimation
4. CO4 Test the goodness of a simulation by analyzing the simulated data.

Course Code: PGCA1936

Course Name: Simulation & Modelling Laboratory

1. CO1 Understand the use of software tools for modelling and analysis of mathematical concepts for engineering application.
2. CO2 Know how to simulate any discrete system using queuing systems.
3. CO3 Model and analyze simple engineering concepts and its importance in engineering applications.
4. CO4 Develop skills to apply simulation software to construct and execute goal-driven system models.

Course Code: PGCA1921

Course Name: E-Commerce & Digital Marketing

1. CO1 Understand various applications and scope of ecommerce.
2. CO2 Acquire knowledge of various payment modes used in ecommerce today.
3. CO3 Learn to develop, evaluate, and execute a comprehensive digital marketing strategy and plan
4. CO4 Describe how and why to use digital marketing for multiple goals within a larger marketing and/or media strategy, Developing effective digital and social media strategies
5. CO5 Understand the major digital marketing channels - online advertising: Digital display, video, mobile, search engine, and social media
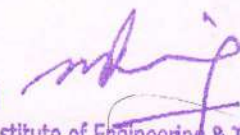
Course Code: PGCA 1955

Course Name: e-Commerce and Digital Marketing Laboratory

1. CO1 Understand of implementation of ecommerce applications.
2. CO2 Learn to develop and implement digital marketing strategy and plan
3. CO3 Implement and developing effective digital and social media strategies
4. CO4 Implementation and working on the social, and security issues concerning the digital marketing and e-commerce.

Course Code: PGCA1931

Course Name: Software Testing & Quality Assurance

1. CO1 Understand various approaches of software testing and quality assurance for software development.

2. CO2 Create test strategies, design test cases, prioritize and execute them.
3. CO3 Identify various risks involved with software projects and build risk management
4. CO4 Plan and execute software management and configuration activities.

Course Code: PGCA1956

Course Name: Software Testing & Quality Assurance Laboratory

1. CO1 Understand various approaches of software testing and quality assurance for software development.
2. CO2 Create test strategies, design test cases, prioritize and execute them.
3. CO3 Identify various risks involved with software projects and build risk management
4. CO4 Plan and execute software management and configuration activities.

Course Code: PGCA1976

Course Name: Machine Learning and Data Analytics using Python

1. CO1 Learn Machine Learning concepts
2. CO2 Understand the difference between supervised and unsupervised learning
3. CO3 Learn clustering and classification algorithms
4. CO4 Analyse data using Python Numpy, Panda Libraries
5. CO5 Visualize data using matplotlib library of Python

Course Code: PGCA 1958

Course Name: Advanced Web Technologies

1. CO1 Understand client-side and server-side programming.
2. CO2 Learn to represent web data and XML document handling.
3. CO3 Understand AJAX and relevance.
4. CO4 Develop a dynamic webpage by the use of java PHP and MySQL.
5. CO5 Able to learn how to perform basic CRUD database operations in a DynamicWebsite.
6. CO6 Learn about web services and their development.

Course Code: PGCA1977

Course Name: Machine Learning and Data Analytics using Python Laboratory

1. CO1 Develop knowledge of various learning models of data.
2. CO2 Implement a wide variety of learning algorithms.
3. CO3 Understand how to evaluate models generated from data.
4. CO4 Apply the algorithms to a real-world problems.
5. CO5 Optimize the models learned and report on the expected accuracy that can be achieved by applying the models.

Course Code: PGCA 1960

Course Name: Advanced Web Technologies Laboratory

1. CO1 Understand the advance concepts of website development.
2. CO2 Provide skills to design and develop dynamic web sites.

3. CO3 Work independently for database programming for web applications
4. CO4 Understand concepts of jQuery methods, AJAX, Bootstrap and REACT
5. CO5 Connect Website with an Database Server and perform basic CRUD operations.
6. CO6 Develop market ready website, to be used by clients.

Course Code: PGCA1937

Course Name: Cloud Computing

1. CO1 Understand the basic concept and importance of cloud computing.
2. CO2 Access the suitability of migrating to a cloud solution for different applications.
3. CO3 Compare and evaluate the virtualization technologies.
4. CO4 Monitor and manage the cloud resources, applications and data while addressing the security concerns.
5. CO5 Use cloud solutions offered by industry leaders for various applications.

Course Code:PGCA 1938

Course Name: Cloud Computing Laboratory

1. CO1 Learn the use of cloud computing tools offered by industry leaders.
2. CO2 Develop and deploy cloud applications using popular cloud platforms.
3. CO3 Configuration of the virtual machines on the cloud and building of a private cloud.

Course Code: PGCA1963

Course Name: Digital Image Processing

1. CO1 Understand the need for various image transforms along with properties
2. CO2 Learn different techniques employed for the enhancement of images
3. CO3 Understand the rapid advances in Machine vision
4. CO4 Analyze images in multiresolution environment
5. CO5 Learn image compression techniques

Course Code: PGCA1964

Course Name: Digital Image Processing Laboratory

1. CO1 Implement the various operations which can be performed on images.
2. CO2 Apply filters on images as per the requirement
3. CO3 Implement different techniques employed for the enhancement of images
4. CO4 Develop an Image Processing Application

Course Code: PGCA1965

Course Name: NLP and Speech Recognition

1. CO1 Learn basics of natural language processing
2. CO2 Understand the text normalization, use of edit distance, and regular expressions
3. CO3 Learn Naive bayes and sentiment classification algorithms

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4. CO4 Familiarize with chatbots and phonetics
5. CO5 Learn the concept of speech recognition and text to speech conversion.

Course Code: PGCA1966

Course Name: NLP and Speech Recognition Laboratory

1. CO1 Develop knowledge of various learning models of data.
2. CO2 Understand a wide variety of learning algorithms.
3. CO3 Understand how to evaluate models generated from data.
4. CO4 Apply the algorithms to a real-world problems.
5. CO5 Optimize the models learned and report on the expected accuracy that can be achieved by applying the models.

Course Code: PGCA1967

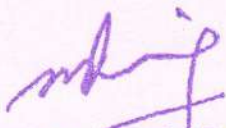## Course Name: IOT & Blockchain Technology

1. CO1 Understand the terminology and enabling technologies of IoT and Blockchain
2. CO2 Enumerate the steps involved in IoT system design methodology
3. CO3 Gain Knowledge about the working of bit coin crypto currency
4. CO4 Describe domain specific applications of IoT and Blockchain

Course Code: PGCA1968

Course Name: IOT & Blockchain Technology Laboratory

1. CO1 Learn and Use IoT sensors and remotely monitor data and control devices.
2. CO2 Develop real life IoT based projects.
3. CO3 Understand blockchain technology and develop blockchain based solutions.
4. CO4 Build and deploy IoT based blockchain applications for on-premise and cloud based architecture.

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