Criterion- 2: Teaching and Learning Evaluation

2.6.1 - Programme and course outcomes for all Programmes offered by the institution are stated and displayed on website and communicated to teachers and students.

(Dr. A S K Gopalamma)
Criteria-2 Coordinator

DADI INSTITUTE OF ENGINEERING & TECHNOLOGY
DIET
ANAKAPALLE

PRINCIPAL
Dadi Institute of
Engineering & Technology
ANAKAPALLE - 531 002

The Process for Establishing the POs

The POs are established through the following process steps:

The Vision, Mission of the institute along with the 12 Graduate Attributes is used in defining the POs.

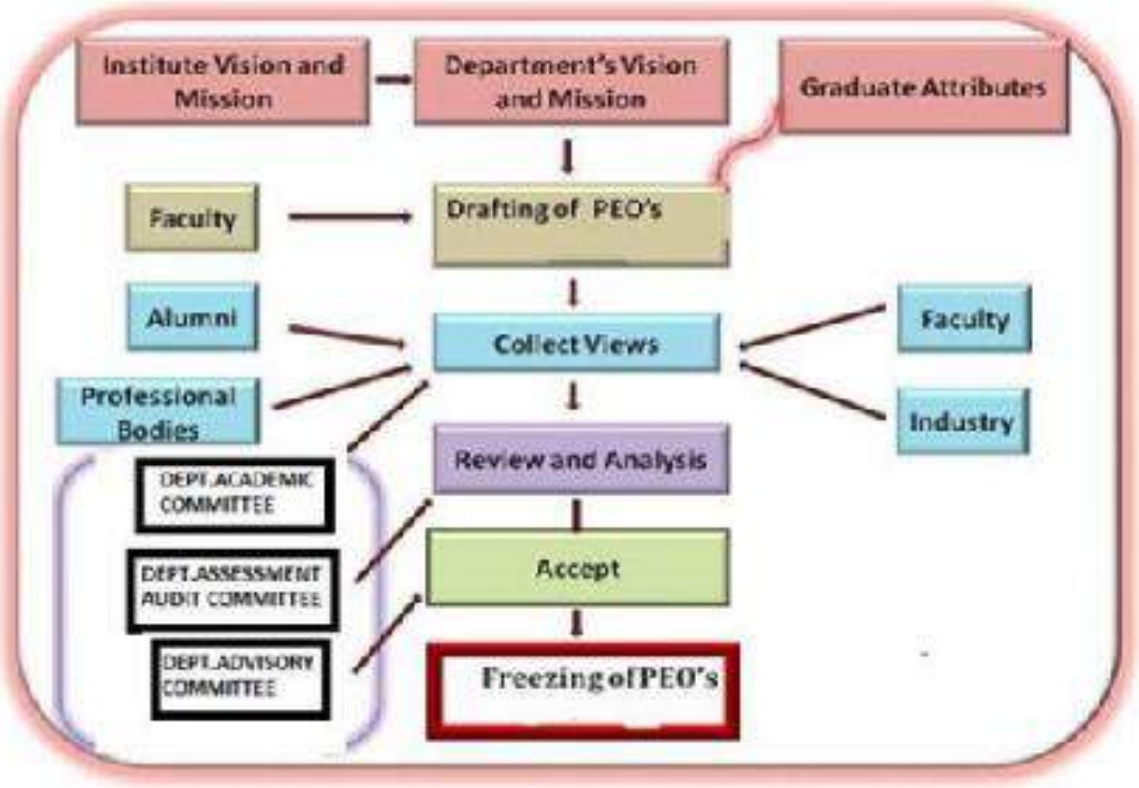
Step 1: College Academic Committee consults the key constituents: faculty and collects their views and prepares the draft version of the POs.

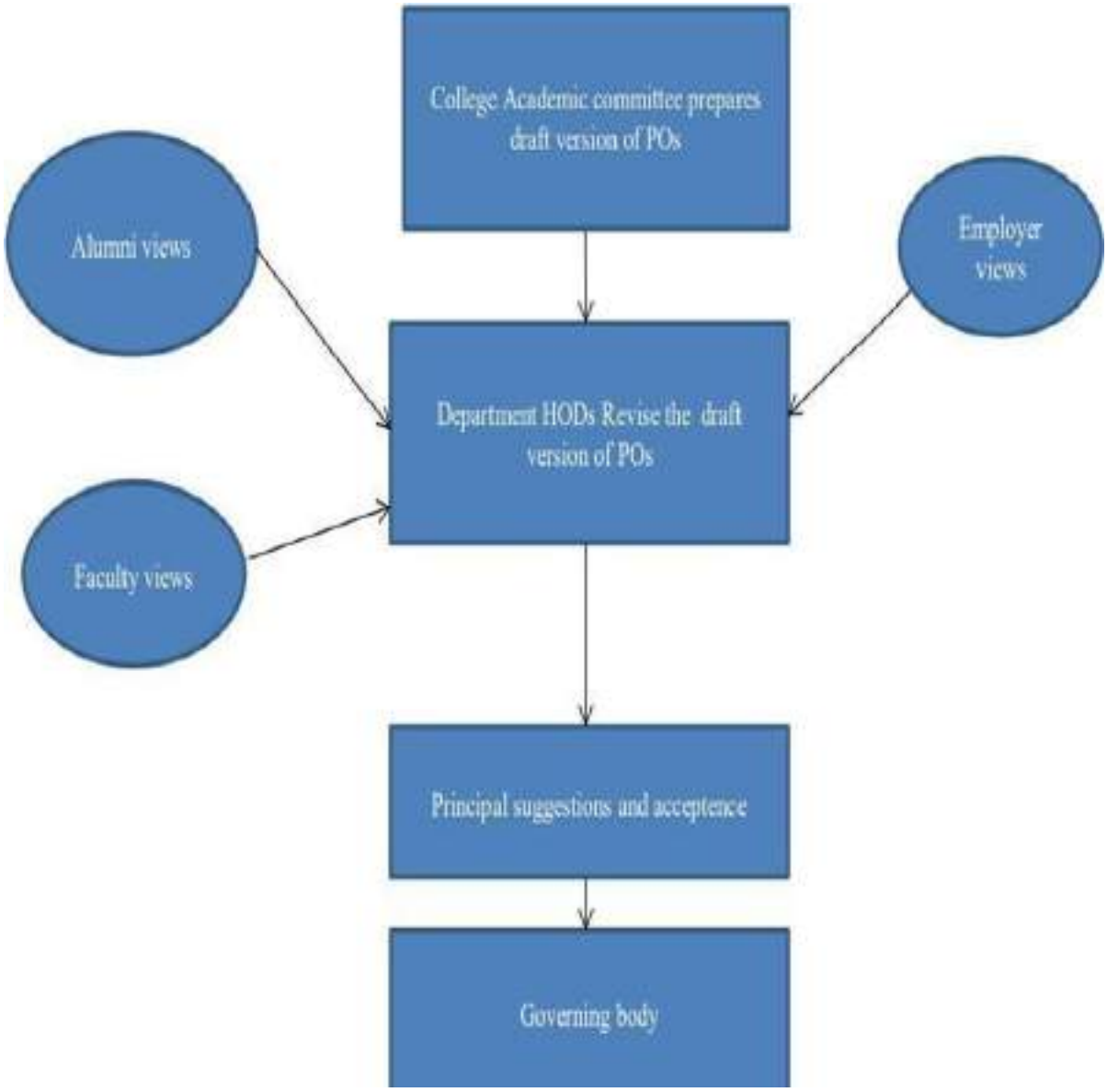
Step 2: The Department HODs gather views from the Alumni, Industry representatives / Employer along with the faculty and revise the draft.

Step 3: The Department HODs and analyze and express its opinion on the revised POs and forwards the same for final approval to the principal.

Step 4: Principal deliberate on the views expressed by the Department HODs formulate the accepted views and forward to Governing body.

PROCESS OF ESTABILISHING DEPARTMENT PROGRAM EDUCATIONAL OBJECTIVES




College Academic committee prepares draft version of POs
Alumni views
Employer views
Department HODs Revise the draft version of POs
Faculty views
Principal suggestions and acceptence
Governing body

DADI INSTITUTE OF ENGINEERING & TECHNOLOGY (AUTONOMOUS)

(Approved by A.I.C.T.E.& Permanently Affiliated to JNTU-GV, Vizianagaram)
Accredited by NAAC with 'A' Grade and Inclusion u/s 2(f) & 12(B) of UGC Act

DEPARTMENT OF BASIC SCIENCE & HUMANITIES
COURSE OUTCOMES
APPLIED PHYSICS

UNIT-1 (CO-1)
To comprehend and provide hands on experience on Interference, diffraction and polarization

UNIT-2 (CO-2)
To examine and study various types of emission of radiation, characteristics of lasers and principles of optical fibers which helps students experience the propagation of light waves in various media.

UNIT-3 (CO-3)
To identify and study how an electron behaves inside a metal. To explain the various characteristics of metals, semiconductors and insulators based on the electron properties.

UNIT-4 (CO-4)
To examine the nature of insulating materials and magnetic materials and apply them in various engineering fields

UNIT-5 (CO-5)
To understand the semi conducting and super conducting nature of the materials and how they are used in engineering fields.

DEPARTMENT OF BASIC SCIENCE & HUMANITIES
COURSE OUTCOMES
ENGINEERING PHYSICS

UNIT-1 (CO-1)
To comprehend and provide hands on experience on Interference, diffraction and polarization

UNIT-2 (CO-2)
To examine and study various types of emission of radiation, characteristics of lasers and principles of optical fibers which helps students experience the propagation of light waves in various media.

UNIT-3 (CO-3)
To examine the nature of insulating materials and magnetic materials and apply them in various engineering fields

UNIT-4 (CO-4)
To analyze acoustic parameters and sound level disruptors. To study the applicationsof ultra-sonics in architectural fields of engineering.

UNIT-5 (CO-5)
To understand the various crystal structures and the important properties of crystals using XRD pattern.

DEPARTMENT OF BASIC SCIENCE & HUMANITIES
COURSE OUTCOMES
APPLIED CHEMISTRY

UNIT-1 (CO-1) POLYMER TECHNOLOGY

- **Analyze** the different types of composite plastic materials and **interpret** the mechanism of conduction in conducting polymers.

UNIT-2 (CO-2) ELECTROCHEMICAL CELLS AND CORROSION

- **Utilize** the theory of construction of electrodes, batteries and fuel cells in redesigning new engineering products and **categorize** the reasons for corrosion and study methods to control corrosion.

UNIT-3 (CO-3) MATERIAL CHEMISTRY

- **Synthesize** nano materials for modern advances of engineering technology.
- **Summarize** the preparation of semiconductors, analyse the applications of liquid crystals and superconductors.

UNIT-4 (CO-4) SPECTROSCOPIC TECHNIQUES & NON-CONVENTIONAL ENERGY SOURCES

- **Analyze** the principles of different analytical instruments and their applications.
- **Design** models for energy by different natural sources.

UNIT-5 (CO-5) ADVANCED CONCEPTS/TOPICS IN CHEMISTRY

- **Obtain** the knowledge of computational chemistry and molecular machines.

DEPARTMENT OF BASIC SCIENCE & HUMANITIES

COURSE

OUTCOMES

MATHEMATICS-

I

UNIT-1 (CO-1)

- Utilize mean value theorems to real life problems

UNIT-2 (CO-2)

- Solve the differential equations related to various engineering fields

UNIT-3 (CO-3)

- Solve the differential equations related to various engineering fields

UNIT-4 (CO-4)

- Familiarize with functions of several variables which is useful in optimization

UNIT-5 (CO-5)

- Apply multiple integration techniques in evaluating areas bounded by region and Students will learn important tools of multiple integral techniques in higher dimensions.

DEPARTMENT OF BASIC SCIENCE & HUMANITIES

COURSE

OUTCOMES

MATHEMATICS-

II

UNIT-1 (CO-1)

- Develop the use of matrix algebra techniques that is needed by engineers for practical applications to solve system of algebraic equations using Gauss elimination

UNIT-2 (CO-2)

- Develop the use of matrix algebra techniques that is needed by engineers for practical applications & Caculate higher powers using Cayely Hamilton theorem

UNIT-3 (CO-3)

- solve system of linear algebraic equations using Gauss Jordan, Gauss Seidel methods & evaluate the approximate roots of polynomial and transcendental equations by differential algorithms

UNIT-4 (CO-4)

- Apply Newton's forward & backward interpolation and Lagrange's formulae for equal and unequal intervals

UNIT-5 (CO-5)

- Apply numerical integral techniques to different Engineering problems & different algorithms for approximating the solutions of ordinary differential equations with initial conditions to its analytical computations

II YEAR

ELECTRONIC DEVICES AND CIRCUITS

1. Apply the basic concepts of semiconductor physics.
2. Understand the formation of p-n junction and how it can be used as a p-n junction as diodein different modes of operation.
3. Know the construction, working principle of rectifiers with and without filters with relevantexpressions and necessary comparisons.
4. Know the need of transistor biasing, various biasing techniques for BJT and FETand stabilization concepts with necessary expressions.
5. Perform the analysis of small signal low frequency transistor amplifier circuits.

SWITCHING THEORY and LOGIC DESIGN

1. Classify different number systems and apply to generate various codes.
2. Use the concept of Boolean algebra in minimization of switching functions
3. Apply knowledge of flip-flops in designing of Registers and counters
4. The operation and design methodology for synchronous sequential circuits and algorithmicstate machines.
5. Produce innovative designs by modifying the traditional design techniques.

SIGNALS and SYSTEMS

1. Differentiate the various classifications of signals.
2. Differentiate the various classifications of systems.
3. Analyze the frequency domain representation of signals using Fourier concepts
4. Classify the systems based on their properties and determine the response of LTI Systems.
5. Apply Laplace and z-transforms to analyze signals and Systems (continuous &discrete).

RANDOM VARIABLES and STOCHASTIC PROCESSES

1. Mathematically model the random phenomena.
2. Solve simple probabilistic problems.
3. Compute statistical averages of these random variables.
4. Characterize the random processes in the time and frequency domains.
5. Analyze the LTI systems with random inputs.

OBJECT ORIENTED PROGRAMMING THROUGH JAVA

1. The analytical skills of object oriented programming
2. Overall development of problem solving and critical analysis.
3. Formal introduction to Java programming language
4. Show competence in the use of the Java programming language in the development of small to medium-sized application programs that demonstrate professionally acceptablecoding and performance standard
5. Demonstrate an introductory understanding of graphical user interfaces, multithreaded programming, and event-driven programming.

MANAGERIAL ECONOMICS & FINANCIAL ANALYSIS

1. The Learner is equipped with the knowledge of estimating the demand and demandelasticity for a product.
2. The knowledge of understanding of the Input-Output-Cost relationships.
3. Estimation of the least cost combination of inputs.
4. The pupil is also ready to understand the nature of different markets and Price Output determination under various market conditions and also to have the knowledge of different Business Units.
5. The Learner is able to prepare Financial Statements and the usage of various Accounting tools for Analysis.

ELECTRONIC CIRCUIT ANALYSIS

1. Design and analysis of small signal high frequency transistor amplifier using BJT and FET.
2. Design and analysis of multi stage amplifiers using BJT and FET.
3. Design and analysis of multi stage amplifiers using Differential amplifier using BJT.
4. Condition for oscillation of RC and LC oscillators and their amplitude and frequencystability concept.
5. Know the classification of the power and tuned amplifiers and their analysis withperformance comparison.

LINEAR CONTROL SYSTEMS

1. This course introduces the concepts of feedback and its advantages to various controlsystems
2. The performance metrics to design the control system in time-domain.
3. The performance metrics to design the control system in frequency domain are introduced.
4. Control systems for various applications can be designed using frequency domain analysis.
5. In addition to the conventional approach, the state space approach for the analysisof control systems is also introduced.

ECTROMAGNETIC WAVES and TRANSMISSION LINES

1. Determine E and H using various laws and applications of electric fields
2. Determine E and H using various laws and applications of magnetic fields
3. Apply the Maxwell equations to analyze the time varying behavior of EM waves
4. Gain the knowledge in uniform plane wave concept and characteristics of uniform plane wave in various media and Calculate Brewster angle, critical angle and total internal reflection.
5. Derive and Calculate the expressions for input impedance of transmission lines, reflection coefficient, VSWR etc. using smith chart

ANALOG COMMUNICATIONS

1. Differentiate various Analog modulation
2. Demodulation schemes and their spectral characteristics
3. Analyze noise characteristics of various analog modulation methods
4. Analyze various functional blocks of radio transmitters and radio receivers
5. Design simple analog systems for various modulation techniques.

COMPUTER ARCHITECTURE and ORGANIZATION

1. Students can understand the architecture of modern computer.
2. They can analyze the Performance of a computer using performance equation
3. Students can calculate the effective address of an operand by addressing modes
4. They can understand how computer stores positive and negative numbers.
5. Understand the concepts of I/O Organization and Memory systems.

MANAGEMENT and ORGANISATIONAL BEHAVIOUR

1. After completion of the Course the student will acquire the knowledge on management functions, global leadership and organizational structure.
2. Will familiarize with the concepts of functional management that is HRM.
3. The learner is able to think in strategically through contemporary management practices.
4. The learner can develop positive attitude through personality development and canequip with motivational theories.
5. The student can attain the group performance and grievance handling in managing the organizational culture.

III YEAR
COMPUTER ARCHITECTURE AND ORGANIZATION

1. Students can understand the architecture of modern computer.
2. They can analyze the Performance of a computer using performance equation
3. Students can calculate the effective address of an operand by addressing modes
4. They can understand how computer stores positive and negative numbers.
5. Understanding of how a computer performs arithmetic operation of positive and negative numbers.

LINEAR IC APPLICATIONS

1. Design circuits using operational amplifiers for various applications.
2. Analyze and design amplifiers and active filters using Op-amp.
3. Diagnose and trouble-shoot linear electronic circuits.
4. Understand the gain-bandwidth concept and frequency response of the amplifier configurations.
5. Understand thoroughly the operational amplifiers with linear integrated circuits

DIGITAL IC APPLICATIONS

1. Understand the structure of commercially available digital integrated circuit families.
2. Learn the IEEE Standard 1076 Hardware Description Language (VHDL).
3. Model complex digital systems at several levels of abstractions, behavioral, structural, simulation, synthesis and rapid system prototyping.
4. Analyze and design basic digital circuits with combinatorial logic circuits using VHDL.
5. Analyze and design basic digital circuits with sequential logic circuits using VHDL

DIGITAL COMMUNICATIONS

1. Determine the performance of different waveform coding techniques for the generation of the signals.
2. Determine the performance of different waveform coding techniques for the digital representation of the signals.
3. Determine the probability of error for various digital modulation schemes
4. Analyze different source coding techniques
5. Compute and analyze different error control coding schemes for the reliable transmission of digital information over the channel.

ANTENNA AND WAVE PROPAGATION

1. Identify basic antenna parameters.
2. Design and analyze wire antennas, loop antennas, reflector antennas, lens antennas, horn antennas and micro strip antennas
3. Quantify the fields radiated by various types of antennas4.Design and analyze antenna arrays
4. Identify the characteristics of radio wave propagation

MICROPROCESSORS AND MICROCONTROLLERS

1. Understand the architecture of microprocessor and their operation.
2. Understand the architecture of microcontrollers and their operation
3. Demonstrate programming skills in assembly language for processors and Controllers.
4. Analyze various interfacing techniques and apply them for the design of processor based systems.
5. Analyze various interfacing techniques and apply them for the design of Controller based systems.

MICROWAVE ENGINEERING

1. Design different modes in waveguide structures
2. Calculate S-matrix for various waveguide components and
3. Splitting the microwave energy in a desired direction
4. Distinguish between Microwave tubes and Solid State Devices, calculation of efficiency of devices.
5. Measure various microwave parameters using a Microwave test bench

VLSI DESIGN

1. Understand the properties of MOS active devices and simple circuits configured when using them and the reason for such encumbrances as ratio rules by which circuits can be interconnected in silicon.
2. Know three sets of design rules with which nMOS and CMOS designs may be fabricated.
3. Understand the scaling factors
4. Determining the characteristics of MOS circuits in silicon.
5. Determining the performance of MOS circuits in silicon.

DIGITAL SIGNAL PROCESSING

1. Apply the difference equations concept in the analysation of Discrete time systems
2. Use the FFT algorithm for solving the DFT of a given signal and Design a Digital filter (FIR&IIR)from the given specifications
3. Realize the FIR and IIR structures from the designed digital filter.
4. Use the Multirate Processing concepts in various applications (eg: Design of phaseshifters, Inter facing of digital systems…)
5. Apply the signal processing concepts on DSP Processor.

OOPS THROUGH JAVAOPEN ELECTIVE

1. Understand Java programming concepts and utilize Java Graphical User Interfacein Program writing.
2. Write, compile, execute and troubleshoot Java programming for networking concepts.
3. Build Java Application for distributed environment.
4. Design and Develop multi-tier applications.
5. Identify and Analyze Enterprise applications

III **YEAR**

RADAR SYSTEMS

1. Derive the radar range equation
2. To solve some analytical problems.
3. Understand the different types of radars and its applications
4. Understand the concept of tracking and different tracking techniques.
5. Understand the various components of radar receiver and its performance

DIGITAL IMAGE PROCESSING

1. Perform image manipulations
2. Different digital image processing techniques
3. Perform basic operations like – Enhancement, segmentation, compression, Image transforms and restoration techniques on image.
4. Analyze pseudo and full color image processing techniques.
5. Apply various morphological operators on images

COMPUTER NETWORKS

1. Understand OSI and TCP/IP models
2. Analyze MAC layer protocols and LAN technologies
3. Design applications using internet protocols
4. Understand routing and congestion control algorithms
5. Understand how internet works

OPTICAL COMMUNICATIONS

1. Choose necessary components required in modern optical communications systems .
2. Design and build optical fiber experiments in the laboratory, and learn how to calculate electromagnetic modes in waveguides, the amount of light lost going through an opticalsystem, dispersion of optical fibers.
3. Use different types of photo detectors and optical test equipment to analyze optical fiber and light wave systems.
4. Choose the optical cables for better communication with minimum losses Design, build, and demonstrate optical fiber experiments in the laboratory.

CELLULAR AND MOBILE COMMUNICATIONS

1. Identify the limitations of conventional mobile telephone systems
2. Understand the concepts of cellular systems.
3. Understand the frequency management, channel assignment strategies and antennas in cellular systems.
4. Understand the concepts of handoff of various cellular systems.
5. Understand the concepts of architectures of various cellular systems.

ELECTRONIC MEASUREMENTS ANDINSTRUMENTATION

1. Select the instrument to be used based on the requirements.
2. Understand and analyze different signal generators
3. Understand and analyze different and analyzers.
4. Understand the design of oscilloscopes for different applications.
5. Design different transducers for measurement of different parameters

SATELLITE COMMUNICATIONS

1. Understand the concepts, applications and subsystems of Satellite communications.
2. Derive the expression for G/T ratio
3. To solve some analytical problems on satellite link design.
4. Understand the various types of multiple access techniques and architecture of earth station design.
5. Understand the concepts of GPS and its architecture.

IV **ECE (R16)**

Digital Signal Processing Lab

CO1: Develop various DSP Algorithms using the MATLAB Software package.

CO2: Develop and Implement DSP algorithms in software using a computer language such as C with TMS320C6713 floatingpoint Processor.

CO3: Analyze and Observe Magnitude and phase characteristics (Frequency response Characteristics) of digital IIR-Butterworth,Chebyshev filters. Using TMS320C6713 floating point Processor.

CO4: Analyze and Observe Magnitude and phase characteristics (Frequency response Characteristics) of digital FIR filters usingwindow techniques, using TMS320C6713 floating point Processor.

CO5: Observe and Analyze Digital Signals using FM4 Starter Kit.

Microwave Engineering and Optical Lab

CO1. Verify the characteristics of Reflex klystron.

CO2.Analyze Various parameters of wave guide components.

CO3. Demonstrate characteristics of various optical Resources.

CO4. Measure Data rate, Numerical Aperture and losses in optical link.

C05. Observe the Radiation pattern of Horn antenna.

III ECE (R16)

Linear IC Applications Lab

CO1: Design Adder, Subtractor, Comparator, integrator & differentiator using OP AmpIC741

CO2: Design different types of active filters

CO3: Design different oscillator circuits and Function generator using OP-Amp IC741.

CO4: Design different Multi vibrators using IC555 timer.

CO5: Use IC565 for PLL, IC566 for VCO, IC723for voltage regulator &IC7805, 7809,7912 for three terminal voltageregulators.

Micro Processors and Micro Controllers Lab

CO1: To familiarise the student with the architecture of 8086 Microprocessors and assembly language programming by using theinstruction set.

CO2: To familiarise the student with the architecture of 8051 Microcontrollers and assembly language programming by using theinstruction set.

CO3: To understand Programmable Peripheral Interfacing.

CO4: To study the operation of serial data transmission using 8251 USART.
CO5: To familiarise the student with the ARM 32bit microprocessors and microcontrollers and their applications.

VLSI Lab

CO1: An ability to design CMOS logic circuits.
CO2: Simulate circuits within a CAD tool and compare to design specifications.
CO3: Design, implement, and simulate circuits using VHDL.
CO4: write machine language programs and assembly language programs for the simple computer.
CO5: To learn by using Xilinx Foundation tools and Hardware Description Language (VHDL) and to analyze the results oflogic and timing simulations and to use these simulation results to debug digital systems.

Digital IC Applications Lab

CO1: Have extended knowledge of digital circuits and systems
CO2: Understand different IC numbers for different circuits.
CO3: Able to design circuits using digital ICs
CO4: Have thorough understanding of combinational and sequential circuits for various applications
CO5: Design and Implement Digital Systems using logic ICs

Digital Communications Lab

CO1: Able to understand basic theories of Digital communication system in practical.
CO2: Able to design and implement different modulation and demodulation techniques.
CO3: Able to analyze digital modulation techniques by using MATLAB tools.
CO4: Able to identify and describe different techniques in modern digital communications, in particular in source coding usingMAT Lab tools.
CO 5: Able to perform channel coding.

II ECE (R19)

Electronic Circuit Analysis Lab

CO1: Design different types of Amplifier
CO2: Design different types of Oscillator circuits(K6)
CO3: Simulate different types of Amplifier and Oscillator circuits using software tool.
CO4: Simulate different types of Oscillator circuits using software tool
CO5: calculate the efficiency of different types power Amplifiers

Electronic Devices and Circuits Lab

CO1: Understand the diode and transistor characteristics.

CO2: Verify the rectifier circuits using diodes and implement them using hardware.

CO3: Design the biasing circuits like self biasing.

CO4: Design various amplifiers like CE, CC, common source amplifiers and implement them using hardware and also observetheir frequency responses

CO5: Analyze the concepts of SCR and observe its characteristics.

Switching Theory and Logic Design Lab

CO1. Describe and explain the operation of fundamental digital gates

CO2. Analyze the operation of medium complexity standard combinational circuits like the encoder, decoder, multiplexer, de -multiplexer, adder .

CO 3. Analyze the operation of a flip-flop and examine relevant timing diagrams

CO4. Analyze the operation of counters and shift registers

CO5. Design operate practical digital logic circuits

I ECE (R20)
Electronic Workshop Lab

CO1: Able to build and Simulate Core Electronic Circuits based on syllabus.

CO2: Able to design and implement different Applications on Software.

CO3: Able to analyze the circuit

CO4: Able to troubleshoot errors if any.

CO 5: Build core hardware projects

R-19 EEE Syllabus 2-1 Semester Course outcomes

ELECTRICALCIRCUIT ANALYSIS-II

- □ solve three- phase circuits under balanced and unbalanced condition.
- □ find the transient response of electrical networks for different types of excitations.
- □ find parameters for different types of network.
- □ realize electrical equivalent network for a given network transfer function.
- □ extract different harmonics components from the response of an electrical network.

ELECTRICAL MACHINES – I

- □ assimilate the concepts of electromechanical energy conversion.
- □ mitigate the ill-effects of armature reaction and improve commutation in dc machines.
- □ understand the torque production mechanism and control the speed of dc motors.
- □ analyze the performance of single phase transformers.
- □ predetermine regulation, losses and efficiency of single phase transformers.

ELECTRONIC DEVICES AND CIRCUITS

- □ understand the concepts of Semiconductor Technology.
- □ appraise the construction & operation of electronic devices.
- □ develop the biasing circuits using the electronic devices.
- □ model the amplifier circuits.
- □ analyse the characteristics of the devices.

ELECTROMAGNETIC FIELDS

- □ Determine electric fields and potentials using Guass's lawor solving Laplace's or Possion's equations, for various electric charge distributions.
- □ Calculate and design capacitance, energy stored in dielectrics.
- □ Calculate the magnetic field intensity due to current, the application of Ampere's law and the Maxwell's second and third equations.
- □ determine the magnetic forces and torque produced by currents in magnetic field
- □ determine self and mutual inductances and the energy stored in the magnetic field.

THERMAL AND HYDRO PRIME MOVERS

.To make the student learn about the constructional features internal combustion engines.

. operational details of various types of internal combustion engines

. Details of several engine systems

.Basic air standard cycles, that govern the engines.

.The student shall be able to calculate the performance of different types of internal combustion engines.

MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

- The Learner is equipped with the knowledge of estimating the Demand and demand elasticities for a product.
- The knowledge of understanding of the Input-Output-Cost relationships and estimation of the least cost combination of inputs.
- The pupil is also ready to understand the nature of different markets and Price Output determination under various market conditions and also to have the knowledge of different Business Units.
- The Learner is able to prepare Financial Statements and the usage of various Accounting tools for Analysis.
- The Learner can able to evaluate various investment project proposals with the help of capital budgeting techniques for decision making.

R-19 EEE Syllabus 2-2 Semester Course outcomes

ELECTRICAL MEASUREMENTS AND INSTRUMENTATION

- □ choose right type of instrument for measurement of ac and dc Electrical quantities.
- □ choose right type of instrument for measurement of power and power factor.
- □ select right type for measurement of R, L,C.
- □ understand the effectiveness of Transducer.
- □ able to understand Digital Meters.

ELECTRICAL MACHINES – II

- □ explain the operation and performance of three phase induction motor.
- □ analyze the torque-speed relation, performance of induction motor and induction generator.
- □ explain design procedure for transformers and three phase induction motors.
- □ implement the starting of single phase induction motors.
- □ perform winding design and predetermine the regulation of synchronous generators.

DIGITAL ELECTRONICS

- □ classify different number systems and apply to generate various codes.
- □ use the concept of Boolean algebra in minimization of switching functions
- □ design different types of combinational logic circuits.
- □ apply knowledge of flip-flops in designing of Registers and counters
- □ the operation and design methodology for synchronous sequential circuits and algorithmic state machines.

CONTROL SYSTEMS

- □ Derive the transfer function of physical systems and determination of overall transfer function using blockdiagram algebra and signal flow graphs.
- □ Determine time response specifications of second order systems and to determine error constants.
- □ Analyze absolute and relative stability of LTI systems using Routh's stability criterion and the rootlocus method.
- □ Analyze the stability of LTI systems using frequency response methods.
- □ Design Lag, Lead, Lag-Lead compensators to improve system performance from Bode diagrams.

POWER SYSTEMS-I

- identify the different components of thermal power plants.
- identify the different components of nuclear Power plants.
- identify the different components of air
- identify the different components gas insulated substations.
- identify single core and three core cables with different insulating materials.

SIGNALS AND SYSTEMS

- characterize the signals and systems and principles of vector spaces, Concept of orthgonality.
- analyze the continuous-time signals and continuous-time systems using Fourier series, Fourier transform and Laplace transform.
- apply sampling theorem to convert continuous-time signals to discrete-time signal and reconstruct back.
- understand the relationships among the various representations of LTI systems
- understand the Concepts of convolution, correlation, Energy and Power density spectrum and their relationships.

R-16 EEE Syllabus3-1 Semester Course outcomes

POWER SYSTEMS–II

- □ Able to understand parameters of various types of transmission lines during different Operating conditions.
- □ Able to understand the performance of short and medium transmission lines.
- □ Student will be able to understand travelling waves on transmission lines.
- □ Will be able to understand various factors related to charged transmission lines.
- □ Will be able to understand sag/tension of transmission lines and performance of line insulators.

RENEWABLE ENERGY SOURCES

- □ Analyze solar radiation data, extraterrestrial radiation, and radiation on earth's surface.
- □ Design solar thermal collectors, solar thermal plants.
- □ Design solar photo voltaic systems.
- □ Develop maximum power point techniques in solar PV and wind energy systems.
- □ Explain wind energy conversion systems, wind generators, power generation.

SIGNALS & SYSTEMS

- □ Characterize the signals and systems and principles of vector spaces, Concept of orthgonality.
- □ Analyze the continuous-time signals and continuous-time systems using Fourier series, Fouriertransform and Laplace transform.
- □ Apply sampling theorem to convert continuous-time signals to discrete-time signal andreconstruct back.
- □ Understand the relationships among the various representations of LTI systems
- □ Understand the Concepts of convolution, correlation, Energy and Power density spectrum and theirrelationships.

PULSE AND DIGITAL CIRCUITS

- □ Design linear and non-linear wave shaping circuits.
- □ Apply the fundamental concepts of wave shaping for various switching and signal generating circuits.
- □ Design different multi vibrators
- □ Design different time base generators.
- □ Utilize the non sinusoidal signals in many experimental research areas.

POWER ELECTRONICS

- □ Explain the characteristics of various power semiconductor devices and analyze the static and dynamiccharacteristics of SCR's.
- □ Design firing circuits for SCR.
- □ Explain the operation of single phase full–wave converters and analyze harmonics in the input current.
- □ Explain the operation of three phase full–wave converters.
- □ Explain the operation of inverters and application of PWM techniques for voltage control andharmonic mitigation.

R-16 EEE Syllabus3-2

SemesterCourse outcomes

POWER ELECTRONIC CONTROLLERS& DRIVES

- □ Explain the fundamentals of electric drive and different electric braking methods.
- □ Analyze the operation of three phase converter fed dc motors and four quadrant operations of dc motors using dual converters.
- □ Describe the converter control of dc motors in various quadrants of operation
- □ Know the concept of speed control of induction motor by using AC voltage controllers and voltagesource inverters.
- □ Differentiate the stator side control and rotor side control of three phase induction motor..

POWER SYSTEM ANALYSIS

- □ Able to draw impedance diagram for a power system network and to understand per unit quantities.
- □ Able to form a Y_{bus} and $Z_{bus}$for a power system networks.
- □ Able to understand the load flow solution of a power system using different methods.
- □ Able to find the fault currents for all types faults to provide data for the design of protective devices.
- □ Able to find the sequence components of currents for unbalanced power system network.

MICRO PROCESSORS AND MICRO CONTROLLERS

- □ To be able to understand the microprocessor capability in general and explore the evaluation ofmicroprocessors.
- □ To be able to understand the addressing modes of microprocessors
- □ To be able to understand the micro controller capability
- □ To be able to program mp and mc
- □ To be able to interface mp and mc with other electronic devices

DATA STRUCTURES THROUGH C++

- □ Distinguish between procedures and object oriented programming.
- □ Apply advanced data structure strategies for exploring complex data structures.
- □ Compare and contrast various data structures and design techniques in the area of Performance.
- □ Implement data structure algorithms through C++. • Incorporate data structures into the applications such as binary search trees, AVL and B Trees
- □ Implement all data structures like stacks, queues, trees, lists and graphs and compare their Performance and trade offs

UNIX AND SHELL PROGRAMMING

- □ Documentation will demonstrate good organization and readability.
- □ File processing projects will require data organization, problem solving and research.
- □ Scripts and programs will demonstrate simple effective user interfaces.
- □ Scripts and programs will demonstrate effective use of structured programming.
- □ Scripts and programs will be accompanied by printed output demonstrating completion of a test plan.

VLSI DESIGN

- □ Understand the properties of MOS active devices and simple circuits configured when using them
- □ Understand the reason for such encumbrances as ratio rules by which circuits can be interconnected in silicon.
- □ Know three sets of design rules with which nMOS and CMOS designs may be fabricated.
- □ Understand the scaling factors determining the characteristics
- □ Understand the performance of MOS circuits in silicon.

R-16 EEE Syllabus4-1 Semester Course outcomes

UTILIZATION OF ELECTRICALENERGY

- □ Able to identify a suitable motor for electric drives and industrial applications
- □ Able to identify most appropriate heating or welding techniques for suitable applications.
- □ Able to understand various level of illuminosity produced by different illuminating sources.
- □ Able to estimate the illumination levels produced by various sources and recommend the most efficient illuminating sources and should be able to design different lighting systems by taking inputs and constraints in view.
- □ Able to determine the speed/time characteristics of different types of traction motors.

LINEAR IC APPLICATIONS

- □ Design circuits using operational amplifiers for various applications.
- □ Analyze and design amplifiers and active filters using Op-amp.
- □ Diagnose and trouble-shoot linear electronic circuits.
- □ Understand the gain-bandwidth concept and frequency response of the amplifier configurations. Understand thoroughly the operational amplifiers with linear integrated circuits.

POWER SYSTEM OPERATION AND CONTROL

- □ Able to compute optimal scheduling of Generators.
- □ Able to understand hydrothermal scheduling.
- □ Understand the unit commitment problem.
- □ Able to understand importance of the frequency.
- □ Understand importance of PID controllers in single area and two area systems.

SWITCHGEAR AND PROTECTION

- □ Able to understand the principles of arc interruption for application to high voltage circuit breakers of air,oil, vacuum, SF_6 gas type.
- □ Ability to understand the working principle and operation of different types of electromagnetic protectiverelays.
- □ Students acquire knowledge of faults and protective schemes for high power generator and transformers.
- □ Improves the ability to understand various types of protective schemes used for feeders and bus barprotection.
- □ Able to understand different types of static relays and their applications.

INSTRUMENTATION

- □ Able to represent various types of signals .
- □ Acquire proper knowledge to use various types of Transducers.
- □ Able to monitor and measure various parameters such as strain, velocity,temperature, pressure etc.
- □ Acquire proper knowledge and working principle of various types of digital voltmeters.
- □ Able to measure various parameter like phase and frequency of a signal with the help of CRO.

SPECIAL ELECTRICAL MACHINES

- □ Distinguish between brush dc motor and brush less dc motor**.**
- □ Explain the performance and control of stepper motors, and their applications.
- □ Explain theoryof operation and control of switched reluctance motor.
- □ Explain the theory of travelling magnetic field and applications of linear motors.
- □ Understand the significance of electrical motors for traction drives.

R-16 4-2 Sem syllabus
Course outcomes

DIGITAL CONTROL SYSTEMS

- □ The students learn the advantages of discrete time control systems and the "knowhow" of various associated accessories.
- □ The learner understand z–transformations and their role in the mathematical analysis of different systems (like Laplace transforms in analog systems).
- □ The stability criterion for digital systems
- □ The methods adopted for testing the same are explained.
- □ Finally, the conventional and state space methods of design are also introduced

H.V.D.C. TRANSMISSION

- □ Learn different types of HVDC levels and basic concepts
- □ Know the operation of converters
- □ Acquire control concept of reactive power control and AC/DC load flow.
- □ Understand converter faults, protection and harmonic effects
- □ Design low pass and high pass filters

ELECTRICAL DISTRIBUTION SYSTEMS

- □ Able to understand various factors of distribution system.
- □ Able to design the substation and feeders.
- □ Able to determine the voltage drop and power loss
- □ Able to understand the protection and its coordination.
- □ Able to understand the effect of compensation for p.f improvement.

FLEXIBLE ALTERNATING CURRENT TRANSMISSION SYSTEMS

- □ Understand power flow control in transmission lines using FACTS controllers.
- □ Explain operation and control of voltage source converter.
- □ Analyze compensation methods to improve stability and reduce power oscillations in the transmission lines.
- □ Explain the method of shunt compensation using static VAR compensators.
- □ Understand the methods of compensations using series compensators, UPFC & IPFC

MBA COURSE OUTCOMES

I Semester

MANAGEMENT & ORGANIZATIONAL BEHAVIOURCOURSE OUTCOMES

- Explain the Importance & Role of Management in the Organizations.
- Evaluate the different aspects related to Decision Making and Controlling Process
- Describe the different theories related to Individual behavior in the Organization.
- Analyze Group Behavioral influence in the Organization.
- Evaluate the process and climate effects in Organization Behavior.

Accounting for Managers Course Outcomes

- Explain the application of management accounting and the various tools used
- Make inter-firm and inter-period comparison, of financial statements
- Analyse the financial statement using various ratios
- Prepare Fund Statement and Cash Flow Statement Flow
- Prepare different budgets for the business

Managerial Economics COURSE OUTCOMES

- Enable to apply economic reasoning to the economic problems
- To gain knowledge how the demand and supply interact to determine price
- Provides knowledge about cost of production and how the production cost can be minimized
- To aware about different market condition and its price determination
- To understand the concept and evaluation of national income concept and evaluation

Business Communication and Soft Skills
COURSE OUTCOMES

- Ability for Effective Business
- Writing Effective Interpersonal Communication
- Developing and Delivering Effective Presentations
- Demonstrate Soft skills required for businesssituations

- Analyze the value of Soft skills for career enhancement

Legal and Business Environment
COURSE OUTCOMES

- Knowledge on Indian Contract Act
- Understand the Indian Partnership Act and Consumer Protection Act
- Understand the Factors Affecting Business
- Knowledge on Economic Policies of India
- Understand Environmental Problems and Ways of Handling

Quantitative Analysis for Business Decisions

COURSE OUTCOMES

- The successful completion of this course will impart the basic data analysis skills to the students.
- This will enable students to model business problems and analyze them with the help of fundamental statistical and theoretical backgrounds.
- Examine the basics of descriptive statistics for managers
- Identify the practical applications of probability theory
- Solve business problems with the help of fundamental statistical and theoretical backgrounds

Information Technology LAB

Course Outcomes

- Understand the structure and basic components of computer.
- Know about the processor structure and communication between memory and I/O devices
- Know about number representation and Conversions
- Know about Ms-Word and its features
- Familiar in working with spreadsheets and create their own power point presentations

FINANCIAL MANAGEMENT

Course Outcomes

- □ Explain the concept of fundamental financial concepts, especially time value of money.
- □ Apply capital budgeting projects using traditional methods.
- □ Analyze the main ways of raising capital and their respective advantages and disadvantages in different circumstances
- □ Integrate the concept and apply the financial concepts to calculate ratios and
- □ Understand the concept of capital budgeting

MARKETING MANAGEMENT:

Course Outcomes

- □ Students will demonstrate strong conceptual knowledge in the functional area of marketing management.
- □ Students will demonstrate effective understanding of relevant functional areas of marketing management.
- □ Students will demonstrate effective understanding of relevant functional areas of marketing management applications.
- □ Students will demonstrate analytical skills in identification and resolution of problems pertaining to marketing management.

HUMAN RESOURCE MANAGEMENT :

Course Outcomes

- □ To develop the understanding of the concept of human resource management and to understand its
- □ To develop necessary skill set for application of various HR issues.
- □ To analyse the strategic issues and strategies required to select and develop manpower resources.
- □ To integrate the knowledge of HR concepts to take correct business decisions.

BUSINESS RESEARCH METHODS:

Course Outcomes

- □ Develop understanding on various kinds of research, objectives of doing research, research process, research designs and sampling.
- □ Have basic knowledge on qualitative research techniques
- □ Have adequate knowledge on measurement & scaling techniques as well as the quantitative data analysis
- □ Have basic awareness of data analysis
- □ Have basic awareness of Hypothesis testing procedures

OPERATIONS MANAGEMENT:

Course Outcomes

- □ At the end of the course the students can apply the concept of operations management in manufacturing and service sector and will be able to plan and implement production and service related decisions.
- □ At the end of the course the student will be able to plan production schedules and plan resources (material and machine) required for production
- □ At the end of the course the students can design maintenance schedules in manufacturing units, identify and propose material handling equipments and implement industrial safety rules
- □ At the end of the course the students will be able to apply the concepts of purchase, stores and inventory management and analyze and evaluate material requirement decisions
- □ At the end of the course the students can measure performance related to productivity and will be able to conduct basic industrial engineering study on men and machines.

DATABASE MANAGEMENT SYSTEM:

Course Outcomes

- □ Identify the basic concepts and various data model used in database design ER modeling concepts and architecture use and design queries using SQL.

- □ Apply relational database theoryand be able to describe relational algebra expressions , tuple and domain relation expression fro queries.
- □ Recognize and identify the use of normalization and functional dependency , indexing and hashing technique used in database design.
- □ Recognize /identify the purpose of queryprocessing and optimization also demonstrate the basic of query evaluation.
- □ Apply and relate the concept of transaction, concurrency control and recovery in database.

R Programming :

Course Outcomes

- □ Install, Code and Use R Programming Language in R Studio IDE to perform basic tasks on Vectors, Matrices andData frames.
- □ Describe key terminologies, concepts and techniques employed in Statistical Analysis.
- □ Define, Calculate, Implement Probability and Probability Distributions to solve a wide variety of problems.
- □ Conduct and Interpret a variety of Hypothesis Tests to aid Decision Making.
- □ Understand, Analyze, Interpret Correlation and Regression to analyze the underlying relationship between different variables.

III Semester

Strategic Management Course Outcomes:

- □ To expose students to various perspectives and concepts in the field of Strategic Management
- □ The course would enable the students to understand the principles of strategy formulation, implementation and control in organizations.
- □ To help students develop skills for applying these concepts to the solution of business problems
- □ To help students master the analytical tools of strategic Management
- □ Understand the basic concepts and principles of strategic management analyse the internal and external environment of business

Operations Research Course Outcomes:

- □ Identify and develop operational research models from the verbal description of the real system. Understand the mathematical tools that are needed to solve optimisation problems.
- □ Use mathematical software to solve the proposed models.
- □ Develop a report that describes the model and the solving technique, analyse the results and propose recommendations in language understandable to the decision-making processes in Management Engineering.
- □ Proficiency with tools from optimization, probability, statistics, simulation, and engineering economic analysis, including fundamental applications of those tools in industry and the public sector in contexts involving uncertainty and scarce or expensive resources.
- □ Facility with mathematical and computational modeling of real decision-making problems, including the use of modeling tools and computational tools, as well as analytic skills to evaluate the problems.

Investment Analysis & Portfolio Management

- □ Course Outcomes: At the end of this course students should be able to:
- □ To provide a theoretical and practical background in the field of investments.
- □ Designing and managing the bond as well as equity portfolios in the real word.
- □ Detail relevant asset classes for investment and valuing equity and debt instruments.
- □ Define performance metrics of investment funds and measuring the portfolio performances.

Financial Markets and Services Course Outcomes:

- □ Understand the role and function of the financial system in reference to the macro economy.
- □ Demonstrate an awareness of the current structure and regulation of the Indian financial services sector.
- □ Evaluate and create strategies to promote financial products and services.

Managing Bank and Financial Institutions Course Outcomes:

- □ Recognize the topics related to banking and monetarypolicies, financial institutions and financial risks.
- □ Identify the different financial institutions and their instruments.
- □ Point out their practical skills in determining the interest rates
- □ Construct their professional and analytical skill with respect to the banking and financial operations and monetary tools.
- □ Develop appropriate effective written and oral communication skills relevant to banking and financial institutions.

MERGERS, ACQUISITIONS AND CORPORATE RESTRUCTURING

- □ Distinguish the forms of restructuring a company in Russia and abroad, the motivation and prerequisites of M&A deals, the specifics of legislative regulation
- □ Evaluate the effectiveness of the transaction, forecast the prospects and consequences of M&A deal
- □ Estimate the value of the target company of the merger or acquisition; • Build a strategy for external growth and development of the company through M&A
- □ Identify the tactics of hostile takeovers and define antitakeover measures
- □ Choose methods of financing transactions taking into account strategic, financial, tax aspects

Leadership and Change Management Course Outcomes:

- □ Students will understand the history of leadership and current leadership theories.
- □ , students will understand how leadership models are put into practice personally, locally, and globally.
- □ Students will gain knowledge of diverse cultures, cross-cultural communication, the dynamics of privilege and oppression, and the uses of power between groups.
- □ Students will understand how ethics, morals, and values relate to their leadership dilemmas.
- □ Students will be able to integrate their lived experiences into their leadership development process.

PERFORMANCE EVALUATION AND COMPENSATFION MANAGEMENT

Course Outcomes:

- □ Recognize how pay decisions help the organization achieve a competitive advantage.
- □ Analyze, integrate, and apply the knowledge to solve compensation related problems in organizations.
- □ Demonstrate comprehension by constructing a compensation system encompassing; 1) internal consistency, 2) external competitiveness 3) employee contributions,
- □ Demonstrate comprehension by constructing a compensation system encompassing organizational benefit systems, and administration issues.
- □ Design rational and contemporary compensation systems in modern organizations.

HUMAN CAPITAL MANAGEMENT

- about the new trends in human capital management
- about the work, competencies tasks and organization of Human Resource Specialist
- about basic processes related to Human Capital Management human capital potential and assessment and planning
- Recruiting and keeping proper candidates usage of human capital in organization and proper attitude toward human capital potential (openness to new trends)
- Better understanding of differences in human capital potential

MANPOWER PLANNING, RECRUITMENT, AND SELECTION

Course Outcomes:

- Integrated perspective on role of HRM in modern business. Ability to plan human resources and implement techniques of job design
- Competency to recruit, train, and appraise the performance of employees
- Rational design of compensation and salary administration
- Ability to handle employee issues and evaluate the new trends in HRM

IV Semester

Supply Chain Management and Analytics Course

- Develop a sound understanding of the important role of supply chain management in today's business environment
- Become familiar with current supply chain management trends Understand and apply the current supply chain theories, practices and concepts utilizing case problems and problem-based learningsituations
- Learn to use and apply computer-based supply chain optimization tools including the use of selected state of the art supply chain software suites currently used in business
- Develop and utilize critical management skills such as negotiating, working effectively within a diverse business environment, ethical decision making and use of information technology

- Demonstrate the use of effective written and oral communications, critical thinking, team building and presentation skills as applied to business problems

Innovation and Entrepreneurship Course Outcomes:

- Discuss the attitudes, values, characteristics, behaviour, and processes associated with possessing an entrepreneurial mindset and engaging in successful appropriate entrepreneurial behaviour.
- Discuss what is meant by entrepreneurship and innovation from both a theoretical and practical perspective,and the role of the entrepreneur in the new enterprise creation process.
- Describe the ways in which entrepreneurs perceive opportunity, manage risk, organise resources and addvalue
- Develop a plan for implementing entrepreneurial activities in a globalised and competitive environment beingresponsible for the social, ethical and culture issues.
- Critique a plan for implementing entrepreneurial activities in a globalised and competitive environment beingmindful of the social, ethical and culture issues.

International HRM

- □ Demonstrate an understanding of key terms, theories/concepts and practices within the field of IHRM
- □ Obtain, through elective courses, an in-depth knowledge of specific IHRM-related theories, skills and practices
- □ Appreciate the implications of increasing globalization for the management of human resources, with particular reference to IHRM in multinational corporations

- □ Develop and ability to undertake qualitative and quantitative research and apply this knowledge in the context of an independently constructed work (i.e. dissertation)
- □ Identify and appreciate the significance of ethical issues in HR practices and the management of people in the workplace.

Employee Relations and Engagement

- □ Identify and describe the meaning of employee engagement and its different components
- □ Appreciate the strategic issues associated with employee engagement
- □ Describe the changes in systems of employee relations
- □ Appreciate the impact of structures of management and ownership on employee engagement
- □ Reflect on the current state of employee engagement in an organisation.

Strategic HRM

- Identify the key HRM functions and operations;
- Define, explain, illustrate and reason with the key human resource management concepts;
- Identify the linkages between HRM functions and operations and organisational strategies, structures and culture;
- Reflect and comment in a way that demonstrates awareness of the different contexts that impact on the operation of HRM; and
- Exhibit behaviour and performance that demonstrates enhanced competence in decision-making, group leadership, oral and written communication, critical thinking, problem-solving, planning and teamwork.

Financial Derivatives

- □ Students who complete this program will be able understand financial innovations in equity and debt market.
- □ By the end of the program students will able to price the options ,futures and swaps using various models
- □ Graduates of the program will able to understand implications in using financial derivatives with special references to various cases

- □ Identifying main factors affecting the price of the considered instruments and basic techniques leading to no-arbitrage pricing of derivatives with the basic relationships between adjacent instruments.

- □ Understanding the methods and principles of the mathematical theory of finance as the foundation

  For options pricing.

Global Financial Management

- □ Identify the operations of the developed global financial markets, the trading of financial instruments, and the role of regulatory bodies
- □ 2. Apply competences with financial analytical skills required to evaluate the performance of the firm, including the interpretation of financial data
- □ Evaluate the financial instruments used in the equity and debt markets for funding the corporation
- □ Critically analyse the issues underlying the capital structure theory and practices to achieve the optimal debtto equity ratio
- □ Discuss advanced topics in corporate financial management including specialized topics such as international investments, foreign exchange management, and global portfolio management

Financial Risk Management

- □ Identify the key components of the Basel II framework;
- □ Be able to analyse market risk on a stand-alone basis applying VaR framework and ways to managemarket risk;
- □ Be able to analyse credit risk on a stand-alone basis applying a number of different approaches and waysto manage credit risk;
- □ Be able to analyze operational risk using the standardized approach and ways to manage operational risk;
- □ Develop a general risk management strategy for a financial institution;

Strategic Financial Management

- □ Demonstrate the applicability of the concept of Financial Management to understand the managerial Decisions and Corporate Capital Structure
- □ Apply the Leverage and EBIT EPS Analysis associate with Financial Data in the corporate
- □ Analyse the complexities associated with management of cost of funds in the capital Structure
- □ Demonstrate how the concepts of financial management and investment, financing and dividend policy decisions could integrate while identification and resolution of problems pertaining to LSCM Sector
- □ Demonstrate how risk is assessed

DEPARTMENT OF CIVIL ENGINEERING

COURSE OUTCOMES

II Year - I Semester

COMPLEX VARIABLES AND STATISTICAL METHODS

- Apply Cauchy-Riemann equations to complex functions in order to determine whether a given continuous function is analytic (L3)
- Find the differentiation and integration of complex functions used in engineering problems (L5)
- Make use of the Cauchy residue theorem to evaluate certain integrals (L3) and applydiscrete and continuous probability distributions (L3)
- Design the components of a classical hypothesis test (L6)
- Infer the statistical inferential methods based on small and large sampling tests (L4)

STRENGTH OF MATERIALS – I

- The student will be able to understand the basic materials behavior under the influence of different external loading conditions and the support conditions
- The student will be able to draw the diagrams indicating the variation of the key performance features like bending moment and shear forces
- The student will have knowledge of bending concepts and calculation of section modulus and for determination of stresses developed in the beams and deflections due to various loading conditions
- The student will be able to assess stresses across section of the thin cylinders to arrive at optimum sections to withstand the internal pressure using Lame's equation.
- The student will be able to assess stresses across section ofthe thick cylinders to arrive at optimum sections to withstand the internal pressure using Lame's equation.

FLUID MECHANICS

- Understand the various properties of fluids and their influence on fluid motion and analyse a variety of problems in fluid statics and dynamics.
- Calculate the forces that act on submerged planes and curves.
- Ability to analyse various types of fluid flows.
- Apply the integral forms of the three fundamental laws of fluid mechanics to turbulent and laminar flow through pipes and ducts in order to predict relevant pressures, velocities and forces.
- Able Measure the quantities of fluid flowing in pipes, tanks and channels.

SURVEYING AND GEOMETRICS

- Apply the knowledge to calculate angles, distances and levels
- Identify data collection methods and prepare field notes
- Understand the working principles of survey instruments, measurement errors and corrective measures
- Interpret survey data and compute areas and volumes, levels by different type of equipment
- The student should be in a position to relate the knowledge to the modern equipment and methodologies

BUILDING METERIALS, CONSTRUCTION AND PLANNING

- The student should be able to identify different building materials and their importance in building construction.
- The student is expected to differentiate brick masonry, stone masonry construction and use of lime and cement in various constructions.
- The student should have learnt the importance of building components and finishings.
- The student is expected to know the classification of aggregates, sieve analysis .
- The student should have learnt about moisture content usually required in building construction.

TRANPORTATION ENGINEERING – I

- Plan highway network for a given area.
- Determine Highway alignment and design highway geometrics.
- Design Intersections and prepare traffic management plans
- Judge suitability of pavement materials and design flexible pavements.
- Design of rigid pavements.

STRENGTH OF MATERIALS LAB

- Knowledge on Tension test
- Knowledge on Torsion test, Spring test.
- Knowledge on Compression Test.
- Knowledge on Hardness test.
- Knowledge on Shear test

CONSTITUTION OF INDIA

- Understand historical background of the constitution making and its importance for building a democratic India.
- Understand the functioning of three wings of the government ie., executive, legislative And judiciary.
- Understand the value of the fundamental rights and duties for becoming good citizen Of India.

- Analyze the decentralization of power between central, state and local self-government.
- Apply the knowledge in strengthening of the constitutional institutions like CAG Election Commission and UPSC for sustaining democracy.

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II Year – II Semester

STRENGTH OF MATERIALS – II

- The student will be able to understand the basic concepts of Principal stresses developed in a member when it is subjected to stresses along different axes and design the sections.
- The student can asses stresses in different engineering applications like shafts.
- The student can assess stresses in springs.
- The student should be in a position to calculate the stresses developed in columns subjected to different loading conditions
- The student should be in a position to calculate the stresses developed in struts subjected to different loading conditions

HYDRAULICS AND HYDRAULIC MACHINERY

Course Outcomes:

- The student should be in a position to know the different types of flows and to solve uniform open channel flow problems.
- Solve non uniform open channel flow problems.
- Apply the principles of dimensional analysis and similitude in hydraulic model testing.
- Understand the working principles of various turbines.
- Understand the working principles of various pumps.
-

ENGINEERING GELOGOY

- Identify and classify the geological minerals and Measure the rock strengths of various rocks
- Classify and measure the earthquake prone areas to practice the hazard zonation
- Classify, monitor and measure the Landslides and subsidence
- Prepares, analyses and interpret the Engineering Geologic maps and analyses the ground conditions through geophysical surveys. project construction.
- Investigate the project site for mega/mini civil engineering projects. Site selection for mega engineering projects like Dams, Tunnels, disposal sites etc.

TRANPORTATION ENGINEERING – II

- Design geometrics in a railway track.
- Plan track layouts and control movement of trains
- Design airport geometrics and airfield pavements.
- Plan, construct and maintain Docks.
- Plan,construct and maintain Harbours
-

ENVIRONMENTAL ENGINEERING- I

- Estimation of design population and water demand
- Identify the water source and select proper intake structure
- Characterization of water for drinking, industry and construction
- Design of water treatment plant for a village/city
- Selection and design of an ideal distribution system

ENGINEERING GEOLOGY LAB

Course Outcomes:

- Identify Mega scopic minerals & their properties.
- Identify Mega scopic rocks & their properties.
- Identify the site parameters such as contour, slope & aspect for topography
- . Know the occurrence of materials using the dip problems.
- Know the occurrence of materials using the strike problems.

TRANSPORTATION ENGINEERING LAB

- Test aggregates and judge the suitability of materials for the road construction
- Test the given bitumen samples and judge their suitability for the road construction
- Obtain the optimum bitumen content for Bituminous Concrete
- Determine the traffic volume, speed and parking characteristics.
- Draw highway cross sections and intersections.

FLUID MECHANICS AND HYDRAULIC MACHINERY LAB

- Venturimeter and Orifice meter.
- Knowledge on Impact of jets
- Determine the friction factor.
- Efficiency of centrifugal pump.
- Efficiency of Reciprocating pump

ESSENCE OF INDIAN KNOWLEDGE TRADITION

- . Understand philosophy of Indian culture.
- Distinguish the Indian languages and literature among difference traditions.
- Learn the philosophy of ancient, medieval and modern India.
- Acquire the information about the fine arts in India.
- .The essence of Yogic Science for Inclusiveness of society.

II Year – I Semester

STRUCTURAL ANALYSIS

□ Distinguish between the determinate and indeterminate structures.
□ Identify the behaviour of structures due to the expected loads, including the moving loads, acting on the structure.
□ Estimate the bending moment and shear forces in beams for different fixity conditions.
□ Analyze the continuous beams using various methods -, three moment method, slope deflection method, energy theorems.
□ Draw the influence line diagrams for various types of moving loads on beams/bridges.

CONCRETE TECHNOLOGY

□ Understand basic concepts of concrete.
□ Realize importance of quality of concrete.
□ Familiarize basic ingredients of concrete and their role in concrete and their behavior in thefield.
□ Evaluate ingredients of concrete through lab tests. design concrete mix by IS method.
□ Familiarize basic concepts of special concrete and their production and applications. Understand the behaviour of concrete in various environments.

WATER RESOURCES ENGINEERING – I

Course Outcomes:
□ Be able to quantify major hydrologic components and apply key concepts to several practicalareas of engineering hydrology and related design aspects
□ Develop Intensity-Duration-Frequency and Depth-Area Duration curves to design hydraulicstructures.
□ Be able to determine storage capacity and life of reservoirs and develop unit hydrograph andsynthetic hydrograph.
□ Be able to estimate flood magnitude and carry out flood routing.
□ be able to determine aquifer parameters and yield of wells and Ability to develop the hydrologicalmodels.

ENVIRONMENTAL ENGINEERING – II

□ Plan and design the sewerage systems by estimating the flow
□ Design of Plumbing for an apartment, Gated community or Hotels or Individual houses and Select the appropriate appurtenances in the sewerage systems
□ Estimation of BOD and COD and Suggest a suitable disposal method with respect to effluent standards, and Identify the critical point of pollution in a river for a specific amount of pollutant disposal into the river
□ Analyze sewage and design suitable treatment system for sewage treatment for a village/City.
□ Design of sewage treatment systems like Septic tank soak pit system and FAB reactor for buildings and understanding tertiary treatment of sewage.

PROGRAM ELECTIVE – I A). REPAIR & REHABILITATION OF BUILDINGS

Course Outcomes:
- □ Recognize the mechanisms of degradation of concrete structures and to design durable concrete structures and Conduct field monitoring and non-destructive evaluation of concrete structures.
- □ Design and suggest repair strategies for deteriorated concrete structures including repairing with composites and understand the methods of strengthening methods for concrete structures
- □ Assessment of the serviceability and residual life span of concrete structures by Visual inspection and in situ tests
- □ Evaluation of causes and mechanism of damage and Evaluation of actual capacity of the concrete structure Maintenance strategies
- □ Repair / Rehabilitate / Strengthening techniques by using traditional and advanced materials and techniques

PROGRAM ELECTIVE – I B) ENVIRONMENTAL IMPACT ASSESSMENT&MANAGEMENT

Course Outcomes

- □ Prepare EMP, EIS and EIA report, estimate cost benefit ratio of a project
- □ Selection of an appropriate EIA methodology
- □ Evaluation of impacts on environment
- □ Evaluation of risk assessment
- □ Know the latest acts and guidelines of MoEF& CC

PROGRAM ELECTIVE – I C). CONSTRUCTION TECHNOLOGY & MANAGEMENT

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

- □ Appreciate the importance of construction planning
- □ Understand the functioning of various earth moving equipment
- □ Know the methods of production of aggregate products and concreting and usage of machinery required for the works.
- □ Apply the gained knowledge to project management and construction techniques.
- □ The students shoud Know the applications of PERT & CTM.

CONCRETE TECHNOLOGY LAB

Course Outcomes:

□ Determine consistency and fineness of cement and determine setting times of cement.
□ Determine specific gravity and soundness of cement and determine compressive strength of cement.
□ Determine workability of cement concrete by compaction factor, slump and Vee – Bee tests
□ Determine specific gravity of coarse aggregate and fine aggregate by Sieve analysis.
□ Determine flakiness and elongation index of aggregates and determine bulking of sand.

III Year – II Semester

DESIGN AND DRAWING OF REINFORCED CONCRETE STRUCTURES

Course Outcomes:

- Work on different types of design methods
- Carryout analysis and design of flexural members and detailing
- Design structures subjected to shear, bond and torsion
- Design different type of compression members and footings
- Design different types of slabs.
-

WATER RESOURCES ENGINEERING – II

- □ Be able to estimate irrigation water requirements
- □ Ability to design irrigation canals and canal network and plan an irrigation system
- □ Design irrigation canal structures
- □ Plan and design diversion head works and analyse stability of gravity and earth dams
- □ Design ogee spillways and energy dissipation works

GEOTECHNICAL ENGINEERING – I

- □ The student must know the definition of the various quantities related to soil mechanics and establish their inter-relationships.
- □ The student should be able to know the methods of determination of the various index properties of the soils and classify the soils.
- □ The student should be able to know the importance of the different engineering properties of the soil such as compaction, permeability.
- □ The student should be able to know the importance of consolidation,shear strength and determine them in the laboratory.
- □ The student should be able to apply the above concepts in day-to-day civil engineering practice.

MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS
(Common to all Branches)

Course Outcomes:

□ The Learner is equipped with the knowledge of estimating the Demand and demand elasticitiesfor a product.

□ The knowledge of understanding of the Input-Output-Cost relationships and estimation of theleast cost combination of inputs.

□ The pupil is also ready to understand the nature of different markets and Price Outputdetermination under various market conditions and also to have the knowledge of different Business Units.

□ The Learner is able to prepare Financial Statements and the usage of various Accounting tools forAnalysis.

□ The Learner can able to evaluate various investment project proposals with the help ofcapitalbudgeting techniques for decision making.

PROGRAM ELECTIVE – II A). PRE-STRESSED CONCRETE

Course Outcomes:

□ Understand different methods of prestressing

□ The student should be in a position to know the importance of prestressed concrete with respect to the reinforced cement concrete.

□ Estimate effective prestress including short and long term losses

□ Analyze and design prestressed concrete beams under flexure and shear

□ Understand the relevant IS Code provisions for prestressed concrete.

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CAD LAB

Course Outcomes:

- Model the geometry of real-world structure
- Represent the physical model of structural element/structure
- Perform analysis
- Interpret from the Post processing results
- Design the structural elements and a system as per IS Codes

EVIRONMENTAL ENGINEERING LAB

Course Outcomes:

□ Estimate some important characteristics of water, wastewater and soil in the laboratory

□ Draw some conclusion and decide whether the water is suitable for Drinking/Construction / Agriculture/ Industry.

□ Estimate Chloride, EC and Salinity of Soil and suggest their suitability for Construction/Agriculture

□ Estimation of the strength of the sewage in terms of BOD and COD and Decide whether the water body is polluted or not with reference to the stated parameters in the list of experiments

□ Demonstration of various instruments used in testing of water and soil and study of Drinking water standards, WHO guidelines, Effluent standards and standards for Construction/ Agriculture/ Industry.

IV Year - I Semester

V ENVIRONMENTAL ENGINEERING –II

□ Plan and design the seweragesystems
□ Select the appropriate appurtenances in the sewerage systems
□ Analyze sewage and suggest and design suitable treatment system for sewagetreatment
□ Identify the critical point of pollution in a river for a specific amount of pollutant disposal intothe river
□ Suggest a suitable disposal method with respect to effluent standards.
□

WATER RESOURCES ENGINEERING–II

Course Outcomes:
□ Estimate irrigation water requirements design irrigation canals and canal network
□ Plan an irrigation system
□ Plan and design diversion head works
□ Analyze stability of gravity and earth dams
□ Design ogee spillways and energy dissipation works
□

GEOTECHNICAL ENGINEERING – II

Course Outcomes:
□ The student must be able to understand the various types of shallow foundations.
□ The student must be able to decide the type of foundation required for their location based on soilcharacteristics.
□ The student must be able to compute the magnitude of foundation settlement to decide the size ofthe foundation.
□ The student must be able to use the field test data and arrive at the bearing capacity.
□ The student must be able to design Piles based on the principles of bearing capacity
□ .

REMOTE SENSING AND GIS APPLICATIONS

Course Outcomes:
□ Be familiar with ground, air and satellite based sensor platforms.
□ Interpret the aerial photographs and satellite imageries
□ Create and input spatial data for GIS application
□ Apply RS and GIS concepts in water resources engineering
□ Applications of various satellite data

GROUND IMPROVEMENT TECHNIQUES
(Elective – I)

□ By the end of the course, the student should be able to possess the knowledge of various methodsof ground improvement and their suitability to different field situations.
□ The student should know the different dewatering techniques.
□ The student should be in a position to design a reinforced earth embankment and check itsstability.
□ The student should know the various functions of Geosynthetics and their applications in CivilEngineering practice.
□ The student should be able to understand the concepts and applications of grouting.
□

ENVIRONMENTAL IMPACT ASSESSMENT AND MANAGEMENT
(Elective – II)

□ Prepare EMP, EIS, and EIA report
□ Identify the risks and impacts of a project
□ Selection of an appropriate EIA methodology
□ Estimate the cost benefit ratio of a project
□ Know the role of stakeholder and public hearing in the preparation of EIA

GIS & CAD LAB

Course Outcomes:
□ Work comfortably on GISsoftware
□ Digitize and create thematic map and extract importantfeatures
□ Develop digital elevationmode
□ Use structural analysis software to analyze and design 2D and 3Dframes
□ Design and analyze retaining wall and simple towers using CADsoftware.

IRRIGATION DESIGN AND DRAWING

Course Outcomes:
□ The student *will* be able to design the surplus weir.
□ The student will be able to design the Tank sluice with tower head.
□ The student will be able to design the canal drop(Trapezoidal Notch)
□ The student will be able to design the canal regulator.
□ The student will be able to design the syphon aqueduct type-II & type III.

IV Year - II Semester

ESTIMATION SPECIFICATION & CONTRACTS

□ The student should be able to determine the quantities of different components of buildings.
□ The student will in a position to know the difference between center line method and long wall-short wall method.
□ The student should be in a position to find the cost of various building components.
□ The student should be capable of finalizing the value of structures.
□ The student will be able to calculate the total cost of the structure.

CONSTRUCTION TECHNOLOGY AND MANAGEMENT

Course Outcomes:

□ Appreciate the importance of construction planning
□ Understand the functioning of various earth moving equipment
□ Know the methods of production of aggregate products and concreting and usage of machineryrequired for the works.
□ Apply the gained knowledge to project management and construction techniques
□ The student should be in a position to know the application of PERT & CPM

PRESTRESSED CONCRETE

Course Outcomes:

□ Understand the different methods of pre-stressing
□ Estimate effective pre-stress including the short and long term losses
□ The student should be in a position to know the importance of pre-stressed concrete with respect tothe reinforced cement concrete.
□ Analyze and design pre-stressed concrete beams under flexure and shear
□ Understand the relevant IS Codal provisions for pre-stressed concrete.

SOLID AND HAZARDOUS WASTE MANAGEMENT

Course Outcomes:

□ Design the collection systems of solid waste of a town
□ Design treatment of municipal solid waste and landfill
□ Know the criteria for selection of landfill
□ Characterise the solid waste and design a composting facility
□ Know the Method of treatment and disposal of Hazardous wastes.

COMPUTER SCIENCE & ENGINEERING
II Year –I Semester

MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE

Course Outcomes:

At the end of the course student will be able to

1. Demonstrate skills in solving mathematical problems
2. Comprehend mathematical principles and logic
3. Demonstrate knowledge of mathematical modeling and proficiency in using Mathematical software
4. Manipulate and analyze data numerically and/or graphically using Appropriate Software
5. Communicate effectively mathematical ideas/results verbally or inwriting

SOFTWARE ENGINEERING

Students taking this subject will gain software engineering skills in the following areas:

1. Ability to transform an Object-Oriented Design into high quality, executable code
2. Skills to design, implement, and execute test cases at the Unit and Integration level
3. Compare conventional and agile software methods.
4. To gain the knowledge of how Analysis, Design, Implementation, Testing and Maintenance processes are conducted in a software project.
5. To provide an idea of using various process models in the software industry according to given circumstances.

PYTHON PROGRAMMING

Course Outcomes:

1. Develop essential programming skills in computer programming concepts like data types, containers.
2. Apply the basics of programming in the Python language
3. Solve coding tasks related conditional execution, loops.
4. Solve coding tasks related to the fundamental notions and techniques used in object – oriented programming
5. Use various applications using python.

DATA STRUCTURES

After completing this course a student will be able to:

1. Summarize the properties, interfaces, and behaviors of basic abstract datatypes
2. Discuss the computational efficiency of the principal algorithms for sorting & searching
3. Use arrays, records, linked structures, stacks, queues in writing Programs.
4. Demonstrate different methods for traversing trees.
5. Ability to have knowledge of tree and graphs concepts.

OBJECT ORIENTED PROGRAMMING THROUGH C++

1. Classify object oriented programming and procedural programming.
2. Apply C++ features such as composition of objects, operator overloads, dynamic memory allocation, inheritance and polymorphism, file I/O, exception handling
3. Build C++ classes using appropriate encapsulation and design principles
4. Apply object oriented or non-object oriented techniques to solve bigger computing problems.
5. Illustrate the process of data file manipulations using C++

COMPUTER ORGANIZATION

Course Outcomes:

By the end of the course, the student will

1. Develop a detailed understanding of computer systems
2. Able to design different number systems, binary addition and subtraction, standard, floating-point, and micro operations
3. Develop a detailed understanding of architecture and functionality ofcentral processing unit
4. Exemplify in a better way the I/O and memoryorganization
5. Illustrate concepts of parallelprocessing, pipelining and inter processor communication

PYTHON PROGRAMMING LAB

Course Outcomes:

By the end of this lab, the student is able to

1. Write, Test and Debug Python Programs
2. Use Conditionals and Loops for Python Programs
3. Use functions and represent Compound data using Lists,Tuples and Dictionaries
4. Use various applications using python
5. Use Python for data analysis.

DATA STRUCTURES THROUGH C++ LAB

Course Outcomes:

By the end of this lab the student is able to

1. Apply the various OOPs concepts with the help of programs.
2. Use basic data structures such as arrays and linked list.
3. Programs to demonstrate fundamental algorithmic problems including Tree Traversals, Graph traversals, and shortest paths.
4. Use various searching and sorting algorithms.
5. Illustrate concepts of parallelprocessing, pipelining and inter processor communication

COMPUTER SCIENCE &ENGINEERING

II Year –II Semester

JAVA PROGRAMMING

Course Outcomes:

By the end of the course, the student will be

1. Able to realize the concept of Object Oriented Programming & Java Programming Constructs Able to describe the basic concepts of Java such as operators, classes, objects, inheritance, packages, Enumeration and various keywords
2. Apply the concept of exception handling and Input/ Output operations
3. Able to design the applications of Java & Java applet
4. Able to Analyze & Design the concept of Event Handling and Abstract Window Toolkit.
5. Able to Create Multithreaded programs.

OPERATING SYSTEMS

Course Outcomes:

After learning, the course the students should be able to:

1. Describe various generations of Operating System and functions of Operating System
2. Describe the concept of program, process and thread and analyze various CPU Scheduling Algorithms and compare their performance
3. Solve Inter Process Communication problems using Mathematical Equations by various methods
4. Compare various Memory Management Schemes especially paging and Segmentation in Operating System and apply various Page Replacement Techniques
5. Outline File Systems in Operating System like UNIX/Linux and Windows

DATABASE MANAGEMENT SYSTEMS

Course Outcomes:

By the end of the course, the student will be able to

1. Describe a relational database and object-oriented database
2. Create, maintain and manipulate a relational database using SQL
3. Describe ER model and normalization for database design
4. Examine issues in data storage and query processing and can formulate appropriate solutions
5. Outline the role and issues in management of data such as efficiency, privacy,security, ethical responsibility, and strategic advantage

FORMAL LANGUAGES AND AUTOMATA THEORY

1. Classify machines by their power to recognize languages.
2. Summarize language classes & grammars relationship among them with the help of Chomsky hierarchy
3. Employ finite state machines to solve problems in computing
4. Illustrate deterministic and non-deterministic machines
5. Quote the hierarchy of problems arising in the computer science

JAVA PROGRAMMING LAB

Course Outcomes:

By the end of the course student will be able to write java program for

- Evaluate default value of all primitive data type, Operations, Expressions, Control-flow, Strings
- Determine Class, Objects, Methods, Inheritance, Exception, Runtime Polymorphism, Userdefined Exception handling mechanism
- Illustrating simple inheritance, multi-level inheritance, Exceptionhandling mechanism
- Construct Threads, Event Handling, implement packages, developing applets.
- Construct Mutli threded programmes.

UNIX OPERATING SYSTEM LAB

Course Outcomes:

1. To use Unix utilities and perform basic shell control ofthe utilities
2. To use the Unix file system and file access control
3. To use of an operating systemto develop software
4. Students will be able to use Linux environment efficiently
5. Solve problems using bash for shell scripting

DATABASE MANAGEMENT SYSTEMS LAB

Course Outcomes:

At the end of the course the student will be able to:

1. Utilize SQL to execute queries for creating database and performingdata manipulation operations
2. Examine integrity constraints to build efficient databases
3. Apply Queries using Advanced Concepts of SQL
4. Build PL/SQL programs including stored procedures, functions, cursors and triggers.
5. Able to develop a database and connect to front end.

III Year - I Semester

S. No.	Subjects	L	T	P	Credits
1	Compiler Design	4	--	--	3
2	Unix Programming	4	--	--	3
3	Object Oriented Analysis and Design using UML	4	--	--	3
4	Database Management Systems	4	--	--	3
5	Operating Systems	4	--	--	3
6	Unified Modeling Lab	--	--	3	2
7	Operating System & Linux Programming Lab	--	--	3	2
8	Database Management System Lab	--	--	3	2
MC	Professional Ethics & Human Values	--	3	--	--
	Total Credits				**21**

Compiler Design

Course Outcomes:

1. Acquire knowledge in different phases and passes of Compiler, and specifying different types of tokens by lexical analyzer.
2. Able to use the Compiler tools like LEX, YACC, etc.
3. Parser and its types i.e. Top-down and Bottom-up parsers.
4. Construction of LL, SLR, CLR and LALR parse table. •Syntax directed translation, synthesized and inherited attributes.
5. Techniques for code optimization.

- Documentation will demonstrate good organization and readability.
- File processing projects will require data organization, problem solving and research.
- Scripts and programs will demonstrate simple effective user interfaces.
- Scripts and programs will demonstrate effective use of structured programming.
- Testing will demonstrate both black and glass box testing strategies.

Object Oriented Analysis & Design Using Uml

Course Outcomes:

1. Ability to find solutions to the complex problems using object oriented approach
2. Represent classes, responsibilities and states using UML notation
3. Identify classes and responsibilities of the problem domain.
4. Able to design a system using UML.
5. Can able to work on forward and reverse engineering.

Data Base Management Systems

Course Outcomes:

a. Describe a relational database and object-oriented database. •Create, maintain and manipulate a relational database using SQL
b. Describe ER model and normalization for database design. •Examine issues in data storage.
c. Describe query processing and can formulateappropriate solutions.
d. Understand the role and issues in management of data such as efficiency, privacy, security, ethical responsibility, and strategicadvantage.

2. Design and build database system for a given real world problem

Operating Systems

1. Design various Scheduling algorithms.
2. Apply the principles of concurrency.
3. Design deadlock, prevention and avoidance algorithms.
4. Compare and contrast various memory management schemes. •Design andImplementa prototype file systems.
5. Perform administrative tasks on Linux Server.

Unified Modeling Lab

Course Outcomes:

- Understand the Case studies and design the Model.
- Understand how design patterns solve design problems.
- Develop design solutions using creational patterns.
- Develop Solutions on Design patterns.
- Understand Structure of Modeling

Operating Systems And Linux Programming Lab

Course Outcomes:

1. To use Unix utilities and perform basic shell control of the utilities
2. To use the Unix file system and file access control.
3. To use of an operating system to develop software.
4. Students will be able to use Linux environment efficiently •Solve problems using bash forshell scripting
5. Will be able to implement algorithms to solve data mining problems using weka tool

Data Base Management System Lab

1. Understand, appreciate and effectively explain the underlying concepts of database technologies
2. Design and implement a database schema for a given problem-domain
3. Normalize a database
4. Populate and query a database using SQL DML/DDL commands.
5. Design and build a GUI application using a 4GL

III Year - II Semester

S. No.	Subjects	L	T	P	Credits
1	Computer Networks	4	2	--	3
2	Data Warehousing and Mining	4	--	--	3
3	Design and Analysis of Algorithms	4	--	--	3
4	Software Testing Methodologies	4	--	--	3
5	**Open Elective:** i. Artificial Intelligence ii. Internet of Things iii Cyber Security iv.Digital Signal Processing v.Embbeded Systems vi. Robotics	4	--	--	3
6	Network Programming Lab	--	--	3	2
7	Software Testing Lab	--	--	3	2
8	Data Warehousing and Mining Lab	--	--	3	2
9	IPR & Patents	--	2	--	--
	Total Credits				**21**

Computer Networks Course Outcomes:

1. Understand OSI and TCP/IP models
2. Analyze MAC layer protocols and LAN technologies
3. Design applications using internet protocols
4. Understand routing and congestion control algorithms
5. •Understand how internetworks

Data Ware Housing And Data Mining

Course Outcomes:

1. Understand stages in building a Data Warehouse
2. Understand the need and importance of preprocessing techniques
3. Understand the need and importance of Similarity and dissimilarity techniques
4. Analyze and evaluate performance of algorithms for Association Rules.
5. Analyze Classification and Clustering algorithms

Design And Analysis Of Algorithms

Course Outcomes:

Students who complete the course will have demonstrated the ability to do the following:

1. Argue the correctness of algorithms using inductive proofs and invariants.

2. Analyze worst-case running times of algorithms using asymptoticanalysis.

3. Describe the divide-and-conquer paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm. Synthesize divide-and-conquer algorithms. Derive and solve recurrences describing the performance of divide-and-conquer algorithms.

4. Describe the dynamic-programming paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm. Synthesized ynamic-programming algorithms, and analyze them.

5. Describe the greedy paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm. Synthesize greedy algorithms, and analyze them.

Software Testing Methodologies

1. Understand the basic testing procedures.
2. Able to support in generating test cases and test suites.
3. Able to test the applications manually by applying different testing methods andautomation tools.
4. Apply tools to resolve the problems in Real time environment.
5. Able to support in generating test cases and test suites.

Artificial Intelligence

a. Identify problems that are amenable to solution by AI methods, and which AI methods may be suited to solving a given problem.

b. Formalize a given problem in the language/framework of different AI methods (e.g.,as a search problem, as a constraint satisfaction problem, asa planning problem, as a Markov decision process, etc).

c. Implement basic AI algorithms (e.g., standard search algorithms or dynamic programming).

d. Design and carry out an empirical evaluation of different algorithms.

e. Design of problem formalization, and state the conclusions that the evaluation supports.

Cyber Security

1. Cyber Security architecture principles
2. Identifying System and application security threats and vulnerabilities
3. Identifying different classes of attacks
4. Cyber Security incidents to apply appropriate response
5. Describing risk management processes and practices

Network Programming Lab

1. Understand and explain the basic concepts of Grid Computing;
2. Explain the advantages of using Grid Computing within a given environment;
3. Prepare for any upcoming Grid deployments and be able to get started with a potentially available Grid setup.
4. Discuss some of the enabling technologies e.g. high-speed links and storage are a networks.
5. Build computer grids.

Software Testing Lab

1. Find practical solutions to the problems
2. Solve specific problems alone or in teams
3. Manage a project from beginning to end
4. Work independently as well as in teams.
5. Students shall able to identify all types of testing's.

IV Year - II Semester

S. No.	Subjects	L	T	P	Credits
1	Distributed Systems	4	--	--	3
2- HS	Management Science	4	--	--	3
3	Machine Learning	4	--	--	3
4	**Elective-III** i.Concurrent and Parallel Programming ii.Artificial Neural Networks iii. Operations Research	4	--	--	3
5	Seminar	--	3	--	2
6	Project	--	--	--	10
	Total Credits				**24**

DISTRIBUTED SYSTEMS

Course Outcomes:

1. Develop a familiarity with distributed file systems.
2. Describe important characteristics of distributed systems and the salientarchitectural features of such systems.
3. Describe the features and applications of important standard protocolswhich are used in distributed systems.
4. Gaining practical experience of inter-process communication in a distributed environment.
5. Gain Knowledge on Hadoop File Systems.

MACHINE LEARNING OUTCOMES:

1. Recognize the characteristics of machine learning that make it useful toreal-world Problems.
2. Characterize machine learning algorithms as supervised, semi-supervised, and Unsupervised.
3. Be able to use support vector machines.
4. Be able to use regularized regression algorithms.
5. Understand the concept behind neural networks for learning non-linear functions.

ARTIFICIAL NEURAL NETWORKS

1. This course has been designed to offer as a graduate-level/ final year undergraduate level elective subject to the students of any branch of engineering/ science, having basic foundations of matrix algebra, calculus and preferably (not essential) with a basic knowledge of optimization.
2. Students and researchers desirous of working on pattern recognition and classification, regression and interpolation from sparse observations; control and optimization are expected to find this course useful.
3. The course covers theories and usage of artificial neural networks (ANN) for problems pertaining to classification (supervised/ unsupervised) andregression.
4. The course starts with some mathematical foundations and the structures of artificial neurons, which mimics biological neurons in a grossly scaled down version. It offers mathematical basis of learning mechanisms through ANN.

□ The course introduces perceptrons, discusses its capabilities and limitations as a pattern classifier and later develops concepts of multilayer perceptrons with back propagation learning.

COMPUTER SCIENCE & ENGINEERING
IV Year –I Semester

CRYPTOGRAPHY AND NETWORK SECURITY

1. To be familiarity with information security awareness and a clear understanding of its importance.
2. To master fundamentals of secret and public cryptography
3. To master protocols for security services
4. To be familiar with network security threats and countermeasures
5. To be familiar with network security designs using available secure solutions (such asPGP,SSL,IPSec, etc)

SOFTWARE ARCHITECTURE AND DESIGN PATTERNS

WEBTECHNOLOGIES

1. Analyze a web page and identify its elements and attributes.
2. Create web pages using XHTML and Cascading Styles sheets.
3. Build dynamic web pages.
4. Build web applications using PHP.
5. Write simple client-side scripts using AJAX

BIG DATA ANALYTICS
(Elective - 1)

1. Preparing for data summarization, query, and analysis.
2. Applying data modeling techniques to large data sets
3. Creating applications for Big Data analytics
4. Building a complete business data analytic solution.
5. Understand HADOOP Eco Systems.

INFORMATION RETRIEVAL SYSTEMS
(Elective - 1)

1. Identify basic theories in information retrieval systems
2. Identify the analysis tools as they apply to information retrieval systems
3. Understands the problems solved in current IR systems
4. Understand the difficulty of representing and retrieving documents.
5. Understand the latest technologies for linking, describing and searching the web.

MOBILE COMPUTING
(Elective - 1)

OUTCOMES:

1. Able to think and develop new mobile application.
2. Able to take any new technical issue related to this new paradigm and come up with asolution(s).
3. Able to develop new ad hoc network applications and/or algorithms/protocols.
4. Able to understand any existing or new protocol related to mobile environment.
5. Able to develop new ad hoc network applications

CLOUD COMPUTING
(Elective - 2)

OUTCOMES:

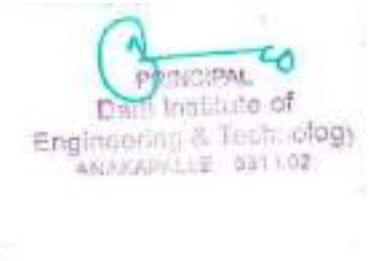
1. Understanding the key dimensions of the challenge of Cloud Computing Assessment of the economics , financial, and technological implications for selecting cloud computing for ownorganization
2. Assessing the financial, technological, and organizational capacity of employer's for actively initiating and installing cloud-based applications.
3. Assessment of own organizations' needs for capacity building and training incloud computing-related IT areas.
4. To match organizational needs to the most effective software development model To understand the basic concepts and issues of software project management

SOFTWARE PROJECT MANAGEMENT

(Elective - 2)

OUTCOMES:

1. To match organizational needs to the most effective software development model
2. To understand the basic concepts and issues of software project management
3. To effectively Planning the software projects
4. To implement the project plans through managing people, communications and change
5. To select and employ mechanisms for tracking the software projects



	M.Tech (Systems and signal processing)	**DEPARTMENT OF ECE**	**ACADEMIC YEAR:2020-21**	
		I-I SEMESTER		
	COURSE NAME	**CO NUMBER**	**COURSE OUTCOMES**	
	Image & Video Processing	**CO1**	**Perform image manipulations and different digital image processing techniques**	
		CO2	**Design and implement algorithms that perform Enhancement, ,Image transforms and restoration techniques on image.**	
		CO3	**Design and implement algorithms for segmentation, compression,**	
		CO4	**Perform the filtering operations and sampling of video**	
		CO5	**Analyze the different motion estimation algorithms used in video processing**	
	COURSE NAME	**CO NUMBER**	**COURSE OUTCOMES**	
	Advanced signal Processing	**CO1**	**Analyze the various filters FFT,IIR,FIR filters**	
		CO2	**understand the multirate signal processing**	
		CO3	**Estimate thespectra from finite duration of signals**	
		CO4	**implement the digital filters**	
		CO5	**Analyze the parametric methods of power spectrum estimation**	
	COURSE NAME	**CO NUMBER**	**COURSE OUTCOMES**	
		CO1	**Understand the concepts of Signal models and characterization.**	
		CO2	**To analyise the concept of Spectral Estimation.**	
		CO3	**To understand concept of filtering and signal stastical parameter estimation**	
		CO4	**To analyise Eigen structure based requency Estimation.**	
	Statistical Signal Processing	**CO5**	**Understand the concepts of Signal weiner filtering**	
	COURSE NAME	**CO NUMBER**	**COURSE OUTCOMES**	
		CO1	**Understand the basics of codingtheories and linear block codes.**	
		CO2	**Understand different types of cyclic codes.**	
		CO3	**Understand different types of convolution codes.**	
		CO4	**Understand different types of burst error correcting codes.**	
	Coding Theory and Applications	**CO5**	**Understand different Types of BCH codes.**	
	COURSE NAME	**CO NUMBER**	**COURSE OUTCOMES**	
		CO1	**Understand the concepts of Signal models and characterization.**	
		CO2	**To analyise the concept of Spectral Estimation.**	
		CO3	**To understand concept of filtering and signal stastical parameter estimation**	
		CO4	**To analyise Eigen structure based requency Estimation.**	
	Statistical Signal Processing	**CO5**	**Understand the concepts of Signal weiner filtering**	
	COURSE NAME	**CO NUMBER**	**COURSE OUTCOMES**	
		CO1	**Perform the Basic Operations on Signals**	
		CO2	**Perform the time domain signal to frequency domain signals using fourier transform, Periodogram**	

		CO3	Design IIR Digital filters.
		CO4	Design FIR Digital filters.
	Signal Processing Laboratory	CO5	Design the Noch filter
	I YEAR II SEMESTER		
	COURSE NAME	CO NUMBER	COURSE OUTCOMES
	PATTERN RECOGNITION AND MACHINE LEARNING	CO1	Study the parametric and linear models for classification
		CO2	Design neural network and SVM for classification
		CO3	Develop machine independent and unsupervised learning techniques
		CO4	Application of machine learning concepts in real life problems.
		CO5	Analyze various pattern recognition algorithms
	COURSE NAME	CO NUMBER	COURSE OUTCOMES
	WIRELESS SENSOR NETWORKS	CO1	Design wireless sensor network system for different applications under consideration
		CO2	Understand the hardware details of different types of sensors and select right type of sensor for various applications.
		CO3	Understand radio standards and communication protocols to be used for wireless sensor network based systems and application.
		CO4	Use operating systems and programming languages for wireless sensor nodes, performance of wireless sensor networks systems and platforms.
		CO5	Handle special issues related to sensors like energy conservation and security challenges
	COURSE NAME	CO NUMBER	COURSE OUTCOMES
	Detection and Estimation Theory	CO1	Understanding the basic concepts and models of random signals
		CO2	To understand the complexity of receivers design and principles behind target detection.
		CO3	To know how the signals corrupted in noise could be meaningfully estimated for navigation , guidance purposes.
		CO4	Examine the performance of signal parameters using optimal estimators.
		CO5	Analyze signal estimation in discrete-time domain using filters.
	COURSE NAME	CO NUMBER	COURSE OUTCOMES
	BIOMEDICAL SIGNAL PROCESSING	CO1	Understand different types of biomedical signal
		CO2	Identify and analyze different biomedical signals
		CO3	Find applications related to biomedical signal processing
		CO4	Analyze Biomedical signal processing by fourier analysis
		CO5	To analyse the Application areas of Bio–Signals analysis Multi Resolution Analysis(MRA) and wavelets
	COURSE NAME	CO NUMBER	COURSE OUTCOMES
	Advanced Signal Processing Laboratory	CO1	Study of various addressing modes of Digital Signal Processor
		CO2	Implementation of FIR filters on DSProcessor
		CO3	Verification of Finite word length effects on the given data
		CO4	Implementation of various Image segmentation techniques
		CO5	Extraction of frames from given Video signals
	IIISEMESTER		
	COURSE NAME	CO NUMBER	COURSE OUTCOMES

	ARTIFICIAL INTELLIGENCE	**CO1**	**Understand the concept of Artificial Intelligence, and knowledge representation issues**	
		CO2	**Understanding reasoning and fuzzy logic for artificial intelligence**	
		CO3	**Understanding game playing**	
		CO4	**Understand the concept of natural language processing**	
		CO5	**Understand the concept of knowledge representation issues**	

COURSE NAME		MTECH (POWER AND INDUSTRIAL DRIVES) ACADEMIC YEAR:2020-21 SEMESTER I
Electrical Machines Modeling and Analysis	CO1	Analyze the characteristics of different types of DC motors to design suitable controllers for different applications.
	CO2	Apply the knowledge of reference frame theory for AC machines to model the induction and Synchronous machines.
	CO3	Evaluate the steady state and transient behavior of induction and synchronous machines to propose the suitability of drives for different industrial applications
	CO4	Analyze the behavior of induction machines using voltage and torque equations.
Analysis of Power Electronic Converters	CO1	Describe and analyze the operation of AC-DC converters.
	CO2	Analyze the operation of power factor correction converters.
	CO3	Analyze the operation of three phase inverters with PWM control.
	CO4	Study the principles of operation of multi- level inverters and their applications
Power Quality and Custom Power Devices	CO1	Identify the issues related to power quality in power systems.
	CO2	Address the problems of transient and long duration voltage variations in power systems.
	CO3	Analyze the effects of harmonics and study of different mitigation techniques.
	CO4	Identify the importance of custom power devices and their applications.
	CO5	Acquire knowledge on different compensation techniques to minimize power quality disturbances
HVDC Transmission and Flexible AC Transmission Systems	CO1	Compare HVDC and EHVAC transmission systems
	CO2	Analyze converter configurations used in HVDC and evaluate the performance metrics.
	CO3	Understand controllers for controlling the power flow through a dc link and compute filter Parameters.
	CO4	Apply impedance, phase angle and voltage control for real and reactive power flow in ac transmission systems with FACTS controller.
	CO5	Analyze and select a suitable FACTS controller for a given power flow condition...
Research Methodology and IPR	_	
		SEMESTER II
Switched Mode Power Conversion	CO1	Analyze operation and control of non-isolated and isolated switch mode converters.
	CO2	Design of non-isolated and isolated switch mode converters.
	CO3	Analyze operation and control of resonant converters.
	CO4	Feedback design of switch mode converters based on linearized models.
Power Electronic Control of Electrical Drives	CO1	Understand the concepts of scalar and vector control methods for drive systems.
	CO2	Analyze and design controllers and converters for induction motor, PMSM and BLDC drives.
	CO3	Select and implement proper control techniques for induction motor and PMSM for specific applications.
	CO4	Analyze and design control techniques and converters for SRM drives.
Control & Integration of Renewable Energy S	CO1	Gain knowledge on different renewable energy sources and storage devices Recognize, model and
	CO2	simulate different renewable energy sources
	CO3	Analyze, model and simulate basic control strategies required for grid connection
	CO4	Implement a complete system for standalone/grid connected system
Hybrid Electric Vehicles	CO1	Know the concept of electric vehicles and hybrid electric vehicles.
	CO2	Familiar with different motors used for hybrid electric vehicles.
	CO3	Understand the power converters used in hybrid electric vehicles
	CO4	Know different batteries and other energy storage systems.
DIGITAL CONTROL SYSTEMS	CO1	Analyze digital control systems using Z-transforms and Inverse Z-Transforms.
	CO2	Evaluate the state transition matrix and solve state equation for discrete model for continuous time systems, investigate the controllability and observability.
	CO3	Determine the stability; design state feedback controller.
	CO4	Design an observer.· Solve a given optimal control problem
Advanced Digital Signal Processing	CO1	Describe structure of digital filters. Design digital filters with different techniques.
	CO2	Understand the implementation aspects of signal processing algorithms.
	CO3	Know the effect of finite word length in signal processing.
	CO4	Analyze different power spectrum estimation techniques.

Applications of Power Converters	**CO1**	**Analyze power electronic application requirements.**	
	CO2	**Identify suitable power converter from the available configurations.**	
	CO3	**Develop improved power converters for any stringent application re**	
	CO4	**Improvise the existing control techniques to suit the application.**	
	CO5	**Design of Bi-directional converters for charge/discharge applications**	
Microcontrollers	**CO1**	**Design the interfacing circuits for input and output to PIC micro co**	
	CO2	**Write ALP for DSP processors.**	
	CO3	**Design PWM controller for power electronic circuits using FPGA.**	
	SEMESTE	**R III**	
Digital Signal Processor Controlled Drives	**CO1**	**Interface the DSP platform with sensors such as hall-effect voltage sensors,**	
	CO2	**Use hall-effect current sensors, shaft encoder for data acquisition for motor drive applications**	
	CO3	**Scale and normalize the data to suit the requirements of the drive system**	
	CO4	**Exploit the architectural features of the DSP platform to design and implement**	
	CO5	**Use algorithms for the realization of controllers, Pulse Width Modulators and observers**	
Smart Grid Technologies	**CO1**	**Understand smart grids and analyze the smart grid policies and developments in smart grids.**	
	CO2	**Develop concepts of smart grid technologies in hybrid electrical vehicles etc.**	
	CO3	**Understand smart substations, feeder automation, GIS etc.**	
	CO4	**Analyze micro grids and distributed generation systems.**	
	CO5	**Analyze the effect of power quality in smart grid and to understand latest developments in ICT for smart grid.**	
Modeling and Simulation of Power Electronic Systems	**CO1**	**Understand the back ground activities i.e. numerical solution used in the simulation software.**	
	CO2	**Can judge or properly choose the required numerical solver to be used for analysis.**	
	CO3	**Can understand and debug the convergence problems occurring during simulation.**	
Industrial Safety	**CO1**	**Understand the general industrial requirements like lighting, cleanliness prevention from hazards and accidents.**	
	CO2	**Analyze maintenance requirements of the industry and cost associated.**	
	CO3	**Analyze wear and corrosion aspects of the industry and their prevention.**	
	CO4	**Identify the faults prone areas and their repair and periodic maintenance**	
Energy Audit Conservation & Management	**CO1**	**Understand the principle of energy audit and their economic aspects.**	
	CO2	**Recommend energy efficient motors and design good lighting system.**	
	CO3	**Understand advantages to improve the power factor.**	
	CO4	**Evaluate the depreciation of equipment.**	
Composite Materials	**CO1**	**Understand characteristics and advantages of composite materials**	
	CO2	**Acquire knowledge of reinforcement, glass fiber, etc.**	
	CO3	**Identify the usage of metal matrix composites**	
	CO4	**Understand manufacturing of polymer matrix composites**	
	CO5	**Understand manufacturing of polymer matrix composites , Identify different types of failures.**	

M.Tech

SEMESTER I

Course Name	COs	Course Outcome description
MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE	CO1	To apply the basic rules and theorems of probability theory such as Baye's Theorem, to determine probabilities that help to solve engineering problems and to determine the expectation and variance of a random variable from its distribution.
	CO2	Able to perform and analyze of sampling, means, proportions, variances and estimates the maximum likelihood based on population parameters.
	CO3	To learn how to formulate and test hypotheses about sample means, variances and proportions and to draw conclusions based on the results of statistical tests
	CO4	Design various ciphers using number theory.
	CO5	□ Apply graph theory for real time problems like network routing problem.
ADVANCED DATA STRUCTURES AND ALGORITHM ANALYSIS	CO1	Be able to understand and analyse some fundamental data structures, such as binary search trees, disjoint sets, and self-adjusting lists
	CO2	Understand the implementation and complexity analysis of fundamental algorithms such as RSA, primality testing, max flow, discrete Fourier transform
	CO3	Have been exposed to algorithmic issues in a variety of areas, including linear programming and game-theory
	CO4	Have some familiarity with randomised algorithms and approximation algorithms
	CO5	choose appropriate data structures and algorithms, understand the ADT/libraries, and use it to design algorithms for a specific problem.
BIG DATA ANALYTICS	CO1	Identify Big Data and its Business Implications.
	CO2	List the components of Hadoop and Hadoop Eco-System
	CO3	Access and Process Data on Distributed File System
	CO4	Manage Job Execution in Hadoop Environment
	CO5	Develop Big Data Solutions using Hadoop Eco System
OBJECT ORIENTED SOFTWARE ENGINEERING	CO1	Apply the Object Oriented Software-Development Process to design software
	CO2	Analyze and Specify software requirements through a SRS documents.
	CO3	Design and Plan software solutions to problems using an object-oriented strategy.
	CO4	Model the object oriented software systems using Unified Modeling Language (UML)
	CO5	Estimate the cost of constructing object oriented software
Advanced Data Structures & Algorithms Lab	CO1	Identify classes, objects, members of a class and relationships among them needed for a specific problem
	CO2	Examine algorithms performance using Prior analysis and asymptotic notations
	CO3	Organize and apply to solve the complex problems using advanced data structures - arrays,stacks, queues, linked lists
	CO4	Organize and apply to solve the complex problems using advanced data structures-graphs and trees
	CO5	Apply and analyze functions of Dictionary
Advanced Computing Lab	CO1	The student should have hands on experience in using various sensors like temperature, humidity,smoke, light, etc.
	CO2	Should be able to use control web camera, network, and relays connected to the Pi.
	CO3	Development and use of s IoT technology in Societal and Industrial Applications
	CO4	Skills to undertake high quality academic and industrial research in Sensors and IoT
	CO5	To classify Real World IoT Design Constraints, Industrial Automation in IoT

SEMESTER-II

MACHINE LEARNING	CO1	Domain Knowledge for Productive use of Machine Learning and Diversity of Data.
	CO2	Demonstrate on Supervised and Computational Learning
	CO3	Analyze on Statistics in learning techniques and Logistic Regression
	CO4	Illustrate on Support Vector Machines and Perceptron Algorithm
	CO5	Design a Multilayer Perceptron Networks and classification of decision tree
MEAN STACK TECHNOLOGIES	CO1	After the completion of the course, student will be able to
	CO2	Identify the Basic Concepts of Web & Markup Languages.
	CO3	Develop web Applications using Scripting Languages & Frameworks.
	CO4	Make use of Express JS and Node JS frameworks
	CO5	Illustrate the uses of web services concepts like restful, react js. and Adapt to Deployment Techniques & Working with cloud platform
ADVANCED DATA BASE MINING	CO1	Analyze on normalization techniques.
	CO2	Elaborate on concurrency control techniques and query optimization.
	CO3	Summarize the concepts of data mining, data warehousing and data preprocessing strategies.
	CO4	Apply data mining algorithms
	CO5	Assess various classification & cluster techniques.
CLOUD COMPUTING	CO1	Describe the principles of Parallel and Distributed Computing and evolution of cloud computing from existing technologies
	CO2	Implement different types of Virtualization technologies and Service Oriented Architecture systems
	CO3	Elucidate the concepts of Cloud Computing architecture and its design challenges
	CO4	Analyse the issues in Resource provisioning and Securizty governance in clouds
	CO5	Choose among various cloud technologies for implementing applications
Machine Learning with python lab	CO1	□ Implement procedures for the machine learning algorithms
	CO2	□ Design Python programs for various Learning algorithms
	CO3	□ Apply appropriate data sets to the Machine Learning algorithms
	CO4	□ Identify Machine Learning algorithms to solve real world problems
	CO5	□ Apply Machine Learning algorithms to solve real world problems
MEAN Stack Technologies Lab	CO1	□ Identify the Basic Concepts of Web & Markup Languages.
	CO2	□ Develop web Applications using Scripting Languages & Frameworks.
	CO3	□ Creating & Running Applications using JSP libraries.
	CO4	□ Creating Our First Controller Working with and Displaying in Angular Js and Nested Forms with ngform.
	CO5	□ Working with the Files in React JS and Constructing Elements with Data.

SEMESTER-III

Deep Learning	CO1	□ Learn deep learning methods for working with sequential data,
	CO2	□ Learn deep recurrent and memory networks,
	CO3	□ Learn deep Turing machines,
	CO4	□ Apply such deep learning mechanisms to various learning problems.
	CO5	□ Know the open issues in deep learning, and have a grasp of the current research directions
OPERATION RESEARCH	CO1	Apply the dynamic programming to solve problems of discreet
	CO2	Apply the dynamic programming to solve problems of continuous variables.
	CO3	Apply the concept of non-linear programming
	CO4	Carry out sensitivity analysis
	CO5	Model the real-world problem and simulate it.

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