

AR!3	Program Outcomes:
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The Bachelor of Technology program aims to produce students that at the time of graduation will be able to:

1. Apply the knowledge of basic sciences and fundamental engineering concepts in solving engineering problems.
2. Identify and define engineering problems, conduct experiments and investigate to analyze and interpret data to arrive at substantial conclusions.
3. Propose appropriate solutions for engineering problems complying with functional constraints such as economic, environmental, societal, ethical, safety and sustainability.
4. Perform investigations, design and conduct experiments, analyze and interpret the results to provide valid conclusions.
5. Select/develop and apply appropriate techniques and IT tools for the design & analysis of the systems.
6. Give reasoning and assess societal, health, legal and cultural issues with competency in professional engineering practice.
7. Demonstrate professional skills and contextual reasoning to assess environmental/societal issues for sustainable development.
8. Demonstrate Knowledge of professional and ethical practices.
9. Function effectively as an individual, and as a member or leader in diverse teams, and in multi-disciplinary situations.
10. Communicate effectively among engineering community, being able to comprehend and write effectively reports, presentation and give / receive clear instructions.
11. Demonstrate and apply engineering & management principles in their own/team projects in multidisciplinary environment.
12. Recognize the need for, and have the ability to engage in independent and lifelong learning.

AR!6	Program Outcomes:
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Civil Engineering

Program Outcomes (POs):

Engineering graduate will be able to:

- PO 1: Apply the knowledge of basic sciences and fundamental engineering concepts in solving civil engineering problems (Engineering knowledge)
- PO 2: Identify and define civil engineering problems and investigate to analyze and interpret data to arrive at substantial conclusions. (Problem analysis)
- PO 3: Propose appropriate solutions for engineering problems complying with functional constraints such as economic, environmental, societal, ethical, safety and

- sustainability in accordance with Indian standard codes of practices.(Design/development of solutions)
- PO 4: Perform investigations, design and conduct experiments, analyze and interpret the results to provide valid conclusions. (Conduct investigations of complex problems)
- PO 5: Select/develop and apply appropriate techniques and IT tools to analyze, design and scheduling of activities with an understanding of the limitations. (Modern tool usage)
- PO 6: Give reasoning and assess societal, health, legal and cultural issues with competency in professional engineering practice. (The engineer and society)
- PO 7: Demonstrate professional skills and contextual reasoning to assess environmental/societal issues for sustainable development. (Environment and sustainability)
- PO 8: Demonstrate Knowledge of professional and ethical practices. (Ethics)
- PO 9: Function effectively as an individual, and as a member or leader in diverse teams, and in multi-disciplinary situations. (Individual and team work)
- PO10: Communicate effectively with respect to oral, written and graphical communication (Communication)
- PO 11: Demonstrate and apply engineering & management principles in their own / team projects in multidisciplinary environment. (Project management and finance)
- PO 12: Recognize the need for, and have the ability to engage in independent and lifelong learning. (Life-long learning)
- PSO#1: Demonstrate the quality and suitability of construction materials (Program Specific)
- PSO#2: Understand the practical aspect of analysis, design and safe construction practices (Program Specific)

Electrical & Electronics Engineering

Engineering graduate will be able to:

- PO 1: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems. (Engineering knowledge)
- PO 2: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences. (Problem analysis)
- PO 3: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations. (Design/development of solutions)
- PO 4: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions. (Conduct investigations of complex problems)
- PO 5: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations. (Modern tool usage)

- PO 6: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice. [\(The engineer and society\)](#)
- PO 7: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development. [\(Environment and sustainability\)](#)
- PO 8: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice. [\(Ethics\)](#)
- PO 9: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings. [\(Individual and team work\)](#)
- PO 10: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions. [\(Communication\)](#)
- PO 11: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments. [\(Project management and finance\)](#)
- PO 12: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. [\(Life-long learning\)](#)
- PO 13: Utilize statistics, transformation methods, discrete mathematics and application of differential equations in analyzing and design of electrical/electronic systems.. [\(Program Specific\)](#)
- PO 14: Analyze, design and implement control of electrical systems in any problem/application of electrical/electronic (s) engineering. [\(Program Specific\)](#)

Electronics and Communication Engineering

Engineering graduate will be able to

- PO 1: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems. [\(Engineering knowledge\)](#)
- PO 2: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences. [\(Problem analysis\)](#)
- PO 3: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations. [\(Design/development of solutions\)](#)
- PO 4: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions. [\(Conduct investigations of complex problems\)](#)
- PO 5: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations. [\(Modern tool usage\)](#)

- PO 6: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice. **(The engineer and society)**
- PO 7: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development. **(Environment and sustainability)**
- PO 8: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice. **(Ethics)** PO 9: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings. **(Individual and team work)**
- PO 10: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions. **(Communication)**
- PO 11: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments. **(Project management and finance)**
- PO 12: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. **(Life-long learning)**
- PO 14: Understand and apply the fundamentals of communication and signal processing to develop systems wrapped with industry standard protocols and standards. **(Program Specific)**
- PO 13: Apply the knowledge of technological evolutions, model / character the devices and design the integrated as to build analog and digital systems. **(Program Specific)** the integrated

Computer Science and Engineering

Engineering graduate will be able to

- PO 1: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems. **(Engineering knowledge)**
- PO 2: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences. **(Problem analysis)**
- PO 3: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations. **(Design/development of solutions)**
- PO 4: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions. **(Conduct investigations of complex problems)**

- PO 5: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations. (Modern tool usage)
- PO 6: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice. (The engineer and society)
- PO 7: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development. (Environment and sustainability)
- PO 8: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice. (Ethics)
- PO 9: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings. (Individual and team work)
- PO 10: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions. (Communication)
- PO 11: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments. (Project management and finance)
- PO 12: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. (Life-long learning)
- PSO1: Understand of social & civic responsibilities, and rights of individuals or groups while developing software tools. (Program Specific)
- PSO2: Demonstrate personal strengths & limitations, committed to critical thinking and performance evaluation to manage software projects. (Program Specific)

Information Technology

Engineering graduate will be able to

- PO 1: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems. (Engineering knowledge)
- PO 2: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences. (Problem analysis)
- PO 3: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations. (Design/development of solutions)

- PO 4: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.(Conduct investigations of complex problems)
- PO 5: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.(Modern tool usage)
- PO 6: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.(The engineer and society)
- PO 7: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.(Environment and sustainability)
- PO 8: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.(Ethics)
- PO 9: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.(Individual and team work)
- PO 10: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.(Communication)
- PO 11: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.(Project management and finance)
- PO 12: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.(Life-long learning)
- PSO1: Implementation of soft computing applications for secure environment to support contemporary services (Program Specific)
- PSO2: Construct software solutions to deliver quality products for Future Enterprise Mobility (Program Specific)

Mechanical Engineering

Engineering graduate will be able to

- PO 1: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
(Engineering knowledge)
- PO 2: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences. (Problem analysis)
- PO 3: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public

- health and safety, and the cultural, societal, and environmental considerations. **(Design/development of solutions)**
- PO 4: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions. **(Conduct investigations of complex problems)**
- PO 5: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations. **(Modern tool usage)**
- PO 6: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice. **(The engineer and society)**
- PO 7: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development. **(Environment and sustainability)**
- PO 8: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice. **(Ethics)** PO 9: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings. **(Individual and team work)**
- PO 10: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions. **(Communication)**
- PO 11: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments. **(Project management and finance)**
- PO 12: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. **(Life-long learning)**
- PSO1: Demonstrate the knowledge and application of Geometric modeling, Analysis and Simulation of mechanical engineering systems. **(Program Specific)**
- PSO2: Demonstrate the knowledge and application of advanced techniques in manufacturing. **(Program Specific).**

Chemical Engineering

Engineering graduate will be able to

- PO 1: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems. **(Engineering knowledge)**
- PO 2: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences. **(Problem analysis)**
- PO 3: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public

- health and safety, and the cultural, societal, and environmental considerations. **(Design/development of solutions)**
- PO 4: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions. **(Conduct investigations of complex problems)**
- PO 5: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations. **(Modern tool usage)**
- PO 6: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice. **(The engineer and society)**
- PO 7: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development. **(Environment and sustainability)**
- PO 8: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice. **(Ethics)**
- PO 9: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings. **(Individual and team work)**
- PO 10: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions. **(Communication)**
- PO 11: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments. **(Project management and finance)**
- PO 12: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. **(Life-long learning)**
- PO 13: Utilize the knowledge of chemistry, thermodynamics, material and energy balances, transport processes, reaction engineering, process dynamics and control in optimal design of Chemical Engineering equipment and processes to meet the desired needs. **(Program Specific)**

2016-17	Course Outcomes
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16HSX01 English Communication Skills

1. Infer explicit and implicit meaning of a text
2. Construct clear, grammatically correct sentences using a variety of sentence structures
3. Analyze and Produce various types & formats of emails, letters in formal & informal ways to meet particular purposes
4. Select and apply appropriate words and phrases in different contexts
5. Formulate and present ideas effectively in spoken form

6. Discuss social issues with concern and imagine possible solutions

16MAX01 Engineering Mathematics I

1. Classify and solve analytically a wide range of first and higher order ordinary differential equations with constant coefficients
2. Apply the knowledge of Mean value theorems, Maxima and Minima of functions of several variables
3. Analyze the characteristics and trace the curve of an equation
4. Adapt methods for measuring lengths, volumes, surface area of an object and transformation of coordinates in practical situations
5. Utilize basic knowledge of conservative field, potential function and work done in engineering problems
6. Identify the relationships between line, surface and volume integrals

16PYX01 Engineering Physics

1. Illustrate the concepts of Interference, Diffraction, Polarization and their applications
2. Summarize the concepts of electric fields, magnetic fields and superconductivity and make out the scope of applications in various engineering fields
3. Outline the quantum mechanics to infer conductivity nature of metals
4. Explain the properties and application of dielectric, magnetic and Nano-materials
5. Demonstrate the emission of laser light, optical fibers and their applications in various Engineering fields
6. Analyze the engineering Applications based on Fundamental concepts

16MEX01 Engineering Mechanics

1. Draw the free body diagram of a given physical system and compute the resultant of a given coplanar system of forces
2. Estimate the centroid of composite figures and bodies
3. Estimate area moment of inertia and mass moment of inertia of composite figures and bodies
4. Explain concepts of friction and principle of virtual work
5. Summarize power transmission through belts
6. Analyze plane truss (frame) by method of joints and method of sections

16CSX01 Problem Solving using C

1. Develop the flow charts and algorithms, and then implement, compile and debug programs in C language for solving a problem

2. Design programs involving decision structures, loops for problem solving
3. Design programs to develop applications using array data structure
4. Solve scientific problems using functions
5. Make use of pointers to design applications for efficient and dynamic memory allocation
6. Design programs to create/update basic data files

16PYX02 Engineering Physics Lab

1. Build the knowledge in the scientific methods and learn the process of measuring different physical parameters
2. Develop the laboratory skills in handling of electrical and Optical instruments
3. Demonstrate the interference and diffraction phenomena of light
4. Inspect and experience physical principles of Magnetic fields and optical fiber communications
5. Apply the principles of physics and measure the solid state properties of materials
6. Design and analyze experiment based on physics concepts

16CSX02 Problem Solving using C Lab

1. Implement, compile and debug programs in C language for solving a problem
2. Design programs involving decision structures, loops for problem solving
3. Design programs to develop applications using array data structure
4. Apply functions to solve real world problems
5. Make use of pointers to design applications with efficient use of memory
6. Design programs to create/update basic data files

16MEX02 Engineering Drawing

1. Understand Principles of engineering drawing
2. Construct Conic sections using general methods and other methods
3. Construct Orthographic projections of Points, Lines and Planes
4. Construct Orthographic projections of Solids using basic drafting software
5. Construct Isometric projections using basic drafting software
6. Construct Orthographic projections from given isometric projections of an object and vice

16HSX03 English Communication Skills II

1. Build new academic vocabulary & phrases and make use of them in different contexts
2. Construct clear, grammatically correct sentences using a variety of sentence structures
3. Analyze and Produce various types & formats of emails, letters in formal & informal ways to meet particular purposes
4. Compose and present ideas logically in written form

5. Organize ideas effectively in spoken form
6. Discuss social issues with concern and imagine possible solutions

16MAX02 Engineering Mathematics II

1. Apply matrix knowledge to Engineering problems
2. Solve problems related to engineering applications using integral transform techniques
3. Make use of Laplace transforms in solving the differential equations with the initial and boundary conditions
4. Apply the concept of Fourier series of periodic functions and expand a function in sine and cosine series
5. Solve problems related to basic linear and non-linear partial differential equations
6. Formulate and solve some of the physical problems of engineering using partial differential equations

16CYX01 Engineering Chemistry

1. Outline the fundamental chemistry with an applied perspective as future engineers with a focus on engineering and industry
2. Analyze the quality of water and its treatment methods for domestic and industrial applications
3. Utilize the polymers, plastics, elastomers and advanced materials (Nano materials) as engineering materials and apply them in domestic and industrial life
4. Infer the concepts of renewable & non-renewable energy sources, quality of fuels and apply a suitable fuel as an energy source
5. Outline the corrosion factors and implement the prevention measures
6. Interpret the Nernst equation for electrode potentials and construction and working of various types of energy storage devices

16EEX01 Basic Electrical Engineering

1. Demonstrate the basic principles of electrical components
2. Outline electric circuits using network laws and reduction techniques
3. Illustrate the behavior of basic circuit elements for an AC excitation
4. Relate the laws of electro-magnetism and select a machine for practical applications
5. Outline the working principle and construction of the measuring instruments
6. Choose appropriate safety measures and wiring schemes

16CHX01 Environmental Studies

1. Translate the learner's attitude to think globally and act locally

2. Motivate environmental organizations to create a concern about our present state of Environment.
3. Find solutions for conservation of natural resources
4. Identify the benefits of ecosystem conservation, biodiversity protection, implement pollution prevention and control measures
5. Illustrate social issues of environmental protection and adopt sustainable developmental practices
6. Perceives the basic structure of environmental policy and law pertaining to specific environmental issues (water quality, air quality, biodiversity protection, Forest, etc.)

16HSX02 English Communication Skills Lab

1. Develop the pronunciation ability by using their gained knowledge of the English sound system
2. Improve the articulation of sounds and pronunciation of words for intelligible English
3. Recognize the use of language in conversational style with focus on communication in English
4. Organize ideas effectively in spoken form
5. Discuss social issues with concern and imagine possible solutions
6. Develop the pronunciation ability by using their gained knowledge of the English sound system

16CYX02 Engineering Chemistry Lab

1. Utilize different Analytical tools and develop the necessary skills in executing experiments involving estimation of metals in alloys, raw materials, finished products and environmental samples etc.
2. Utilize modern instruments like flame photometer, ion analyzer, UV Vis spectrophotometer, Atomic Absorption Spectrophotometer for characterization of materials used in industry & environmental monitoring
3. Determine the amount of hardness, chloride, fluoride, nitrite, DO of water for its quality and know its utility in domestic and industry
4. Summarize the characteristics of lubricants and able to choose/modify lubricants according to purpose
5. Compose some cross-linked polymers like Bakelite, Nylon etc.
6. Identify the adulteration of food items such as milk, honey, tea, coffee & fertility of soil to increase crop production

16MEX03 Engineering Workshop

1. Utilize basic carpentry tools for the preparation of wooden joints

2. Make use of basic hand tools for the preparation of mild steel joints
3. Build simple house hold items with GI sheet using tin smithy tools
4. Make use of house wiring accessories to build simple electrical circuits
5. Build simple components with hand tools for making experimental setups
6. Build simple components with hand tools as per the drawing specifications

2015-16	Course Outcomes
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B.Tech (Civil Engineering)
Engineering mathematics III

16MA303

1. Utilize numerical techniques to find approximate solutions of non-linear Algebraic equations
2. Understand the concepts of interpolation, extrapolation to estimate the unknown functional values
3. Make use of method of least squares to fit a best curve for the given data
4. Find approximate values of derivatives and finite integrals using numerical techniques
5. Understand basic probability axioms and apply Baye's theorem related to engineering problems
6. Identify the suitable distribution among Binomial, Poisson, normal to compute probabilities

16CE302

Surveying

1. Explain the difference between planar and geodetic surveying
2. Infer various tools and methodologies in obtaining desirable results
3. Plan and organize a survey with least possible probable errors
4. Measure levels and draw contours
5. Assess areas of irregular boundaries, volumes of borrow pits, embankments and capacity of reservoirs
6. Make use of equipment viz., Compass, Level, Theodolite, Tachometer and Total station that are used in the construction industry
- 7.

16CE303

Strength of materials I

1. Contrast between normal, shear stresses and various elastic constants
2. Examine the variation of bending moment and shear force at every cross section of a beam under all practical loading cases
3. Examine the variation of flexural /shear stresses for various cross sections of a beam along its depth, under all practical loading cases
4. Select the diameter of the shaft subjected to pure torque
5. Analyze the perfect frames for their internal forces

6. Decide suitable method for calculating deflections in simply supported and cantilever beams

16CE304 Building materials and construction

1. Explain the sources, properties and applications of common building materials
2. Demonstrate how materials are manufactured and assembled into building component parts
3. Explain materials like lime, cement, wood, geo-synthetics, bricks and stone masonry in building construction and also their importance
4. Outline structural components, including foundations, slabs-on-grade, frames and elevated slabs
5. Illustrate various building components and finishing's in building construction
6. Illustrate the basic functions, options, and differences between building systems

16CE305 Fluid mechanics

1. Explain the importance of fluid properties and their influence on fluid motion
2. Apply the principles of total pressure, center of pressure and buoyancy in the design of different components in hydraulic structures
3. Utilize the principles of fluid kinematics and dynamics in different fluid flow problems
4. Explain the concepts of laminar flow, turbulent flow and boundary layer theory
5. Solve various problems related to fluid flow through pipes
6. Make use of fundamental principles of fluid motion in the measurement of flow

16CE306 Building planning and drawing

1. Explain various building bye-Laws laid by town planning authorities and local regulatory bodies
2. Apply techniques for effective project planning and management
3. Plan the different types of residential buildings based on the minimum requirements
4. Plan various public buildings like educational, office buildings and hospital buildings
5. Outline the detailing of components of building
6. Develop the building drawing as per standards

16CE307 Survey practical

1. Utilize conventional and modern survey equipment to measure angles and distances
2. Evaluate differences in elevation, draw and utilize contour plots, and calculate volumes for earthwork
3. Take part in detailing of ground profiles for accurate and thorough note taking in field work to serve as a legal record
4. Make use of theodolite to find heights and distances as well as conducting trigonometric surveying
5. Interpret the principles and operation of the Global Positioning System

6. Organize a team of surveyors to fix positioning and property lines in line with legal agreements during setting out works

16CE308 Strength of materials lab

1. Demonstrate the basic knowledge of the mechanical properties of materials
2. Estimate compressive strength of wood, concrete, brick materials and decide their suitability for the construction purpose
3. Evaluate the tensile strength and comment on their usage in reinforced concrete structures
4. Determine the impact resistance of steel used in construction works
5. Estimate young's modulus of wood/steel materials
6. Estimate rigidity modulus for a given spring

16CE309 Computer aided building drawing lab

1. Create, display, and plot working drawings
2. Construct drawings using layer techniques
3. Construct technical drawings using a standard computer aided drafting program
4. Identify proper templates suitable for residential buildings as per IS specifications / byelaws.
5. Demonstrate proper detailing of RCC & electrical components of residential building
6. Construct drawings of plan, section and elevation of residential structures

16HSX04 Engineering Economics and Project Management

1. Explain basic principles of engineering economics
2. Apply cost-volume-profit (CVP) analysis in their business decision making
3. Evaluate investment proposals through various capital budgeting methods
4. Apply the knowledge to prepare the simple financial statements for measuring performance of business firm
5. Analyze key issues of organization, management and administration
6. Evaluate project for accurate cost estimates and plan future activities

16CE402 Strength of Materials II

1. Identify the orientation of principal planes and magnitude of principal stresses on an element under a complex loading
2. Make use of different failure theories to assess the stresses at the probable failure stage
3. Evaluate the buckling loads of columns with axial and eccentric loading
4. Design the diameter of the helical springs subjected to axial pull, axial couple
5. Select the thickness of cylinder subjected to longitudinal, hoop and radial stresses in case of thin and thick cylinders
6. Assess the resultant stresses in the case of chimneys, retaining walls and dams and checking their stability

16CE403 Engineering Geology

1. Acquire the knowledge of the topographical formation, interior earth, earth process and weathering.
2. Interpret the various types of minerals and assessment of its physical, mechanical and engineering properties.
3. Interpret the various types of rocks and assessment of its physical, mechanical and engineering properties.
4. Determine geological structures and its relevance on civil engineering projects.
5. Analyze the subsurface geological structures through geophysical exploration and application with relevance to civil engineering projects.
6. Assess the geological aspects of the site suitability with relevance to the design of civil engineering structures

16CE404 Soil Mechanics

1. Outline the significance of geotechnical engineering.
2. Examine and determine physical properties of soil.
3. Analyze the hydraulic conductivity in soils due to seepage.
4. Analyze the stress distribution due to different types of loading.
5. Determine one-dimensional consolidation characteristics of fine-grained soils under vertical load.
6. Determine the shear strength of soils and describe the differences between drained and undrained shear strength.

16CE405 Hydraulics and Hydraulic Machinery

1. Explain the behavior of the flow in an open channels for different flow conditions
2. Develop empirical relationships among physical variables involved in flow phenomenon of model and prototype
3. Determine the hydrodynamic forces exerted by the fluid jet on flat, inclined and curved vanes
4. Develop velocity triangles in understanding the functioning of various turbines and pumps
5. Design the turbines based on different hydraulic conditions.
6. Evaluate the performance characteristics of turbine and pump working under different working conditions

16CE406 Transportation Engineering

1. Build the knowledge on road network in India and highway alignment
2. Design various road Geometric elements based on the geographic conditions
3. Identify traffic characteristics and build knowledge on design of Intersections
4. Build the knowledge on basics of railway engineering and airport engineering
5. Design various Railway track Geometric elements
6. Plan runway orientation and length

16CE407 Soil Mechanics Lab

1. Organize specific field investigations including collection of soil samples for testing and observation of soil behavior/ Building damage
2. Identify and classify soil based on standard geotechnical Engineering practice
3. Determine physical and engineering properties of soil samples by performing laboratory tests
4. Develop and implement laboratory procedures to test Geotechnical engineering concept(s)
5. Analyze the behavior of soil sample under different test conditions simulating field conditions
6. Compare the design parameters with those that comply with statutory regulations

16CE408 Fluid Mechanics and Hydraulic Machines Lab

1. Demonstrate the calibration of different flow meters
2. Estimate the coefficient of discharge for different flow conditions
3. Estimate the energy equation to pipe flow problems
4. Apply Bernoulli's equation and Momentum equation for real fluid flow problems
5. Select the required flow rate, pressure rise and the proper pump to optimize pumping efficiency
6. Analyze a variety of practical fluid flow devices and utilize fluid mechanics principles in design

16CE409 Transportation Engineering Lab

1. Build knowledge on quality behavior of road aggregates
2. Develop Knowledge on types of bitumen and their quality behavior
3. Utilize aggregate and bitumen properties in pavement design
4. Examine the traffic characteristics
5. Inspect traffic capacity and safety
6. Utilize traffic characteristics in pavement design

Course Title: ELEMENTS OF REINFORCED CONCRETE DESIGN Course Code: CE3414

At the end of the course student will be able to

1. **Design** a singly reinforced concrete beam of rectangular cross section by using Working Stress Design philosophy.
2. **Apply** IS: 456-2000, code requirements of limit state philosophy related to shear bond, torsion and
3. **Design** singly, doubly reinforced beams of rectangular, T and L cross sections.

4. **Design** long and short rectangular and circular columns subjected to axial load, uniaxial and biaxial moments as per IS: 456-2000
5. **Design** the isolated rectangular and combined footing subjected to axial load, axial load and moment as per IS: 456-2000
6. **Design** one way and two way slabs as per IS: 456-2000
7. **Compute** the deflections under serviceability criteria as per IS: 456-2000

Course Title: HYDROLOGY AND IRRIGATION ENGINEERING .Course Code: CE3415

At the end of the course students will be able to

1. Identify components of hydraulic structures
2. Estimate direct run off from total rain fall, ground water recharges potential, base flow and flood discharge in the catchment area.
3. Construct Hydrograph at a particular location on the stream.
4. Calculate the inflow quantity in to the confined and unconfined wells and seepage characteristics of the ground.
5. Calculate duty and delta, depth and frequency of irrigation to improve the irrigation efficiency and design of irrigation canals suitable for different type of soils.

Course Title: METHODS OF STRUCTURAL ANALYSIS Course Code: CE3416

At the end of the course student will be able to

1. Analyze three /two hinged arches and obtain internal forces at any cross section.
2. Determine design forces in arches subjected to concentrated, distributed and varying loads.
3. Determine the forces in indeterminate frames subjected to lateral loads by using approximate methods of analysis.
4. Solve statically indeterminate beams and frames using classical methods.
5. Evaluate the suitability of classical methods for a given structure and loading.
6. Utilize modern structural analysis software

Course Title: TRANSPORTATION ENGINEERING Course Code: CE3417

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

1. Understand to fix ideal alignment and design of highway
2. Identify traffic problems and give measures to regulate the traffic
3. Build knowledge on highway materials quality, construction and maintenance
4. Adapt railway engineering terminology, basics and build knowledge on track geometric design

Course Title: BUILDING TECHNOLOGY (Elective-I) Course Code: CE3418

At the end of the course the learners will be able to

1. Know the various building bye-Laws laid by town planning authorities and local regulatory bodies for planning various buildings like residential, educational, office buildings and hospital buildings.
2. Know about the techniques for project planning and management.
3. Understand the building drawing standards in various phases of a project.
4. Understand the detailing in building construction.

Course Title: FINITE ELEMENT METHODS IN CIVIL ENGINEERING (Elective-I)
Course Code: CE3419

At the end of the course the learners will be able to

1. Idealize given structure with mathematical modeling and boundary conditions.
2. Model the given structure with suitable elements.
3. Conceptualize the Finite Element Analysis (FEA) procedure.
4. Apply FEA procedure to 1-dimensional structures bars, trusses, plane stress and plane strain conditions using triangular and rectangular elements.
5. Evaluating the suitability of type of element and methods of discretization.
6. Set up and solve 1-D, 2-D, and 3-D structural problems using contemporary finite element software.
7. Interpret results obtained from FEA software solutions, not only in terms of conclusions but also awareness of limitations.

Course Title: GEOMATICS (Elective-I) Course Code: CE3420

At the end of the course, the student is able to:

- a) Understand the basic concepts of spatial data acquisition procedures
 1. Assess the quality of acquired spatial data in a quantitative way
 2. Make informed and critical judgments on technical issues relating to the acquisition, storage, management, analysis and display of spatial data.
 3. Understand the complexity of spatial data and their relationships with non-spatial information;
 4. Appreciate and understand the spatial data and spatial analysis requirements of a remote sensing and/or GIS project;
 5. Perform spatial analysis techniques on a varied range of applications in civil engineering

Course Title: BUILDING PLANNING AND AUTOCAD LAB
Code: CE3221

Course

At the end of the course student will be able to

1. Create, display, and plot working drawings.
2. Use layering techniques.

3. Construct technical drawings using a standard computer aided drafting program.
4. Identify, operate and adjust input and output devices.
5. Demonstrate file management techniques.

Course Title: TRANSPORTATION ENGINEERING LAB Course Code: CE3222

At the end of course student will be able to

1. Know the behavior of Road Aggregates
2. Know the behavior of Bituminous materials
3. Know the Traffic volume counts

Department of Civil Engineering B.Tech- 6th

Semester

Course Title: ENVIRONMENTAL ENGINEERING Course Code: CE3423

At the end of the course the learners will be able to

1. List the factors affecting water supply and wastewater generation
2. Understand the various types of water and wastewater characteristics
3. Design water and wastewater systems
4. Analyze available disposal options and their practical implications

Course Title: FUNDAMENTALS OF SOIL MECHANICS Course Code: CE3424

At the end of the course student will be able to

1. Understand soil as a building material and load bearing member.
2. Understand different procedures for classifying soils.
3. Assess the influence of soil water relationship and analyze engineering behaviour of soils under different load/ drainage conditions
4. Analyze the influence of field conditions on strength and consolidation properties of soils.

Course Title: HYDRAULIC STRUCTURES Course Code: CE3425

At the end of the course students will be able to

1. Design the different water retaining structures.
2. Analyze the parameters needed in the design of weirs/barrages in permeable soils.
3. Analyze and design the Gravity dams and Earth dams with available foundation strata.
4. Design the canal regulation structures and cross drainage structure
5. Understand the design principles of canal fall and Spillway and able to design various components.

Course Title: AIR AND NOISE POLLUTION CONTROL (Elective-II) Course Code: CE3426

At the end of the course the learners will be able to

1. learn the concepts of air pollution and its associated problems on a global scale
2. learn the influence of meteorological aspects on air pollution and its

- dispersion
3. design the different components of particulate and gaseous control equipment
 4. understand problems of noise pollution
 5. learn the basics of noise pollution and its control measures

Course Title: PAVEMENT ANALYSIS AND DESIGN (Elective-II) Course Code: CE3427

At the end of the course the learners will be able to

1. Build knowledge on the various factors affecting in pavement design
2. Design flexible pavement considering sub grade condition and axle loads
3. Design rigid pavement considering sub grade condition and axle loads
4. Discover pavement failures and their remedies

Course Title: SOLID WASTE AND ENVIRONMENTAL MANAGEMENT (Elective-II) Course Code: CE3428

At the end of the course students are able to:

1. Understand the implications of the production, resource management and environmental impact of solid waste management;
2. Assimilate the significance of recycling, reuse and reclamation of solid wastes;
3. be familiar with relationships between inappropriate waste management practices and impacts on water, soil and sediment quality;
4. Appreciate the current practices available and implement the systems available in solid waste management;
5. be capable of carrying out an assessment of the relationships between environmental guidelines, human activities and environmental quality of impacted soils and water;
6. Integrate technical solid waste management options and imposed environmental legislation and guidance to develop legal and safe solutions.

Course Title: DISASTER MANAGEMENT (Open Elective) Course Code: CE3429

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

1. Work theoretically and practically in the processes of disaster management (disaster risk reduction, response, and recovery) and relate their interconnections, particularly in the field of the Public Health aspects of the disasters.
2. Manage the Public Health aspects of the disasters.
3. Obtain, analyze, and communicate information on risks, relief needs and lessons learned from earlier disasters in order to formulate strategies for mitigation in future scenarios with the ability to clearly present and discuss their conclusions and the knowledge and arguments behind them.

4. Design and perform research on the different aspects of the emergencies and disaster events while demonstrating insight into the potential and limitations of science, its role in society and people's responsibility for how it is used.
5. Analyze and evaluate research work on the field of emergencies and disaster while demonstrating insight into the potential and limitations of science, its role in society and people's responsibility for how it is used.

Course Title: GEOMATICS LAB

Course Code: CE3230

At the end of course student will be able to

1. Identify the various rocks and minerals based on the physical properties
2. Interpret different geological maps
3. Solve the various strike and dip problems
4. Work independently on various spatial technologies
5. Understand state of the art technologies in Geomatics

Course Title: SOIL MECHANICS LAB

Course Code: CE3231

1. Identify tools, equipment required and familiarity with experimental procedures for determining index and engineering properties of soils
2. Perform field tests for soil investigations.
3. Apply field conditions for computing and analyzing the experimental data.
4. Infer the results and compare.

Department of Civil Engineering B.Tech- 7th Semester

Course Title: FOUNDATION ENGINEERING Course Code: CE4432

At the end of the course student will be able to

1. Learn various types and methods of undisturbed and disturbed soil sampling.
2. Perform computations for stability of earthen structures.
3. Use the various properties of soils to design the shallow foundations for different loading conditions.
4. Extend the theory of foundation design for special foundation types namely deep foundations.

Course Title: DESIGN OF REINFORCED CONCRETE STRUCTURES (Elective-IV)

Course Code: CE4433

At the end of the course student will be able to

1. **Design** the cross section and evaluate the amount of reinforcement required in the continuous beam as per IS: 456 codal recommendations for all practical loadings.
2. **Design** the amount of reinforcement required in the continuous slab and stair case as per IS: 456 codal recommendations for all practical loadings.
3. Perform analysis and design of prestressed concrete members and

connections

4. Identify and interpret the appropriate relevant industry design codes.
5. Relate with professional and contemporary issues in the design and fabrication of prestressed concrete members.
6. Perform an industry relevant design project in a team setting.

Course Title: EARTHQUAKE RESISTANT DESIGN (Elective – IV) Course Code: CE4434

On successful completion of this course, it is expected that students should be able to;

1. Analyze the free and forced vibration response of single-degree and multi-degree of freedom and continuous systems.
2. Distinguish between earthquake magnitude and earthquake damage (intensity),
3. Understand why earthquakes occur, how they are measured and categorized and the effect they may have on engineering structures. Predict the Dynamic Behavior of simple structural systems,
4. Develop an understanding of structural dynamics of simple systems subject to harmonic, impulse and/or arbitrary loading,
5. Employ the Response Spectrum Analysis Method for Earthquake resistant R/C Buildings,
6. Apply the Basic Principles of Conceptual Design for Earthquake resistant R/C Buildings. Understand the concepts and implementation of IS codes in relation to earthquake design.

Course Title: GROUND WATER HYDROLOGY (Elective-IV) Course Code: CE4435

At the end of the course, students will be able to

1. Understand the occurrence and movement of ground water in the earth's subsurface.
2. Apply principles of fluid mechanics to understand well behavior in different conditions
3. Identify suitable surface and subsurface investigation techniques for the exploration of ground water
4. Understand the concept of artificial recharge of ground water
5. Apply the different principles to know the interface between saline water and fresh water
6. Understand the various mathematical modeling techniques and management of ground water resources

Course Title: RETROFITTING AND REHABILITATION OF STRUCTURES (Elective-IV)

Course Code: CE4436

At the end of the course the learners will be able to

1. Identify the probable reasons for the deterioration of various structural members
2. Able to assess the severity of damage in the structural members
3. Choose materials and appropriate technologies for repair.
4. Identify the appropriate method for strengthening of existing members.
5. Plan for the monitoring of the new buildings by using sensor technology.

Course Title: ENVIRONMENTAL HYDRAULICS AND ADVANCED WASTEWATER TREATMENT (Elective-V) Course Code: CE4437

At the end of the course students are able to:

1. Comprehends the importance of treatment of Liquid waste from various industries.
2. Identifies liquid waste and characteristics at difference stages in various types of industries.
3. Learn about the manufacturing process of various products in industries and how the waste is treated in various industries.
4. Identifies the design requirements of distribution systems
5. Identifies the suitability of sewerage system for a given site conditions.

Course Title: PRESTRESSED CONCRETE DESIGN Course Code: CE4438

At the end of the course students are able to:

1. Describe the basic properties of prestressed concrete constituents.
2. Analyse the flexural behaviour of simple beams
3. Calculate prestress losses for simple prestressed concrete girders.
4. Design prestressed concrete girders for flexure using current design procedures
5. Recognize the effects of transfer and development length on flexural and shear strengths.
6. Construct moment-curvature and load-deflection curves for a prestressed concrete beam.
7. Analyse and design prestressed concrete members for shear.

Course Title: SOIL DYNAMICS AND MACHINE FOUNDATIONS (Elective-V) Course Code: CE4439

At the end of the course students are able to:

1. Students able to understand the basics of soil dynamics.

2. Student will demonstrate the ability to design machine foundations.

Course Title: TRAFFIC ENGINEERING (Elective-V) Course Code: CE4440

At the end of the course the learners will be able to

1. identify traffic stream characteristics and studies
2. Build knowledge on traffic capacity and level of service
3. Discover parking problems and measures to accidents
4. Design traffic signal cycle and learn the measures for the traffic-environment problems

Course Title: ENVIRONMENTAL ENGINEERING LAB Course Code: CE4241

At the end of course student will be able to

1. know how to perform relevant tests in the laboratory to determine the major characteristics of water and wastewater
2. Get hands on experience in operating the various equipment/methods available for examining water and wastewater
3. understand the practical significance of the characteristics, the relevant codes of practice for examination and permissible limits for the characteristics of water and wastewater

Course Title: STRUCTURAL MODELING & DESIGN LAB Course Code: CE4242

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

1. Validate the results of analysis and design of portal frame
2. Analyze and Interpret of results of analysis of Steel trusses used in practice
3. Model, analyze and design the components of multi storied RCC framed structure
4. Interpret and cross check the reinforcement provided in the construction sites of buildings.
5. Interpret and cross check the reinforcement provided in the construction sites of retaining walls and water tanks.

Department of Civil Engineering B.Tech- 8th Semester

Course Title: CONSTRUCTION COSTING AND MANAGEMENT Course Code: CE4443

At the end of the course the learners will be able to

1. Identify, analyze and solve the complex problems that deal with estimation of buildings and pavements.
2. Perform cost analysis of Civil Engineering projects.
3. Establish relationship between cost and quality of the construction process.
4. Manage and administer construction contracts.

5. Estimate the value of existing infrastructure.

Course Title: DESIGN OF STEEL STRUCTURES

Course Code:CE4444

At the end of the course the learners will be able to

1. Apply the basic requirements of the IS design specifications.
2. Apply the concepts of strain compatibility and equilibrium concepts to determine the strength of members made of steel
3. Design for welded connections between steel members
4. Design simple steel members subjected compression, tension bending and their combinations

Course Title: AIRPORT AND HARBOUR ENGINEERING (Elective-IV OR V OR VI)

Course Code: CE4445

At the end of the course the learners will be able to

1. Model the airport layout with all features
2. Design runway based on terrain
3. Model the docks and harbors layout
4. Design structures and non-structures and their maintenance in docks and harbors

Course Title: DESIGN AND DRAWING OF IRRIGATION STRUCTURES

At the end of the course the learners will be able to

1. Identify design components of various irrigation structures
2. Create the drawings of various irrigation structures.
3. Illustrate the component parts of Hydraulic structures
4. Summarize the requirements of irrigation design engineers in large and small consulting firms, and at all levels of government and Private sectors

Course Title: GROUND IMPROVEMENT TECHNIQUES (Elective-IV OR V OR VI)

Course Code: CE4447

At the end of the course the learners will be able to

1. Interpret the concepts behind a range of ground improvement and soil remediation techniques.
2. Find out the advantages, disadvantages, limitations for each ground improvement method discussed.
3. Choose appropriate techniques for a range of ground and site conditions.
4. Identify criteria to determine the applicability of each ground improvement method for a specific project and soil condition under consideration.

Course Title: PAVEMENT MANAGEMENT SYSTEMS

(Elective-IV OR V OR VI)

Course Code: CE4448

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

1. Obtain a basic Knowledge of the fundamental issues in pavement management system.
2. Gain Knowledge on structural and functional evaluation of pavements.
3. Learn types of distress and surveys done on the pavement

4. Build Knowledge on alternatives in pavement distress management

16MA303 Engineering Mathematics III

Course Outcomes

1. Utilize numerical techniques to find approximate solutions of non-linear Algebraic equations
2. Outline the concepts of interpolation, extrapolation to estimate the unknown functional values
3. Make use of method of least squares to fit a best curve for the given data
4. Find approximate values of derivatives and finite integrals using numerical techniques
5. Comprehend basic probability axioms and apply Baye's theorem related to engineering problems
6. Identify the suitable distribution among Binomial, Poisson, normal to compute probabilities

16EE302 Circuit

Course Outcomes

1. Outline the time / frequency domain response of RLC circuit
2. Solve the three phase balanced and unbalanced circuits
3. Apply various network theorems for simplifying both AC and DC circuits
4. Illustrate transient response of a series RL/RC/RLC circuits for DC and AC excitations
5. Find various network parameters for a given two port network
6. Recall the properties of driving point and transfer functions

16EE303 DC Machines

Course Outcomes

1. Illustrate the constructional details and principle of operation of DC Machine
2. Summarize armature reaction and commutation in DC machines
3. Demonstrate the performance characteristics of various DC generators
4. Demonstrate the performance characteristics of various DC motors
5. Outline various speed control methods of DC motors
6. Summarize testing methods of DC machines

16EE304 Electromagnetic Field Theory

Course Outcomes

1. Recall the concepts of vector calculus and coordinate systems
2. Summarize the laws of static electric fields
3. Solve the field quantities in static electric field
4. Illustrate the laws of steady magnetic field

5. Solve the field quantities in steady magnetic field
6. Summarize the Maxwell's equations in static and time varying fields

16EC302 Digital Electronics

Course Outcomes

1. Illustrate the conversion of a number from one number system to another
2. Identify Boolean algebra and K-map as a tool to simplify and design logic circuits
3. Implement combinational circuits using gates
4. Design PLDs and Flip-flops
5. Implement various types of counters and shift registers
6. Attribute innovative designs by modifying the traditional design techniques

16EC303 Electronic Devices & Circuits

Course Outcomes

1. Recall the properties of semiconductor materials in the formation of PN diode and Zener diode
2. Classify the V-I characteristics of CB & CE configurations
3. Design various biasing circuits to achieve the required stability in transistor amplifiers
4. Illustrate the operation of FETs and special diodes for different applications
5. Design half wave, full wave rectifiers with and without filters for different applications
6. Design regulated power supply using Zener diode and transistors

16EC307 Digital Electronics lab

Course Outcomes

1. Implement the Universal gates using logic gates
2. Implement the logic circuits using Universal gates
3. Design and analyze combinational logic circuit
4. Design flip-flop using gates and ICs
5. Design and analyze synchronous and asynchronous counter
6. Implement shift registers using flip-flops and design an application using registers and counters

16EC308 Electronic Devices and Circuits Lab

Course Outcomes

1. Demonstrate various electronic components and test equipment like multimeter, function generator, and CRO in order to measure passive components and observe the waveforms
2. Predict the V-I characteristics of PN junction and Zener diodes

3. Compare the operation of BJT and FET through their V-I characteristics
4. Compare half wave and full wave rectifiers with and without filters
5. Implement D.C. Regulated power supplies circuits using Zener and BJT
6. Design and verify the self-biasing CE configuration circuit

16EE309 Electrical Engineering Lab

Course Outcomes

1. Demonstrate the fundamentals of various electrical gadgets, their working and troubleshooting
2. Construct residential wiring and various types of wiring schemes
3. Classify different types of fuses and MCBs
4. Find various electrical quantities
5. Demonstrate various types of earthing
6. Apply various network reduction methods for simplifying both AC and DC circuits

16EEI01 Automotive Electrical and Electronics

Course Outcomes

1. Classify types of batteries
2. Demonstrate various battery charging techniques
3. Develop battery charging techniques to various types of batteries
4. Illustrate voltage and current regulation schemes
5. Outline various types of cut-out relays
6. Outline various types of regulators

16EC503 Linear IC Applications

Course Outcomes

1. Describe various stages of operational amplifier
2. Explain the characteristics of op-amps and its compensation techniques
3. Implement linear and non-linear applications of op-amp using IC741
4. Design Active filters, PLL and timers
5. Construct different types of voltage regulators and multipliers
6. Analyze different ADCs and DACs

16EE402 Control Systems

Course Outcomes

1. Develop mathematical models of control systems in continuous time
2. Outline the system using block diagram and signal flow graph techniques
3. Analyze the transient and steady state performances of a control system
4. Contrast the stability of a system using time domain and frequency domain techniques
5. Develop different compensators and controllers in time/frequency domain
6. Illustrate state space modelling and compute the controllability and observability for

the given system

16EE403 Network Analysis & Synthesis

Course Outcomes

1. Interpret state variable models for various electrical circuits
2. Develop the solution of state equation for the given state model
3. Illustrate the response of various electrical networks using Laplace transform
4. Assess the response for different electrical networks using Fourier transform
5. Outline Hurwitz polynomial and Positive real functions to realize the network
6. Develop the networks by using synthesis methods for the given transfer function

16EE404 Transformers & Induction Machines

Course Outcomes

1. Illustrate the operation of transformer and analyze its performance
2. Outline parallel operation of transformer to improve the load sharing capabilities and reliability
3. Interpret the usage of three phase transformer in electrical applications
4. Illustrate the operation of three phase induction motor and analyze its performance
5. Apply different speed control methods of three phase induction motors essential for industrial drives
6. List the application of single phase machines for different industrial needs

16EE405 Power Plant Engineering & Economics

Course Outcomes

1. Illustrate the concepts of power generation from thermal energy
2. Outline the concepts of power generation from diesel and gas plant
3. Illustrate the concepts of power generation from nuclear energy
4. Make use of renewable energy sources for electrical power generation
5. Summarize economic aspects of power generation
6. Classify tariff methods

16EE406 Electrical Measurements & Instrumentation

Course Outcomes

1. Outline the basic working principles of MC&MI instruments
2. Identify a suitable instrument transformer for the measurement of high voltage and current
3. Illustrate the usage of wattmeter and energy meter in electrical field of application
4. Find unknown electrical parameters using appropriate methods

5. Demonstrate the suitable method of measuring non-electrical parameters in various applications
6. Select the proper digital instruments to measure electrical quantities

16EC607 Linear IC Applications lab

Course Outcomes

1. Design op-Amp circuits for various applications
2. Demonstrate the practical usage of various linear ICs
3. Design and implement the pulse generator using 555 timer
4. Design and construct the various filters like LPF, HPF, BPF, BRF
5. Design a function generator
6. Design a converter which converts analog signal to Digital signal and vice versa

16EE408 Electrical Measurements & Instrumentation Lab

Course Outcomes

1. Apply suitable method for measuring R, L and C parameters in an electric network
2. Make use of calibration system for various metering equipment
3. Test for dielectric strength of various fluids
4. Measure various non-electrical parameters using transducers
5. Interpret the characteristics of various sensors
6. Measure various non-electrical parameters using sensors

16EE409 DC Machines Lab

Course Outcomes

1. Identify the practical methods to evaluate the performance of DC shunt machines.
2. Apply various methods to find the efficiency of DC series machines.
3. Find the efficiency of DC compound machine at different loads.
4. Analyze various losses of DC machine by performing indirect tests.
5. Find stray losses of a dc shunt machines using two similar machines
6. Apply speed control techniques of DC motors to industrial applications.

B.Tech- 5th Semester

Course Title: Electrical Measurements & Instrumentation Course code: EEE 3417

Upon completion of the course, students are able to

1. Outline the basic working principles of various metering instruments
2. Recognize and identify electrical instruments and justify their operating conditions.
3. Compare different metering techniques based on their performance and justify their usage
4. Judge a suitable instrument to obtain accurate readings.

5. Demonstrate the design considerations

Course Title: Electrical Power Transmission Course code: EEE 3418

Upon completion of this course the students are able to:

1. Calculate the different parameters like Resistance, Inductance, Capacitance for different transmission lines
2. Analyze the effect of proximity corona and shunt compensation on the performance of Transmission line
3. Differentiate Transmission lines based on the distance and analyze their performance
4. Select suitable towers insulators and their placement in a transmission line erection
5. Determine and select the different sizes of cables for power transmission.
6. Distinguish types of system transients and termination of lines with different conditions

Course Title: Power Electronics Course code: EEE 3419

Upon completion of this course the students are able to:

1. Develop control method for Power Electronic switches.
2. Identify suitable converter based on source and load requirements.
3. Analyze the performance of converters for various loads
4. Propose control technique for a power converter with realistic constraints

Course Title: Synchronous and Special Machines Course code: EEE 3420

Upon completion of this course the students are able to:

1. Suggest appropriate single phase induction motor for commercial needs.
2. Comprehend operational characteristics and regulation methods of synchronous machine.
3. Evaluate load performance or synchronization of a synchronous machine connected to an infinite bus
4. Make use of starting methods of synchronous motors and the circle diagrams to analyse their performances.
5. Suggest a special electrical machine for commercial and industrial needs.

Course Title: Computer Networks

Course Code: IT 3410

At the end of the course students are able to:

1. Suggest appropriate network model for data communication.
2. Know how reliable data communication is achieved through data link layer.
3. Propose appropriate routing algorithm for data routing.
4. Connect internet to the system and knowledge of trouble shooting.

Course Title: Database Management Systems Course Code: IT 2405

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

1. Identify and define the data models needed to design a database
2. Create conceptual and logical database design for Large enterprises
3. Apply Integrity constraints over the relations
4. Apply normalization process on existing database for eliminating redundancy

5. Apply the recovery techniques for managing the database effectively to avoid the data lose

Course Title: Software Engineering Course Code: CSE 3409

At the end of the course students are able to

1. Design and develop real-time software projects with effective cost estimation and plan
2. Make feasibility study of a project
3. Specify the design and architectural style of the software products
4. Propose testing strategy for a given software

Course Title: AC Machines & Transformers lab Course code: EEE 3221

Upon completion of this course the students are able to:

1. Evaluate various methods of finding voltage regulation in alternators at different load power factors for finding their performance.
2. Investigate the efficiencies of single phase transformer and induction motors through various tests.
3. Analyze the performance of synchronous motors through V and inverted V curves.
4. Synthesize three phase system from two phase system and vice versa using Scott connection of transformers.
5. Analyze the temperature rise in a transformer and validate the efficiency of cooling method

B.Tech- 6th Semester

Course Title: Control Systems Course code: EEE 3416

Upon completion of this course the students are able to:

1. Develop transfer function and state space models of control systems in continuous time.
2. Describe and simplify a control system using block diagram and signal flow graph techniques.
3. Analyze the transient and steady state performances of control systems.
4. Investigate the stability of a system using time domain and frequency domain techniques.
5. Design different compensators and controllers in time/frequency domain.
6. Examine the controllability and observability of control systems

Course Title: Electrical Drives Course code: EEE 3422

Upon completion of this course the students are able to:

1. Analyze speed control and braking methods of electrical drives for different applications
2. Propose various control techniques of electrical drives for industrial applications
3. Design power electronic circuits to control the electrical drives.
4. Summarize the performance characteristics of converter fed DC motors to justify their applications.

5. Apply the knowledge of control theory to induction and synchronous motor drives

Course Title: Switch Gear & Protective Devices ource code: EEE 3423

Upon completion of this course the students are able to:

1. Apply the electromechanical energy conversion principles for the protection of power system equipments through relay and breakers
2. To explain working of different types of relays and circuit breakers in a power system
3. Propose suitable protection schemes for different electrical equipment against different faults
4. Analyze the different grounding techniques at different locations in a power system
5. Evaluate the influence of over voltages and over currents in a power system

Course Title: Electrical Machine Design Course code: EEE 3424

Upon completion of this course the students are able to:

1. Acquire general idea on topics like mechanical, manufacturing and future challenges for machine design.
2. Design of different types of electric machines
3. Design electric machines with reduced loss
4. Calculate the losses and efficiency in the machine.
5. Pursue computer aided machine design.

Course Title: Flexible AC Transmission Systems ource code: EEE 3425

Upon completion of this course the students are able to:

1. Apply knowledge of FACTS Controllers.
2. Design of different compensators in power system network with constraints.
3. Identify, formulate and solve real network problems with FACTS controllers
4. Evaluate various controllers for the given power system network.

Course Title: Utilization of Electrical Energy ource code: EEE 3426

Upon completion of the course students are able to:

1. Select appropriate electric drive for load characteristics.
2. Design electric heating and welding equipment for industrial applications.
3. Analyze different schemes of speed control and braking in traction system.
4. Design different lighting schemes for different application.

Course Title: Renewable Energy Systems (Open Elective) Course code: EEE 3427

At the end of the semester the student will

1. Apply the principles of various energy systems in day to day life.
2. Recognize the new ways of harnessing Renewable Energy Sources.
3. Analyze the industrial needs and convert theoretical model to practical circuits with wide range of specifications.
4. Judge the importance of the renewable resources of energy as the fossil fuels are depleting in the world very fast.
5. Express the clean and green energy for next generation.

Course Title: Digital Electronics & Microprocessors Lab Course code: ECE 3229

After undergoing the course, students will be able to:

1. Implement logic circuits using basic AND, OR, NOT and universal gates.
2. Construct and analyze the operation of flip-flop circuits.
3. Design various types of sequential circuits like registers, counters
4. Control the stepper motor, traffic lights using 8086
5. Generate different waveforms like saw tooth, triangular, square wave etc

Course Title: Power Electronics lab Course code: EEE 3228

1. Upon completion of this course the students are able to:
2. Choose power electronic switches based on their characteristics.
3. Evaluate the performance of various firing circuits of SCR.
4. Design the commutation circuits depending on the converter.
5. Design of various converters for real-time applications.

B.Tech- 7th Semester

Course Title: Engineering Economics & Project Management Course code: HS 3405

At the end of the course students are able to

1. Understand basic principles of engineering economics
2. Evaluate investment proposals through various capital budgeting methods
3. Apply the knowledge to prepare the simple financial statements of a company for measuring performance of business firm
4. Analyze key issues of organization, management and administration
5. Evaluate project for accurate cost estimates and plan future activities

Course Title: Advanced Control Systems Course code: EEE 4429

Upon completion of this course the students are able to:

1. Develop state-space models.
2. Examine the controllability and observability of control systems
3. Examine stability analysis, state trajectory behavior evaluation for nonlinear systems.
4. Design state feedback controller and state observer
5. Learn nonlinear systems control design, robust and optimal control systems

Course Title: High Voltage Engineering Course code: EEE 4430

Upon completion of this course the students are able to:

1. Outline the behavior of gas, solids and liquids when they are used as insulation medium.
2. Elucidate the concepts used for the generation of high voltages and currents and design corresponding circuits
3. List out high voltage testing methods and propose suitable testing instruments.
4. Apply numerical methods in calculating electrical parameters related

to High voltage Engineering

Course Title: Power System Analysis

Course code: EEE 4431

Upon completion of this course the students are able to:

1. Model and represent system components (ex. Transformers, lines, generators etc.) for positive, negative and zero sequence networks.
2. Build nodal admittance and impedance matrices for the power system network.
3. Understand and modify existing system and design for future expansion of the system or sub systems for load flow study.
4. Learn about power system behavior under symmetrical and unsymmetrical faults, symmetrical component theory.
5. Understand the basic concepts of steady state and transient stabilities and their

Course Title: Reliability Engineering & Application to Power Systems Course code: EEE 4432

Upon completion of this course the students are able to:

1. Know basic terminology and concepts for reliability analysis.
2. Analyze a system using Markov modeling, Life time modeling etc. and techniques for reliability analysis
3. Formulate an optimization problem for maintenance planning and propose solution approach.

Course Title: Digital Control Systems

Course code: EEE 4433

Upon completion of this course the students are able to:

1. Apply z-transforms and block-diagram reduction techniques to discrete time systems.
2. Develop pulse transfer function and state space models of the given discrete time system.
3. Investigate controllability, observability and stability of control systems for pole placement at desired locations.
4. Design different controllers in time/frequency domain to improve the system performance.
5. Design full order and reduced order observers for state estimation.

Course Title: Digital Signal Processing

Course code: ECE 3420

At the end of the course students are able to

1. Analyze the system in Time and Frequency domain through its respective tools
2. Demonstrate knowledge of complex number, Fourier series and ability to design electrical and electronics systems, analyze and interpret data
3. Design the digital filter circuits for generating desired signal wave shapes (non sinusoidal) for different applications like computers, control systems and counting and timing systems

4. Design the digital computer or digital hardware for quantizing amplitudes of signals
5. Design the various processing circuits that are necessary in the hardware or interfacing blocks in systems used in radars, satellite etc

Course Title: Programmable Logic Controllers Course code: EEE 4434

At the completion of this course, the student will:

1. Learn the major components of a Programmable Logic Controller (PLC)
2. Learn the functions of the CPU, input modules, and output modules in a PLC
3. Describe the function and principles of operation of a Programmable Logic Controller (PLC) in industrial applications.
4. Identify and explain different types of network modules used by PLCs.
5. Detail and state the application of logic gates in PLC systems.

Course Title: Electrical Distribution Systems Course code: EEE 4435

Upon completion of the course students are able to:

1. Apply power system fundamentals to the design of a system that meet specific needs
2. Prepare a report describing the design process followed
3. Design a power system solution based on the problem requirements and realistic constraints.
4. Use tools such as AutoCAD, Matlab, spreadsheets, and power system analysis software to Complete their designs.

Course Title: Measurements & Control Systems Lab Course code: EEE 4236

After undergoing this lab course, students will be able to

1. Evaluate the performance of different controllers in a closed loop systems applicable to electrical systems
2. Justify the applications of DC Servo motor from the speed torque characteristics.
3. Analyze the efficiency of AC motors and synchronous motors through closed loop transfer functions.
4. Investigate the performance of DC machines through transfer function analysis.
5. Analyze the quality of the metering instruments and find the reasons behind erroneous operation.
6. Check the performance of different electric machines by doing qualitative analysis on the parameters of that machine.

Course Title: Power Systems lab Course code: EEE 4237

Upon completion of this course the students are expected to:

1. Analyze various characteristics of relays.
2. Evaluate breakdown strength of Oil.
3. Analyze the characteristics of a Fuse.
4. Evaluate the parameters, performance of a long transmission line.

5. Evaluate the efficiency, regulation of a long transmission line.

B.Tech- 8th Semester

Course Title: HV Transmission Course code: EEE 4438

Upon completion of this course the students are able to:

1. Outline different types of HVDC links and applications of AC and DC Transmission systems.
2. Summarize the converter control characteristics and Reactive power control in HVDC system.
3. Apply Power Flow Analysis in ac and dc systems using simultaneous and sequential methods.
4. Demonstrate types and design of different filters and reduction of harmonics

Course Title: Power System Operation and Control Course code: EEE 4439

Upon completion of this course the students are able to:

1. Outline the concepts of economic operation in thermal & Hydro-thermal Power plants.
2. Develop mathematical model of power system components
3. Analyze the performance of power system for given load variations.
4. Design controllers for obtaining desired outputs of a power plant.

Course Title: Electrical Installation, Design & Estimation Course code: EEE 4440

At the end of the course students are able to

1. Estimation and costing of residential and commercial buildings
2. Learn Distribution systems, its types and substations.
3. Condition monitoring and Testing of various electrical equipments
4. Describe substation readings, planning and cost estimation.
5. Identify tools, appliances, special outlets, motors and motor circuits.

Course Title: Machine Modeling & Steady State Analysis Course code: EEE 4441

Upon completion of this course the students are able to:

1. Equipped with the basic theories and methods for analyzing typical electric machines in both steady and dynamic states and have the ability to apply them to solve the problems arising from engineering reality.
2. Identify, formulate and solve the problems concerning the contemporary issues of practical electric machines and their systems.
3. Solve and analyze electric machinery models.

Course Title: Power System Dynamics and Control Course code: EEE 4442

Upon completion of this course the students are able to

1. Analyze a power system by knowing the characteristics of major components.
2. Model power system elements such as generators, transmission lines etc.
3. Categorize different types of power system stability based on

disturbances.

4. Suggest suitable method of enhancing stability.
5. Control the power system with different control methods and measures.

Course Title: VLSI Design Course code: ECE 4432

Upon completion of this course the students are able to:

6. Design the various layouts for digital and analog blocks.
7. Understand the steps involved in IC fabrication
8. Design the various Analog and digital IC building blocks like inverters, current
9. Design the various Analog and digital IC building blocks like inverters, current mirrors, current sources, voltage references and all basic building blocks
10. Get the idea behind back end and front end design issues in IC design

Department of Mechanical Engineering B.Tech (ME)- 3rd Semester

16ME301 ENGINEERING THERMODYNAMICS

1. Explain thermodynamic systems, Boyle's Law, Charles law and Avogadro's law
2. Analyze the flow and non-flow thermodynamic processes
3. Apply zeroth, first and second law of thermodynamics to various thermodynamic systems
4. Illustrate the concept of entropy and the mixtures of perfect gases
5. Analyze the properties of the steam
6. Evaluate the pplane truss (frame) by method of joints and method of sections

Course Title: Basic Elements of Machine Design Course Code: ME 3418

7. Understand the design procedure and selection of material for a specific application
8. Design a component subjected static loads based on strength and stiffness criterion.
9. Design a component when it is subjected variable loads.
10. Provide alternate design solutions based on requirement.

Course Title: Dynamics of Machinery Course Code: ME 3419

1. Interpret the principle of gyroscope and calculate gyroscopic effect for aeroplanes, ships, two wheelers and four wheelers.
2. Perform static and dynamic force analysis of planar mechanisms.
3. Summarize the working of important machine elements like clutches, brakes, flywheels and governors.
4. Examine balancing of rotating and reciprocating masses.

5. Analyze mechanical systems subjected to longitudinal, transverse and torsional vibrations.

Course Title: Metal Cutting & Metrology Course Code: ME 3420

At the end of the course students are able :

1. Understand the cutting tool geometry, mechanism of chip formation and mechanics of orthogonal cutting.
2. Identify basic parts and operations of machine tools including lathe, shaper, planer, drilling, boring, milling and grinding machine.
3. Design locating and clamping devices produce a component.
4. Select a machining operation and corresponding machine tool for a specific application in real time.
5. Select a measuring instrument inspect the dimensional and geometric features of a given component.

Course Title: Steam and Gas Turbines Course Code: ME 3421

At the end of the course students are able :

1. Understand the concept of Rankine cycle.
2. Understand working of boilers including water tube, fire tube and high pressure boilers and determine efficiencies.
3. Analyze the flow of steam through nozzles
4. Evaluate the performance of condensers and steam turbines
5. Evaluate the performance of gas turbines

Course Title: Instrumentation & Control System (Elective-I) Course Code: ME 3422

At the end of the course students are able :

1. Understand working principles of basic measuring instruments
2. Select a transducer for measurement of primary and derived variables.
3. Analyze the response of a measuring instrument.
4. Analyze and design an instrumentation system.
5. Understand temperature, speed and position control systems.

Course Title: Operations Research (Elective-I) Course Code: ME 3423

At the end of the course students are able :

1. Formulate a real time situation in a mathematical model.
 1. Assign a right job a right person using job sequencing.
 2. Make right decisions in operations management using game theory, queuing theory and replacement analysis.
 3. Solve non-linear problems using non-linear programming techniques.
 4. Perform optimum problem solving using dynamic programming and simulation techniques.

Course Title: Unconventional Machining Processes (Elective-I) Course Code: ME 3424

At the end of the course students are able :

1. Understand the need and applications of modern machining processes.
2. Understand the working principle of modern machining process.
3. Select a suitable modern machining process for given applications.
4. Understand the working principle of advanced forming processes.

Course Title: Machine Tools and Metrology Lab

Course Code: ME 3225

At the end of the course students are able :

1. Measure the bores by internal micrometers and dial bore indicators.
2. Measure the angle and taper using Bevel protractor and Sine bar.
3. Measure screw thread parameters.
4. Perform step turning, taper turning, thread cutting, drilling and tapping operations on lathe.
5. Perform operations on shaper, planer and milling machines.
6. Perform alignment tests for the evaluation of machine tool accuracy.

Course Title: Thermal Engineering Lab

Course Code: ME 3226

At the end of the course students are able :

1. Evaluate the performance of IC engines.
2. Perform heat balance analysis of IC engines.
3. Evaluate the performance of a reciprocating air compressor.
4. Evaluate the performance of refrigeration and air conditioning systems.
5. Plot Valve and Port timing diagrams of 4-stroke and 2-stroke engines
6. Compile and present specifications of two and four wheelers.

B.Tech- 6th Semester

Course Title : Engineering Economics and Project Management Course Code : HS 3405

At the end of the course students are able :

7. Understand basic principles of engineering economics
1. Evaluate investment proposals through various capital budgeting methods
2. Apply the knowledge prepare the simple financial statements of a company for measuring performance of business firm
3. Analyze key issues of organization, management and administration
4. Evaluate project for accurate cost estimates and plan future activities

Course Title: Design of Machine Members Course Code: ME 3427

At the end of the course students are able :

1. Design journal bearings, ball and roller bearings subjected static and dynamic loads.
2. Analyze curved beams subjected static loads.
3. Design engine parts including connecting rod, crank shaft, pistons and cylinders.

4. Design power transmission systems including power screws, belts, pulleys, spur and helical gears.
5. Design machine tool elements including beds guide ways.

Course Title: Heat Transfer

Course Code: ME 3428

At the end of the course students are able :

1. Understand basic modes of heat transfer and compute temperature distribution in steady state and unsteady state heat conduction
2. Analyze heat transfer through extended surfaces
3. Interpret and analyze free & forced convection heat transfer
4. Comprehend the phenomena and flow regimes of boiling and condensation
5. Understand the principles of radiation heat transfer
6. Apply LMTD and NTU methods design heat exchangers

Course Title: Industrial Robotics (Elective-II) Course Code: ME 3429

At the end of the course students are able :

1. Understand basic parts and configurations of robotic systems.
2. Analyze robotic systems using forward and inverse kinematics.
3. Analyze robotic systems for dynamic performance using Lagrange –Euler and Newn-Euler formulations.
4. Develop a trajectory plan for a given application.
5. Understand actuators and feedback devices used in robotic systems.

Course Title: Mechatronics (Elective-II) Course Code: ME 3430

At the end of the course students are able :

1. Recognize of different sensors, transducers, signal conditioning techniques
2. Develop a system models like Mechanical, Electrical, Fluid & Thermal systems
3. Formulate Transfer function for different Systems.
4. Understand the working principle of different controllers like Proportional, Derivative, Integral, PI, PD, PID.
5. Develop a PLC programming techniques with Microprocessor, ladder diagram for different logic Gates
6. Demonstrate case studies of Mechatronics systems like pick-and-palace robot.

Course Title: Refrigeration and Air Conditioning (Elective-II) Course Code: ME 3431

At the end of the course students are able :

1. Understand the principles and applications of refrigeration systems
2. Understand vapor compression refrigeration system and identify methods for performance improvement
3. Study the working principles of steam jet, vapor absorption, thermoelectric and vortex tube systems
4. Analyze air conditioning processes using principles of psychometry.
5. Evaluate cooling and heating load in an air conditioning system

6. Identify ecofriendly refrigerants and use P-H charts evaluate the performance of refrigeration systems

Course Title: Principles of Entrepreneurship (Elective-III) Course Code: ME 3432

At the end of the course students are able :

1. Explain the role of entrepreneur in economic development.
2. Demonstrate methods of generating ideas
3. Develop the business plan start their own enterprises
4. Manage various production aspects such as manufacturing costs control, marketing management and waste reduction
5. Make financial plan for enterprise
6. Find the institutional support entrepreneurship

Course Title: Heat Transfer Lab Course Code:

ME 3233

At the end of the course students are able :

1. Apply the knowledge of heat transfer perform experiments related conduction heat transfer
2. Evaluate heat transfer coefficient in free and forced convection heat transfer situation
3. Determine fin efficiency and emissivity in respective experiments
4. Observe the phenomena of drop and film wise condensation
5. Evaluate the performance of heat exchangers in parallel & counter flow types

Course Title: Instrumentation and Dynamics Lab Course Code: ME 3234

At the end of the course students are able :

1. Perform calibration on Pressure gauges, temperature detectors and LVDT.
2. Study the working and calibrate photo and magnetic pickups and seismic pickups.
3. Determine the critical speed using whirling of shaft.
4. Perform balancing of rotating masses.
5. Determine gyroscopic couple.
6. Analyze cam profile.

B.Tech- 7th Semester

Course Title: Geometric Modeling and Computer Aided Manufacturing Course Code: ME 4435

At the end of the course students are able :

1. Understand the use of computers in product design and manufacturing and their life cycle.
2. Perform basic 2D and 3D geometric Transformations
3. Interpret and develop models of simple curves, surfaces and solids.
4. Understand NC, DNC, CNC, GT, CAPP and FMS
5. Develop CNC part programs for Milling and Turning operations.

1. Explain CAQC,CIM systems

Course Title: Advanced IC Engines Course Code: ME 4436

At the end of the course the learners will be able

1. Analyze engine cycles and the factors responsible for making the cycle different from the Ideal cycle
2. Apply principles of thermodynamics, fluid mechanics, and heat transfer influence the engine's performance
3. Comprehend the delay period and fuel injection system
4. Understanding of the relationships between the design of the IC engine and environmental and social issues

Course Title: Design for Manufacturing

Course Code ME 4437

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At the end of the course students are able :

1. Understand modern manufacturing operations, including their capabilities, limitations, and how design various components for lowest cost.
2. Gain insight in how design a criterion for material selection interrelationship with process selection and process selection charts.
3. Acquire how analyze products and be able improve their manufacturability and lower costs.
4. Understand the relationship between customer desires, functional requirements, product materials, product design, and manufacturing process selection.
5. Examine a product and determine how it was manufactured and why.
6. Comprehend how and why value stream analysis is used lower manufacturing costs.

Course Title: Fracture Mechanics & Fatigue

Course Code: ME 4438

At the end of the course students are able :

1. Understand the mechanism of fracture in ductile and brittle materials
2. Evaluate critical stress intensity factor.
3. Analyze plastic zone shape and size near the crack tip.
4. Estimate crack tip opening displacement (CTOD) & J- integral.
5. Understand micro mechanisms of fatigue & estimate life of a component

Course Title: Non- Conventional Sources of Energy

Course Code: ME 4439

At the end of the course students are able :

1. Understand the concept of different forms of alternative sources of renewable energy
2. Explain the solar energy storage methods
3. Evaluate the design parameters of wind energy and solar energy
4. Understand the principles of Biomass energy conversion.
5. Explain the techniques and methods of Tidal, Geothermal and OTEC.

6. Illustrate the principles of direct energy conversion methods

Course Title: Finite Element Methods

Course Code: ME 4440

At the end of the course students are able :

1. Apply the concepts of minimum potential energy principles solve structural mechanics problems.
2. Demonstrate various concepts like tal potential energy principles, weighted residual methods.
3. Apply the finite element procedure for stress analysis and design of load carrying structures.
4. Estimate Eigen values and eigenvectors find natural frequency and mode shapes for simple dynamic systems.

Course Title: Jet Propulsion and Rocket Engineering

Course Code: ME 4441

At the end of the course students are able :

1. Understand the basic principles of gas turbine and jet propulsion.
2. Illustrate and analyze turboprop, turbojet and ramjet engines.
3. Understand and evaluate the performance of rocket engines.
4. Apply the rocket technology recent advances such as cryogenics, plasma arc propulsion etc.

Course Title: Nano Technology

Course Code: ME 4442

At the end of the course the learners will be able

1. Outline the evolution, history, applications and impact of nanotechnology.
2. Compare and discuss different top-down and bottom-up approaches for the synthesis of nanomaterials.
3. Explain the principles of different structural and microstructural characterization techniques.
4. Summarize the mechanical, electrical and optical properties of the nano materials.
5. Understand the interaction between bio-molecules and nano-particle surface and the concepts of nano-medicine development.

Course Title: Production Planning and Control (Elective-V) Course Code: ME 4443

At the end of the course students are able :

1. Define and relate the tasks of strategic planning, materials requirements planning, aggregate production planning and scheduling.
2. Develop forecasting models for demand forecasting
3. Solve various inventory management problems
4. Specify optimal global manufacturing process and logistics network based on world market options

5. Implement various scheduling techniques schedule shop floor activities of the industry.
6. Develop aggregate production plans weekly assembly quantities for end items

Course Title: CAD LAB

Course Code: ME 4244

At the end of the course students are able:

1. Draw orthographic and isometric views of simple mechanical components using any drafting software as per the BIS standard.
2. Model and assemble 3D objects in Solid modeling software.
3. Prepare a systematic approach for solving FEM problems
4. Solve, analyze and validate the results using ANSYS.

Course Title: CAM & Mechatronics Lab

Course Code: ME 4245

At the end of the course students are able :

1. Write Manual Part programs using G and M codes and simulate those using CNC lathe and milling programs.
2. Perform machining on CNC machines and fabricate simple machine components on Lathe and milling Machines.
3. Develop simple ladder logic programs and run them on PLCs.
4. Understand the basic components of pneumatic circuit and operate those using PLCs.
5. Learn operating various sensors and transducers using PLCs.
6. Write simple programs for controlling basic elements in automatic systems by using microcontroller.

B.Tech- 8th Semester

Course Code: Automobile Engineering

Course Code: ME 4446

At the end of the course students are able :

1. Identify different types of automobile vehicles and their category, engine construction, turbo charging and supercharging.
2. Choose the different components necessity and their working related transmission system.
3. Explain the necessity and working of controlling system like steering, suspension, braking and electrical system,
4. Identify different causes for troubles faced during the operation and their remedies.
5. Illustrate the engine safety systems and emission control methods

Course Title: Industrial Engineering and Management Course Code: ME 4447

At the end of the course students are able :

1. Develop the simplest work methods and establish one best way of doing the work.

2. Select the site and develop a systematic layout for the smooth flow of work without any interruptions
3. Understand how improve productivity and profitability by implementing work study and SQC methods.
4. Select and maintain skilled and sufficient manpower perform various functions.
5. Implement Project Management techniques estimate expected completion time and optimal cost of the projects

Course Title: Advanced Materials

Course Code: ME 4448

At the end of the course the learners will be able

1. Understand the need and explain different types of composite materials.
2. Summarize the various methods for manufacturing of the composite materials.
3. Distinguish between the properties and uses of different reinforcement fibres.
4. Explain the principles, types and applications of different functionally graded materials and shape memory alloys.
5. Infer the reasons for the variation in the properties of nanomaterials in comparison those of bulk materials.

Course Title: Cellular Manufacturing Systems Course Code: ME 4449

At the end of the course students are able :

1. Understand the concept and applications of cellular manufacturing system
2. Distinguish the coding systems, production flow analysis and component flow analysis.
3. Apply the essential algorithms and data structures on cellular manufacturing systems.
4. Analyze the factors in cell design consideration
5. Analyze the factors influencing the effectiveness, efficiency and utilization for cellular manufacturing and its implementation issues.
6. Understand the scheduling and production control activities in Cellular manufacturing and its benefits.

Course Title: Computational Fluid Dynamics Course Code: ME 4450

At the end of the course, the students will be able :

1. Understand the basic principles of mathematics and numerical concepts of fluid dynamics.
2. Develop governing equations for a given fluid flow system.
3. Adapt finite difference techniques for fluid flow models.
4. Apply finite difference method for heat transfer problems.
5. Solve computational fluid flow problems using finite volume techniques.

6. Get familiarized modern CFD software used for the analysis of complex fluid-flow systems.

Course Title: Power Plant Engineering

Course Code: ME 4451

At the end of the course students are able :

1. Describe construction, working principles and advantages of steam and hydroelectric power plants.
2. Describe working principles of diesel and gas turbine power plants
3. Apply the concepts of non-conventional energy sources
4. Outline different technologies adopted in nuclear power plants
5. Apply pollution control techniques, economic analysis in power plants

16MA304 COMPLEX VARIABLES

Course Outcomes

1. Implement the knowledge of Z-Transformations in signal analysis and solve difference equations
2. Define and assess limits and continuity for complex variable functions as well as consequences of continuity
3. Identify the significance of differentiability and Analyticity for complex variable functions and be familiar with the Cauchy-Riemann equations
4. Compute integrals along a path in the complex plane using the Cauchy's theorem and Residue theorem
5. Classify the singularities of complex variable function by expanding them into Taylor's and Laurent's series
6. Interpret various types of transformations in complex plane

16EC302 DIGITAL ELECTRONICS

Course Outcomes

1. Illustrate the conversion of a number from one number system to another
2. Identify Boolean algebra and K-map as a tool to simplify and design logic circuits
3. Implement combinational circuits using gates
4. Design PLDs and Flip-flops
5. Implement various types of counters and shift registers
6. Attribute innovative designs by modifying the traditional design techniques

16EC303 ELECTRONIC DEVICES AND CIRCUITS

Course Outcomes

1. Explain the properties of semiconductor materials in the formation of PN diode and Zener diode
2. Classify the V-I characteristics of CB & CE configurations
3. Design various biasing circuits to achieve the required stability in transistor amplifiers
4. Illustrate the operation of FETs and special diodes for different applications
5. Design half wave, full wave rectifiers with and without filters for different applications
6. Design regulated power supply using Zener diode and transistors

16EC304 LINEAR CIRCUIT ANALYSIS

Course Outcomes

1. Summarize the characteristics of RL, RC, RLC series and parallel circuits in both time and frequency domain.
2. Find the power and power factor of RL, RC, RLC series and parallel circuits.
3. Design resonant circuits which are used in wireless transmission and communication networks.
4. Implement the theorems to simplify complex networks
5. Outline the transient analysis in electrical circuits and to analyze the system stability
6. Determine the parameters of two port networks to analyze the performance of transmission lines.

16EC305 RANDOM VARIABLES & STOCHASTIC PROCESSES

Course Outcomes

1. Illustrate probability concepts and Bayes theorem
2. Find the distribution and density functions of random variables
3. Compute various moments of random variables
4. Demonstrate vector random variables and their statistical averages
5. Outline the temporal and spectral characteristics of random processes
6. Summarize noise sources and characteristics

16EC306 SIGNALS & SYSTEMS

Course Outcomes

1. Interpret various types of signals and systems with the basic signal operations
2. Explain the concept of orthogonality for periodic signals approximation
3. Implement the various transform techniques for analyzing continuous time signals
4. Implement correlation and convolution techniques for various signals

5. Find the response of LTI system
6. Attribute the concept of sampling theorem and Laplace transform

16EC307 DIGITAL ELECTRONICS LAB

Course Outcomes

1. Implement the Universal gates using logic gates
2. Implement the logic circuits using Universal gates
3. Design and analyze combinational logic circuit
4. Design flip-flop using gates and ICs
5. Design and analyze synchronous and asynchronous counter
6. Implement shift registers using flip-flops and design an application using registers and counters

16EC308 ELECTRONIC DEVICES AND CIRCUITS LAB

Course Outcomes

1. Demonstrate various electronic components and test equipment like multimeter, function generator, and CRO in order to measure passive components and observe the waveforms
2. Predict the V-I characteristics of PN junction and Zener diodes
3. Compare the operation of BJT and FET through their V-I characteristics
4. Compare half wave and full wave rectifiers with and without filters
5. Implement D.C. Regulated power supplies circuits using Zener and BJT
6. Design and verify the self-biasing CE configuration circuit

16EC309 SIGNALS AND SYSTEMS LAB

Course Outcomes

1. Illustrate signal representation techniques and signal characteristics
2. Interpret the process of sampling and the effects of under sampling
3. Design suitable filters to process the analog signals
4. Contrast the signals in Time and Frequency domain through its respective tools
5. Determine the power content and power spectral density of the signal
6. Determine the Autocorrelation and power density spectrum of the processes

16EE410 LINEAR CONTROL SYSTEMS

Course Outcomes

1. Explain mathematical models of control systems in continuous time
2. Formulate a control system using block diagram and signal flow graph techniques
3. Find the transient and steady state performances of a control system
4. Contrast the stability of a system using time domain and frequency domain techniques
5. Design different compensators and controllers in time/frequency domain
6. Compute the controllability and observability of a given system

16IT306 OBJECT ORIENTED PROGRAMMING THROUGH JAVA

Course Outcomes

1. Apply object oriented concepts to real world problems
2. Develop applications using different types of inheritances
3. Create and use user defined packages
4. Analyze and recover runtime exceptions arise in the applications
5. Apply parallel processing applications using threads
6. Develop internet based interactive applications using peripheral functions

16EC403 ANALOG COMMUNICATIONS

Course Outcomes

1. Explain various blocks in communication systems
2. Compute modulation indexes for AM and FM modulation techniques
3. Illustrate the analog modulator and demodulator circuits
4. Implement different types of Pulse modulation techniques
5. Compare the noise level in Analog communication systems
6. Explain the operations of Transmitters and Receivers

16EC404 ELECTROMAGNETIC FIELDS AND WAVES

Course Outcomes

1. Classify different coordinate systems
2. Execute the problems on different charge distributions using Coulomb's law & Gauss law
3. Assess the problems on current elements of electrostatics and magneto statics
4. Implement Maxwell's equations for plane waves and their propagation in different media
5. Predict the reflection and refraction of uniform plane waves in different media interfaces
6. Compare wave equations for uniform plane waves

16EC405 ELECTRONIC CIRCUIT ANALYSIS

Course Outcomes

1. Implement single stage amplifiers at low and high frequencies using transistors and FETs
2. Implement multistage amplifiers at low and high frequencies using transistors and FETs
3. Illustrate feedback amplifiers for different applications
4. Design sinusoidal Oscillators for a specified frequency
5. Design power amplifier for different applications
6. Assess tuned amplifiers for communication systems

16EC406 PULSE AND DIGITAL CIRCUITS

Course Outcomes

1. Design of linear wave shaping circuits for different applications
2. Construct nonlinear wave shaping circuits to remove undesired portion of input signal
3. Construct nonlinear circuits to clamp the input signal to desired level
4. Differentiate multivibrators for different applications
5. Design of Time base generators for different applications
6. Design of pulse generation circuits and sampling gates

16IT309 JAVA LAB

Course Outcomes

1. Make use of JAVA SDK environment to create - debug and run java programs
2. Create applications based on code reusability
3. Develop programs using threads
4. Develop and debug real time problems using exception handling
5. Create interactive applications using event handling mechanisms
6. Design Graphical User Interface using AWT components

16EC408 ANALOG COMMUNICATIONS LAB

Course Outcomes

1. Implement sampling theorem
2. Compute and simulate analog modulation & demodulation techniques
3. Construct pre-emphasis and de-emphasis at the transmitter and receiver respectively

4. Construct diode detector and AGC circuit that are necessary for good reception of the signal
5. Assess the spectrum of modulating signal and modulated signal
6. Design and simulate the pulse modulation techniques

16EC409 ELECTRONIC CIRCUITS LAB

Course Outcomes

1. Design and verify linear and nonlinear wave shaping circuits
2. Parse the Mono stable Multivibrator and Schmitt trigger circuits
3. Implement the single stage amplifier circuits using BJT and FET for desired characteristics
4. Design of sinusoidal oscillations for the desired frequency
5. Check the output and efficiency of class-A power amplifier
6. Determine the gain and bandwidth of amplifiers

Course Title: ANTENNAS AND WAVE PROPAGATION Course Code: ECE 3414

At the completion of the course, students should be able to:

1. Explain how an antenna radiates and capture radio wave energy from the concepts of radiation.
2. Distinguish the properties and parameters of an antenna.
3. Apply the Friis transmission expression to predict the received powers in a system consisting of transmit and receive antenna.
4. Design an antenna system, including the shape of the antenna, the requirement on the arrangement of the radiating elements in an array for the given specifications.
5. Interpret various procedures for measuring antenna parameters like gain, directivity etc.
6. Describe the mechanism of the atmospheric effects on radio wave propagation.

Course Title: DIGITAL COMMUNICATIONS Course Code: ECE 3415

After undergoing the course students will be able to:

1. Understands the principle features of digital communication systems and their current and future applications
2. Understands the baseband pulse transmission, and provide tools to analyze the performance of different PCM waveform in noise
3. Compute the bandwidth and transmission power by analyzing time and frequency domain spectra of signal required under various modulation schemes.

4. Understand Band pass digital modulation and demodulation (binary and M-level; ASK, PSK and FSK), and provide tools to analyze the performance in noise.
5. Characterize error-control coding techniques and explain the working of Viterbi algorithm, for the reliable transmission of digital information over the channel.
6. Identify and describe different techniques in digital communications, and judge the applicability of different techniques in different situations.

Course Title: ELECTRONIC DESIGN AUTOMATION USING HDL Course Code: ECE 3416

After undergoing the course students will be able to

1. know the importance of EDA tools and its flow for VLSI designs
2. demonstrate the architectural details of FPGA and CPLD
3. design and implement the fundamental digital logic circuits using verilog HDL
4. perform system level design
5. Implement Design rule checks and timing parameters
6. Draw the Digital circuits using SM charts

Course Title: LINEAR AND DIGITAL IC APPLICATIONS Course Code: ECE 3417

After undergoing the course students will be able to:

1. Acquaint with a wide variety of op-amp and linear IC applications and design different signal conditioning circuits like filters, A/D and D/A converters, low signal amplifiers, rectifiers, clippers, peak detectors etc.
2. Design Pulse generator circuits of required frequency and PLL circuits.
3. Design CMOS logical gates and understand the issues with respect to fan-in, fan-out and power dissipation
4. Build various combinational and sequential logics using commercial IC's and verify the functionality as per logic.
5. Originate a simple ROM memory and analyze the working principles of RAM, SRAM and DRAM

Course Title: COMPUTER NETWORKS (ELECTIVE-I) Course Code: IT 3410

At the end of the course students are able to:

1. recommend appropriate network model for data communication.
2. be familiar with how reliable data communication is achieved through data link layer.
3. intend appropriate routing algorithm for data routing.
4. Connect internet to the system and knowledge of trouble shooting.

Course Title: CONTROL SYSTEMS (Elective-I) Course code: EEE 3416

Upon completion of this course the students are able to:

1. Develop transfer function and state space models of control systems in continuous time.

2. Describe and simplify a control system using block diagram and signal flow graph techniques.
3. Analyze the transient and steady state performances of control systems.
4. Investigate the stability of a system using time domain and frequency domain techniques.
5. Design different compensators and controllers in time/frequency domain.
6. Investigate the controllability and observability of control systems

Course Title: DATA STRUCTURES (ELECTIVE-I) Course Code: IT 2401

At the end of the course students are able to:

1. Create and manage data structures for developing real world applications.
2. Use algorithms and data structures in well-written modular code in an adequate and optimal way.
3. Apply the data structure array for various list processing operations such as searching and sorting.
4. Decide to use array or linked-list for solving a given problem.
5. Differentiate between linear and non-linear data structures.

Course Title: DIGITAL COMMUNICATIONS LAB Course Code: ECE 3218

After undergoing the course students will be able to:

1. Understand, analyze, and design fundamental digital communication systems.
2. Identify and describe different techniques in modern digital communications, in particular in source coding, modulation and detection, carrier modulation, and channel coding.
3. Understand the basics of information theory and error correcting codes
4. Apply suitable modulation schemes and coding for various applications
5. Understand the design issues in a digital communication system.

Course Title: LINEAR AND DIGITAL IC APPLICATIONS LAB Course Code: ECE 3219

After completion of the course, students will be able to

1. Design op-Amp circuits for various applications.
2. Get the practical exposure on various linear and digital ICs
3. Design and implement the pulse generator using 555 timer
4. Design and construct the various first order filters like LPF, HPF, BPF and BRF.
5. Know the usage of various digital ICs for combinational and sequential logic applications

B.Tech- 6th Semester

Course Title: MICROPROCESSORS AND MICROCONTROLLERS Course Code: ECE 3421

At the end of the course students are able to :

1. Recognise the operational modes of microprocessors, microcontrollers and gains the knowledge of machine level, assembly level programming, interfacing techniques.
2. Differentiate the peripherals and their features and also interpret various microcontrollers that allow certain important multiprogramming and multiprocessing.
3. Familiarize with the architecture of 8086 processor, assembling language programming and interfacing with various modules.
4. Learn to Interface various I/O peripherals like ADC, DAC, Keyboard, stepper motor etc., with microprocessors using 8255 PPI.
5. Do any type of industrial and real time applications by knowing the concepts of Microprocessors and Microcontrollers.
6. Understand of 8051 Microcontroller concepts, architecture, programming and microcontroller based systems

Course Title: MICROWAVE ENGINEERING Course Code: ECE 3422

At the completion of the course, students should be able to:

1. Understand the basic knowledge of microwaves and waveguides.
2. Examine microwave components and ferrite devices.
3. Interpret the basics of S parameters and use them in describing the components.
4. Analyze the working principle and performance of the microwave tubes and microwave semiconductor devices.
5. Distinguish between the linear and cross field electron beam microwave tubes.

Course Title: DATABASE MANAGEMENT SYSTEMS (Elective-II) Course Code: IT 2405

At the end of the course students are able to :

1. Write queries to retrieve data from multiple tables
2. Explore different database tools
3. Design a database for business information problems
4. Maintain a database management system
5. Develop projects using acquired knowledge of database concepts

Course Title: OBJECT ORIENTED PROGRAMMING THROUGH JAVA Course Code: IT 2402

At the end of the course, the students can:

1. Know the concepts of classes, objects, members of a class and the relationships among them
2. Implement Applications using Packages
3. Handle runtime errors using Exceptions handling mechanism.
4. Develop application for concurrent processing using Thread concepts
5. Design interactive applications for use on internet.

6. Design applets that take user response through various peripheral devices such as mouse and keyboard by event handling mechanism

Course Title: TELECOMMUNICATION SWITCHING SYSTEMS Course Code: ECE 3423 AND NETWORKS (Elective-II)

After undergoing the course students will be able to:

1. Understand the need for switching systems and their evolution from analogue to digital.
2. Understand various signaling techniques used in telecommunication systems.
3. Familiarize with functions of OSI-ISO layers, switching at network layer, connecting devices at physical layer.
4. Understand integrated networks and protocol frame formats of these networks.

Course Title: Fundamentals of Global Positioning System –Elective-III(Open elective) Course Code: ECE 3424

After undergoing the course students will be able to:

1. Explain the history of GPS and new trends in the activity.
2. Calculate GPS satellite orbit positions and velocities.
3. Define the fundamental working principle of GPS and outline its development
4. Describe global satellite navigation systems, satellite orbital characteristics, and satellite signal structure
5. Define coordinates systems likely to be encountered by GPS users and calculate and discuss GPS coordinates

Course Title: HDL laboratory Course Code: ECE 3225

After undergoing the course, students will be able to

1. Design and implement the fundamental digital logic circuits using verilog HDL.
2. Perform system level design for functionality.
3. Implement design rule checks and timing parameters.
4. Know the resources consumed by the design on FPGA.
5. Design digital IC

Course Title: MICROPROCESSORS AND MICROCONTROLLERS LAB Course Code: ECE 3226

After completing the course the students will able to:

1. Understand the full internal workings of a typical simple CPU including the utilization of the various Hardware resources during the execution of instructions
2. Design computers like desktops, laptops using various processors.
3. Design the high speed communication circuits using serial bus connection for computers.

4. Design Traffic light signals using Microprocessors and Microcontroller chips.
5. Introduce the design of basic I/O hardware and microprocessor interfacing: memory chip selection, Memory expansion, I/O interfacing, different I/O techniques.

B.Tech- 7th Semester

Course Title: ENGINEERING ECONOMICS AND PROJECT MANAGEMENT Course Code: HS 3405

At the end of the course students are able to:

1. comprehend basic principles of engineering economics
2. Evaluate investment proposals through various capital budgeting methods
3. Apply the knowledge to prepare the simple financial statements of a company for measuring performance of business firm
4. Analyze key issues of organization, management and administration
5. Evaluate project for accurate cost estimates and plan future activities

Course Title: BIOMEDICAL ENGINEERING Course Code: ECE 4429

After undergoing the course students will be able to:

1. Be familiar with the principle operation, design and the background knowledge of biomedical instruments and specific applications of biomedical engineering.
2. Recognize human physiology system.
3. Distinguish between the various methods used for information gathering, Diagnosis, evaluation.
4. Apply concepts of physiology and the Electrical Components of a biomedical system.
5. Classify the elements of patient care and monitoring and understand the measurements using therapeutic and prosthetic devices.
6. Demonstrate monitors, recorders and identify shock hazards and accident prevention methods.

Course Title: OPTICAL COMMUNICATIONS Course Code: ECE 4430

After undergoing the course students will be able to:

1. comprehend about optical fiber communication system and fiber optic devices
2. Classify the Optical sources and detectors and to discuss their principle.
3. Identify the difference between single mode/multimode fibers as well as step index and graded index fibers.
4. Apply fundamental physics principles to the operation of common optoelectronic devices.
5. Analyze the significance of various components involved in optical fiber communication system design
6. Design a basic optical fiber link

Course Title: R.F. CIRCUITS DESIGN Course Code: ECE 4441

At the end of the course students are able to

1. Know about design techniques and current applications in RF Circuit Design.
2. Draw Smith chart for basic transmission line calculations.
- 3.
4. Apply differential and complex calculus to obtain analytical and numerical solutions for RF circuits.
5. design RF Transistor Amplifiers.
6. Analyzes needs to produce problem definition for passive and active RF circuits, systems, and components.
7. Evaluate various Oscillators and mixers.

Course Title: VLSI Design Course Code: ECE 4432

After undergoing the course students will be able to:

1. narrate IC Production process, various fabrication processes, BiCMOS Technology, MOS device operation and overview of PLDs.
2. reveal device properties, circuit design processes, scaling.
3. illustrate stick diagrams, layouts for CMOS circuits and compute delays of CMOS circuits.
4. Minimize the scaling effects of MOS circuits.
5. Determine different levels of testing of IC

Course Title: DIGITAL IMAGE PROCESSING Course Code: ECE 4433

After undergoing the course students will be able to

1. appreciate image manipulations and different digital image processing techniques in various fields.
2. Perform basic operations like – Enhancement, Image transform and restoration techniques on image.
3. make use of image segmentation , compression for various applications.
4. Analyze pseudo and full color image processing techniques.
5. Apply the various image transforms used in image processing
6. apply MATLAB to implement the image processing techniques.

Course Title: EMBEDDED SYSTEMS Course Code: ECE 4434

After undergoing the course, students will be able to

1. Define differences between embedded system and general purpose systems.
2. Describe embedded system with the help of various components.
3. Analyze the design of embedded system with respect to quality attribute and can demonstrate the up gradations for real time application.
4. Know the hardware software co design of embedded system.
5. Explore different IDEs to design and implementation of embedded system and able to create real time applications.

Course Title: RADAR ENGINEERING Course Code: ECE 4435

After undergoing the course students will be able to:

1. Explain the operation of CW, FM-CW, MTI and Pulse Doppler radar.
2. Describe the range ambiguities and various system losses.
3. Explain parameters of radar receivers like noise figure, noise temperature.
4. Explain radar displays and types of duplexers.

Course Title: TESTING AND TESTABILITY OF DIGITAL SYSTEMS Course Code: ECE 4436

After undergoing the course, students will be able to

1. Apply knowledge of design of digital logic circuits.
2. Understand concepts of reduction of state tables and state assignments.
3. Illustrate various fault models in digital design and identify the faults in a given digital logic circuit.
4. Apply knowledge of fault diagnosis of designed combinational circuits using conventional methods
5. Realize concepts of design for testability and compression techniques of digital circuits.
6. Apply knowledge of BIST concepts and test Pattern generation.

Course Title: DIGITAL SIGNAL PROCESSING LAB Course Code: ECE 4237

At the end of the course students are able to :

1. design the digital filter circuits for generating desired signal wave shapes (non sinusoidal) for different applications like digital signal processing
2. analyze the system in Time and Frequency domain through its respective tools.
3. design the digital computer or digital hardware for quantizing amplitudes of signals.
4. design the various processing circuits that are necessary in the hardware or interfacing blocks in systems used in control systems ,CODEC, communications and signal processing

Course Title: MICROWAVE LAB Course code: ECE 4238

At the end of the course students are able to:

1. Determine isolation and insertion losses for different components like isolator, circulator, and directional coupler etc.
2. Select components that can be used in microwave transmission.
3. Measure the various parameters at microwave frequencies.
4. Analyze how the radiation intensity, radiation pattern and Gain of Horn antenna.
5. Measure the numerical aperture of optical fiber.
6. Outline the V-I characteristics of LED's and LASER to understand the benefits of optical fiber communication.

B.Tech- 8th Semester

Course Title: CELLULAR AND MOBILE COMMUNICATIONS Course Code: ECE 4439

After undergoing the course students will be able to:

1. Analyze and design wireless and mobile cellular systems.
2. Explain the concepts of handoff, frequency reuse, and operation of cellular systems
3. Understand the types of interference, its management.
4. Design the antenna system, parameters, and their effects in the reduction of C/I ratio.
5. Calculate the path loss slope and analyze the propagation effects of signal under various environment conditions.
6. Analyze and design digital cellular systems

Course Title: SATELLITE COMMUNICATIONS Course Code: ECE 4440

At the end of the course students are able to :

1. Locate satellite in the orbit and assess the orbital effects on satellite communications
2. Understand the functioning of attitude and orbit control system, Telemetry, tracking and command, Power Systems, Communication Subsystems, Spacecraft antennas and TDMA, FDMA and CDMA techniques
3. Perform and verify link budget calculations
4. Understand the generation of PN sequence and the concepts of direct sequence spread spectrum and frequency hopping spread spectrum
5. Understand the GPS Signal Structure and Operation of GPS receiver

Course Title: ANALOG I.C. DESIGN Course Code: ECE 4441

After undergoing the course students will be able to:

1. Describe MOS structures, operation and second order effects
2. Explain the basic analog IC blocks like mirrors, basic amplifiers and differential amplifiers
3. Demonstrate the internal circuits and topologies of Opamp
4. Implement frequency compensated and gain boosting operational amplifier
5. Analyze noise analysis of opamp
6. Analyze the switched capacitors

Course Title: INFORMATION SECURITY Course Code: CSE 3414

At the end of the course students are able to:

1. Analyze a given system with respect to security of the system.
2. Create an understanding of Authentication functions the manner in which Message
3. Authentication Codes and Hash Functions works.
4. Examine the issues and structure of Authentication Service and Electronic Mail Security
5. appreciate conventional and public key cryptographic approaches used in message encryption.
6. identify various types of attacks and its effect over the networks.

Course Title: REAL TIME OPERATING SYSTEMS Course Code: CSE 3416

At the end of the course students are able to:

1. Present the mathematical model of the system and to develop real time algorithm for task scheduling.
2. Understand capabilities Handling Resource Sharing and dependencies among Real-time Tasks
3. Generate a high-level analysis for Scheduling Real-time tasks in multiprocessor and distributed systems
4. Understand the working of real time operating systems and real time database.

Course Title: WIRELESS SENSOR NETWORKS Course Code: ECE 4442

After undergoing the course, students will be able to:

1. List various applications for sensor networks, describe key concepts and emerging trends in sensor networks.
2. Architect sensor networks for various application setups.
3. Solve problems in sensor node and transceiver design.
4. Determine suitable medium access protocols, routing protocols, security protocols and radio hardware.
5. Prototype sensor networks using commercial components.

Department of Computer Science & Engineering B.Tech (CSE)

16IT305 Data Structures

Course Outcomes

1. Explain basic operations of stacks, queues, and linked-lists
2. Understand various sorting and searching techniques
3. Choose an appropriate hashing technique for a given problem
4. Understand the basic operations of trees and its types
5. Explain the concept of height balancing in AVL and B trees
6. Demonstrate graph traversal algorithms

16IT306 Object Oriented Programming through Java

Course Outcomes

1. Summarize object oriented programming concepts
2. Develop applications using different types of inheritances
3. Create simple applications using Interfaces, packages and collections
4. Analyse and recover runtime exceptions arise in the applications
5. Apply parallel processing applications using threads
6. Develop Interactive applications for standalone and Internet (Applet)

16CS303 Computer Organization and Architecture

Course Outcomes

1. Understand the basic operations of digital computer system to learn the integrated circuit logic families and its micro-operation
2. Analyze the machine instructions and codes to implement or translate the sequence of micro-operation
3. Apply the fundamental issues related to computer arithmetic operation and circuits to support the system computation
4. Understand the various components of memory system to organize the operational units of CPU
5. Analyze the data processing operations of central processing and control unit to design the CPU specification
6. Understand the concepts of pipeline design techniques to increase the execution rate of a processor

16CS304 Database Management Systems

Course Outcomes

1. Understand data models to design a database
2. Illustrate the conceptual design for Large enterprises
3. Formulate SQL queries and integrity constraints over relations
4. Apply normalization on database for eliminating redundancy
5. Summarize transaction properties, concurrency control and recovery techniques
6. Understand the OODBMS concepts and design

16CS305 Digital Logic Design

Course Outcomes

After undergoing the course students will be able to:

1. Recognize the conversion of one number system to other Number system
2. Classify different logic circuits by using Universal gates
3. Execute Boolean algebra and K-map as a tool to simplify and design logic circuits
4. Implement and analyze the operation of Combinational and Sequential Circuits
5. Check various types of sequential circuits like counters and universal Shift Registers
6. Differentiate between the Mealy and Moore machines

16CS306 Discrete Structures & Graph Theory

Course Outcomes

1. Understand mathematical logic and predicates
2. Explain set theory, functions and algebraic structures

3. Demonstrate the ability to describe computer programs using Recursive Functions
4. Apply basic Counting techniques to solve Combinatorial Problems
5. Utilize generating functions and substitutions to solve recurrence relations
6. Demonstrate the Graphs and Trees as tools to visualize and simplify situations

16IT308 Data Structures Lab

Course Outcomes

1. Implement array - stack - and queue data structures to solve various computing applications
2. Implement linked list data structure to solve various computing problems
3. Apply the data structure array for various list processing operations such as searching and sorting
4. Design and develop applications using appropriate hashing method
5. Demonstrate and apply binary tree and its applications
6. Demonstrate and apply different methods for traversing graphs

16IT309 Java Lab

Course Outcomes

1. Make use of JAVA SDK environment to create - debug and run java programs
2. Create applications based on code reusability
3. Develop programs using threads
4. Develop and debug real time problems using exception handling
5. Using IDE, create interactive applications using event handling mechanisms
6. Design Graphical User Interface using AWT components and Applets

16CS309 Database Management Systems Lab

Course Outcomes

1. Illustrate ER model and identify the roles and privileges of various users in a database
2. Apply common SQL statements including DDL, DML and DCL statements to perform different operations
3. Construct SQL Queries for various operations on database
4. Interpret Embedded and Nested Queries
5. Implement control statements in PL/SQL
6. Apply triggers and assertions to stop malicious operations on tables

16CSI01 Tibero @ DB

(Course designed and will be delivered by TMaxSoft, Bangalore)

Course Outcomes

1. Demonstrate and understanding of the relational data model
2. Performance analysis between Tibero® DB and Oracle DBMS

16CSI02 Data Modelling for Business Intelligence

Course Outcomes

1. Understand DW architecture and different stages of data storage
2. Use normalization techniques to design OLTP and data warehouse
3. Design a data model for real life scenario

16MA405 Probability and Statistics

Course Outcomes:

1. Understand basic probability axioms and apply Baye's theorem related to engineering problems.
2. Identify the suitable distribution among Binomial, Poisson, exponential, normal in engineering applications.
3. Make use of the sampling distribution of the sample mean in general situations, using the Central Limit Theorem.
4. Decide the null or alternative hypotheses using the suitable test statistic.
5. Apply the regression analysis to fit the curves.
6. Understand the methods and applications of Control charts like X-bar, p and R-charts

16EC410 Microprocessors and Interfacing

Course Outcomes

1. Illustrate the internal working of a typical simple CPU including the utilization of the various hardware resources during the execution of instructions.
2. Implement memory chip and I/O chip interfacing to the 8086 microprocessor.
3. Interpret the architecture of 8086 processor, assembly language programming and interfacing with various modules.
4. Choose various I/O peripheral interfacing like ADC, DAC, Keyboard, stepper motor etc., with microprocessors using 8255 PPI.
5. Interface the 8086 interrupts and serial communication devices.
6. Use the concepts of microprocessors in real time and industrial applications.

16IT406 Operating Systems

Course Outcomes

1. Explain the concepts of process and implement CPU scheduling algorithms
2. Illustrate different problems and solutions related to process synchronization
3. Understand deadlock and use various algorithms to handle deadlocks
4. Understand various memory management mechanisms
5. Analyze various mechanisms used in virtual memory management

6. Analyze various file system and disk storage mechanisms

16CS404 Software Engineering

Course Outcomes

1. Understand the need of Software Life Cycle Models
2. Demonstrate the Requirements of the Software Systems process
3. Summarize the system models of software engineering
4. Choose appropriate software architecture style for real-time software projects
5. Analyze various testing techniques
6. Analyze Risk management and Software quality of the software products

16CS405 Theory of Computation

Course Outcomes

1. Understand finite automata and regular expressions
2. Demonstrate the minimization of DFA, Mealy and Moore machines
3. Summarize context free grammar and construction of PDA
4. Understand Chomsky classification and design Turing machine
5. Summarize computability, decidability and complexity through problem solving
6. Apply working skills in theory and application of finite state machines in compiler design

16CS406 Web Technologies

Course Outcomes

1. Understand HTML tags to design static web pages
2. Describe the basic concepts of JavaScripts to design dynamic web pages
3. Familiarize the concepts of PHP and AJAX
4. Develop interactive applications using Servlets and JSP
5. Demonstrate database connectivity
6. Select appropriate tools for designing dynamic and interactive web applications

16EC411 Microprocessors and Interfacing Lab

Course Outcomes

1. Illustrate the arithmetic operations, procedures and macros.
2. Design real time applications with microprocessors.
3. Design the PC based communication circuits using serial bus connection.
4. Explain the full internal workings of a typical simple CPU including the utilization of the various hardware resources during the execution of instructions.
5. Outline the design of basic I/O hardware and microprocessor interfacing: memory chip selection, memory expansion, I/O interfacing.

6. Use microprocessors chips to control Traffic lights signals

16CS408 Linux Programming Lab

Course Outcomes

1. Illustrate the knowledge of the basics of Unix/Linux commands
2. Apply the concepts of shell scripting on data and files
3. Understand the utility of SED to work on specific data
4. Apply the Inter Process Communication in Linux environment
5. Develop a simple communication application to communicate using TCP/UDP client server model
6. Develop solutions to real-world problems

16CS409 Web Technologies Lab

Course Outcomes

1. Create a static web pages using HTML and CSS
2. Develop JavaScript code for data validation
3. Integrate frontend and backend technologies in client-server systems
4. Demonstrate Servlet life cycle methods
5. Design dynamic web applications using PHP and JSP
6. Demonstrate database connectivity for developing web applications

16IT404 Computer Networks

Course Outcomes

1. Understand the basic network infrastructure to learn the overall function of networking systems
2. Classify various wired and wireless transmission media for data communication networks
3. Apply knowledge of different techniques of error detection and correction to detect and solve error bit during data transmission
4. Compare various routing algorithm and select an appropriate one for a routing design
5. Design a network routing for IP networks
6. Understand the internal functionalities of main protocols such as HTTP, FTP, SMTP, TCP, UDP, IP

B. Tech- 5thSemester

Course Title: COMPUTER NETWORKS

Course Code: IT 3410

At the end of the course students are able to:

1. Suggest appropriate network model for data communication.
2. Know how reliable data communication is achieved through data link layer.
3. Propose appropriate routing algorithm for data routing.
4. Connect internet to the system and knowledge of trouble shooting.

Course Title: DESIGN AND ANALYSIS OF ALGORITHMS Course Code: IT 2406

At the end of the course students are able to:

1. Analyze the asymptotic runtime complexity of algorithms for real world problems developed using different algorithmic methods.
2. Find the optimal solutions by using advanced design and analysis of algorithm techniques like greedy method and dynamic programming.
3. Apply the search space and optimization problem techniques like backtracking and branch and bound method to solve problems optimally where advanced algorithm design techniques fail to find solution.
4. Distinguish the problems and its complexity as polynomial and NP problems and can formulate some real world problems to abstract mathematical problems.

Course Title: WEB TECHNOLOGIES

Course Code: IT 3415

At the end of the course students are able to:

1. Choose, understand, and analyze any suitable real time web application.
2. Integrate java and server side scripting languages to develop web applications.
3. To develop and deploy real time web applications in web servers and in the cloud.
4. Extend this knowledge to .Net platforms.

Course Title: SOFTWARE ENGINEERING

Course Code: CSE 3409

At the end of the course students are able to:

1. Design and develop real-time software projects with effective cost estimation and plan
2. Make feasibility study of a project
3. Specify the design and architectural style of the software products
4. Propose testing strategy for a given software

Course Title: MICROPROCESSORS AND INTERFACING

Course Code: ECE 3428

After undergoing the course, students will be able to :

1. Understand the full internal workings of a typical simple CPU including the utilization of the various hardware resources during the execution of instructions.
2. Introduce the design of basic I/O hardware and microprocessor interfacing: memory chip selection, memory expansion, I/O interfacing.

3. Interface input and output devices like LCD, LED, Keyboards ADC, DAC and stepper motor to microprocessors.
4. Design the home appliances and toys using Microprocessor chips.

Course Title: ADVANCED DATABASES

Course Code: CSE 3410

At the end of the course students are able to:

1. Design an architectural model for distributed database management system.
2. Analyze Query processing and query optimization methods.
3. Implement transaction management and database reliability for real world scenario.
4. Use object-oriented distributed data model for data

Course Title: COMPUTER GRAPHICS

Course Code: CSE 3411

At the end of the course students are able to:

1. Be familiarized with contemporary graphics hardware, the actual methodology and techniques to draw computer graphics, animations etc. for the real world presentation and how it is implemented in Computer graphics software
2. Develop new kinds of graphics and animations.
3. Design and develop graphics applications with the implementation of advanced methods such as ray tracing, texture mapping, illumination and shading and be able to build interactive user interface to manipulate objects in a 3D scene and also in the development of Web pages.
4. Demonstrate the ability to develop an animation movie.

Course Title: COMPUTER NETWORKS LAB

Course Code: IT 3211

At the end of the course students are able to:

1. By learning models students suggest appropriate network model for data communication.
2. Know how reliable data communication is achieved through data link layer.
3. Suggest appropriate routing algorithm for the network.
4. Provide internet connection to the system and its installation.

Course Title: WEB TECHNOLOGIES LAB

Course Code: IT 3220

At the end of this course the student can answer how to:

1. Integrate frontend and backend web technologies in distributed systems.
2. Facilitate interface between frontend and backend of a web application.
3. Debug, test and deploy web applications in different web servers.
4. Migrate the web applications to the other platforms like .Net

Course Title: DATA ENGINEERING

Course Code:

CSE 3412

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

1. Apply relevant preprocessing techniques on different data sets for mining.
2. Implement Association rule mining concept and generate association rules.

3. Apply classification/clustering techniques on different types of data and analyze patterns.
4. Suggest appropriate data mining techniques to mine different types of data.

Course Title: OBJECT ORIENTED ANALYSIS AND DESIGN

Course Code: IT 3414

At the end of the course students are able to:

1. Understand the use of unified modeling language for object oriented analysis and design
2. Know the syntax of different UML diagrams.
3. Develop different models for a software system.
4. Apply object oriented analysis and design to build a software system
5. Apply forward and reverse engineering for a software system.

Course Title: LANGUAGE PROCESSORS

Course Code: CSE 3413

At the end of the course, students are able to:

1. Deal with different translators and to acquire the knowledge of compiler and its Phases.
2. Use of formal grammars for specifying the syntax and Semantics of programming languages
3. Build symbol tables and generate intermediate code for a given program.
4. Apply the code optimization techniques to improve the performance of a program in terms of speed and space.
5. Design a compiler for a concise programming language.

Course Title: DIGITAL SIGNAL PROCESSING

Course Code: ECE 3420

At the end of the course students are able to :

1. Analyze the system in Time and Frequency domain through its respective tools.
2. Demonstrate knowledge of complex number, Fourier series and ability to design electrical and electronics systems, analyze and interpret data.
3. Design the digital filter circuits for generating desired signal wave shapes (non sinusoidal) for different applications like computers, control systems and counting and timing systems.
4. Design the digital computer or digital hardware for quantizing amplitudes of signals.
5. Design the various processing circuits that are necessary in the hardware or interfacing blocks in systems used in radars, satellite etc

Course Title: INFORMATION SECURITY

Course Code: CSE 3414

At the end of the course students are able to:

1. Analyze a given system with respect to security of the system.
2. Create an understanding of Authentication functions the manner in which Message Authentication Codes and Hash Functions works.
3. Examine the issues and structure of Authentication Service and Electronic Mail Security Understand conventional and public key cryptographic approaches used in message encryption.

4. Able to identify various types of attacks and its effect over the networks.

Course Title: MOBILE COMPUTING Course Code: CSE 3415

At the end of the course students are able to:

1. Demonstrate knowledge of different voice and data communication standards
2. Analyze the need for optimizations in Mobile IP
3. Distinguish between proactive and reactive routing in an Ad hoc network
4. Develop simple app using Android

Course Title: REAL TIME OPERATING SYSTEM Course Code: CSE 3416

At the end of the course students are able to:

1. Present the mathematical model of the system and to develop real time algorithm for task scheduling.
2. Understand capabilities Handling Resource Sharing and dependencies among Real-time Tasks
3. Generate a high-level analysis for Scheduling Real-time tasks in multiprocessor and distributed systems
4. Understand the working of real time operating systems and real time database.

Course Title: SOFT COMPUTING Course Code: CSE 3417

At the end of the course students are able to:

1. Identify and describe soft computing techniques and their roles in building intelligent machines.
2. Apply fuzzy logic and reasoning to handle uncertainty and solve engineering problems
3. Apply neural networks to pattern classification and regression problems.
4. Evaluate and compare solutions by various soft computing approaches for a given problem.

Course Title: OBJECT ORIENTED ANALYSIS AND DESIGN LAB Course Code: IT 3219

After undergoing the course students are able to:

1. Know the syntax of different UML diagrams.
2. Create different UML diagrams for a software system
3. Identify appropriate models to represent a software system.
4. Analyze and design a software system in an object oriented style using tools like Rational Rose.

Course Title: LANGUAGE PROCESSORS LAB Course Code: CSE 3218

At the end of the course students are able to:

1. Apply the knowledge of LEX tool to develop a scanner.
2. Compute the first and follow of non-terminals of a grammar.
3. Apply the knowledge of YACC tool to develop a parser.
4. Design top-down and bottom-up parsers

Course Title: DESIGN PATTERNS Course Code: IT 4425

: At the end of the course students are able to:

1. Classify and document design patterns
2. Understand patterns to manage algorithms and assign responsibilities to objects
3. Apply patterns to solve design problems
4. Create new design patterns

Course Title: DISTRIBUTED SYSTEMS

Course Code: CSE 4419

Course Outcomes: At the end of the course students are able to :

1. Learn the core concepts underlying distributed systems designs.
2. Identify entities and resources in distributed systems and examine the naming conventions
3. Apply and compare the various communication mechanisms in distributed systems.
4. Identify issues on how to coordinate and synchronize multiple tasks in a distributed system.

Course Title: HUMANCOMPUTERINTERACTION

Course Code: CSE 4420

At the end of the course students are able to:

1. Explain the human components functions regarding interaction with computer
2. Demonstrate Understanding of Interaction between the human and computer components.
3. Implement Interaction design basics
4. Use HCI in the software process and Apply Design rules
5. Use Evaluation techniques

Course Title: MIDDLEWARETECHNOLOGIES

Course Code: CSE 4421

Course Outcomes: At the end of the course students are able to:

1. Choose appropriate client server computing model for given problem.
2. Design a dynamic remote application with RMI and JDBC Connectivity.
3. Develop client server applications using C#.net
4. Select appropriate language for homogeneous and heterogeneous objects.
5. Develop real time projects by combining CORBA and database interfacing

Course Title: SOFTWAREPROJECTMANAGEMENT

Course Code: CSE 4422

At the end of the course students are able to:

1. Apply and practice Project Management principles while developing a software.
2. Defining and implementing software project planning.
3. Analyzing software risks and risk management strategies
4. Defining the concepts of software quality and reliability on the basis of international quality standards.

5. Knowing and implementing the software project management tools

Course Title: DIGITAL IMAGE PROCESSING

Course Code: ECE 4433

Course Outcomes: After undergoing the course students will be able to

1. Appreciate image manipulations and different digital image processing techniques in various fields.
2. Perform basic operations like – Enhancement, Image transform and restoration techniques on image.
3. Make use of image segmentation , compression for various applications.
4. Analyze pseudo and full color image processing techniques.
5. Apply the various image transforms used in image processing
6. Apply MATLAB to implement the image processing techniques.

Course Title: BIG DATA ANALYTICS

Course Code: CSE 4423

At the end of the course students are able to:

1. Identify the need for big data analytics for a domain.
2. Apply big data analytics for a given problem.
3. Suggest areas to apply big data to increase business outcome.
4. Use Hadoop, Map Reduce Framework handle massive data

Course Title: MULTIMEDIA SYSTEMS

Course Code: CSE4424

At the end of the course students are able to:

1. Use different realizations of multimedia tools.
2. Implement various multimedia applications and Action scripts.
3. Analyze various storage technologies.
4. Apply video compression Techniques for real time applications.

Course Title: WIRELESS AD HOC NETWORKS

Course Code: CSE 4425

At the end of the course students are able to:

1. Analyze MAC protocols for Ad Hoc Wireless Networks
2. Analyze Routing protocols for Ad Hoc Wireless Networks
3. Understand the need for Energy Management in Ad Hoc Wireless Networks
4. Understand the issues and challenges in Wireless Network security

Course Title: DATA ENGINEERING LAB.

Course Code: CSE 4226

At the end of the course students are able to:

1. Implement the algorithms to solve data mining problem using WEKA tool
2. Identify an appropriate method to apply in a given situation
3. Communicate results in terms relevant to science, business etc.
4. Apply different clustering techniques to characterize subgroups.

Course Title: DESIGN AND ANALYSIS OF ALGORITHMS LAB **Course Code: CSE 4227**

At the end of the course students are able to:

1. Implement searching and sorting techniques efficiently to retrieve data.
2. Put into practice algorithms using greedy strategy and dynamic programming optimally.

3. Design and execute the algorithms using search space and optimization problem techniques for finding globally best solution.
4. Realize basic computability concepts and the complexity and to implement number theoretic algorithms to work in information security.

Course Title: ENGINEERING ECONOMICS AND PROJECT MANAGEMENT Course Code: HS 3405

At the end of the course students are able to:

1. Understand basic principles of engineering economics
2. Evaluate investment proposals through various capital budgeting methods
3. Apply the knowledge to prepare the simple financial statements of a company for measuring performance of business firm
4. Analyze key issues of organization, management and administration
5. Evaluate project for accurate cost estimates and plan future activities

Course Title: OBJECT ORIENTED SOFTWARE ENGINEERING Course Code: CSE 4428

At the end of the course students are able to:

1. Relate the object oriented methodology and implementation of software and the management of the software project.
2. Apply the knowledge of object oriented design tools including use cases, UML, Java and the JDK.
3. Study and experiment with alternative models of the software development process from the Prototyping method to dynamic modeling.
4. Practice the principles and techniques by developing a "real world" software system.

Course Title: NETWORK PROGRAMMING

Course Code: IT 4423

At the end of the course students are able to:

1. Comprehend Networking concepts.
2. Differentiate various network protocols like TCP, UDP etc.
3. Compare SOCKETS in IPV4, IPV6 & ICMPV6
4. Implement different types of communications in LAN.
5. Demonstrate Inter Process Communication.

Course Title: BIO-INFORMATICS

Course Code: CSE 4429

At the end of the course students are able to:

1. Extract information from different types of bioinformatics data (gene, protein, disease, etc.), including their biological characteristics and relationships
2. Analyze processed data with the support of analytical and visualization tools
3. Carry out bioinformatics research under advisement, including systems biology, structural bioinformatics and proteomics
4. Manipulate DNA and protein sequences using stand-alone PC programs and programs available on the WWW

Course Title: E – COMMERCE

Course Code: CSE 4430

Course Outcomes: At the end of the course students are able to:

1. Examine some typical distributed applications.
2. Detail some of the problems that are encountered when developing distributed applications.
3. Understand some of the technologies that are used to support distributed applications.
4. Illustrate some of the business models used in the internet.

Course Title: PATTERN RECOGNITION Course Code: CSE 4431

Course Outcomes: At the end of the course students are able to:

1. Implement decision functions
2. Analyze tradeoffs involved in various classification techniques
3. Apply various dimensionality reduction methods whether through feature selection or feature extraction
4. Develop model for solving problems in more specialized areas such as speech
5. Recognition, optical character recognition etc.,

Department of Chemical Engineering

Course name : 16CY303 Physical & Analytical Chemistry

Course Outcomes

1. Understand the principles and applications of distribution law
2. Explain the importance of colligative properties of dilute solutions
3. Apply the fundamental concepts of colloidal chemistry to industrial needs and process engineering
4. Evaluate the quality of products in industry by using spectroscopic principles
5. Select a chromatographic instrument and test a given sample
6. Utilize GC, HPLC and other chromatographic techniques in pharmaceutical industry & forensic industry for identification and isolation of products

16CSX01 Object Oriented Programming

Course Outcomes

1. Apply object oriented concepts to real world problems
2. Develop applications using different types of inheritances
3. Create and use user defined packages
4. Analyze and recover runtime exceptions arise in the applications
5. Apply parallel processing applications using threads
6. Develop internet based interactive applications using peripheral functions

16CH303 Chemical Engineering Thermodynamics

Course Outcomes

1. Explain the basic concepts and laws of chemical engineering thermodynamics
2. Make use of first law of thermodynamics to find heat, work & changes in internal energy and enthalpy
3. Apply the second law of thermodynamics & concept of entropy to analyze ideal & real systems
4. Compare and explain the different refrigeration and liquefaction processes
5. Apply equation of state to evaluate thermodynamic properties
6. Apply first and second law of thermodynamics to specific processes viz., pipe flow, nozzles, expansion and compression

16CH304 Chemical Process Calculations

Course Outcomes

1. Make use of different methods expressing composition of mixture (molarity, normality, ppm, moles per volume and mass per volume)
2. Apply the behavior of ideal gas equation to bring the relation between temperature and pressure for pure component & solutions
2. Solve heating and cooling problems involving moist air
3. Analyze material balance calculations for steady state unit operations and process
4. Analyze enthalpy balance for a reactive and nonreactive systems
5. Make use of material & energy balance concept to combustion calculations

16CH305 Introduction to Chemical Engineering

Course Outcomes

1. Identify and describe typical aspects within chemical engineering
2. Develop simple flow sheets, block diagrams of basic chemical processes along with material balance
3. Explain fundamental laws and concepts transfer operations and reaction engineering
4. Familiarize professional ethics and Human Values
4. Develop a set of beliefs, attitudes, and habits that engineers should display concerning morality
5. Understand the moral values that ought to guide the Engineering profession

16CH306 Process Instrumentation

Course Outcomes

1. Explain the functions of elements in measuring instruments
2. Illustrate the operation of temperature measuring instruments used in industries
3. Choose suitable pressure measuring devices for different ranges of pressure
4. Select the suitable level measuring devices for open and closed vessels
5. Classify the various flow measuring devices for industrial operations.
6. Illustrate the operation of flow measuring instruments used in industries

16CH307 Computational Tools for Chemical Engineers

Course Outcomes

1. Illustrate the use of programming language in handling of arrays, matrices and plots
2. Demonstrate the use of scripts and functions
3. Execute the programs using relational and logical operators
4. Compute the properties of a given compound using any computational tool
5. Use any computational tool to solve equation of state
6. Use any computational tool to solve material balance and energy balance problems

16CH308 Instrumentation Lab

Course Outcomes

1. Evaluate the precision of pressure and temperature detectors
2. Appraise the sensors like pressure gauges, temperature detectors and LVDT
3. Explain the working and operation of the sensors
4. Demonstrate the analytical systems usage and estimate the process variables
5. Inspect the working of different signal receivers
6. Function effectively in both single-team and also able to communicate verbal, written and graphical

16CY304 Physical & Analytical Chemistry Lab

Course Outcomes

1. Interpret the kinetics of reactions and thereby design the process
2. Interpret the dynamics of distribution process that will be applicable in manufacturing industries
3. Utilize the adsorption and gravimetric methods of analysis in industry
4. Experiment with modern analytical instruments which are used in industries for monitoring & process control, quality testing etc
5. Apply the knowledge of chromatographic techniques for isolation and identification of compounds

- Determine the air quality at industrial/domestic areas

16MA303 Engineering Mathematics III

Course Outcomes

- Utilize numerical techniques to find approximate solutions of non-linear Algebraic equations
- Understand the concepts of interpolation, extrapolation to estimate the unknown functional values
- Make use of method of least squares to fit a best curve for the given data
- Find approximate values of derivatives and finite integrals using numerical techniques
- Understand basic probability axioms and apply Baye's theorem related to engineering problems
- Identify the suitable distribution among Binomial, Poisson, normal to compute probabilities

16CY405 Organic Chemistry

Course Outcomes

- Understand the basic principles of organic chemistry
- Differentiate between electrophilic and nucleophilic reactions
- Apply the concepts of named reactions in synthetic organic chemistry
- Understand the preparation and uses of various heterocyclic compounds including dyes
- Familiarize with the preparation and application of important polymers and synthetic rubber
- Outline the preparation and application of important industrial chemicals and synthetic drugs

16CH403 Mechanical Unit Operations

Course Outcomes

- Summarize the characterization of particulate solids and explain the phenomenon of screening
- Identify physico-chemical methods for the separation of heterogeneous mixtures
- Determine the filter medium resistance and specific cake resistance
- Select a suitable equipment for size reduction and mixing
- Select a dense media separation equipment for fluid-solid operations
- Estimate the power consumption of the equipments for mixing and size reduction operations

16CH404 Momentum Transfer

Course Outcomes

1. Apply the principle of fluid statics to understand the working of manometers and decanters
2. Develop the continuity, momentum, and energy balance equations and to solve the fluid flow problems in pipes
3. Determine flow rates, pressure changes, minor and major head losses for viscous flows through pipes and channels.
4. Illustrate subsonic, sonic, supersonic, hypersonic flows with respect to Mach number
5. Explain the effect of forces acting on flow past immersed bodies and fluidization
6. Identify the appropriate fluid moving and metering machinery based on the process requirement

16CH405 Phase and Chemical Equilibria

Course Outcomes

1. Estimate the thermodynamic properties, such as enthalpies, entropies, Gibbs energies, fugacity coefficients, and activity coefficients of pure fluids as well as fluid mixtures
2. Choose appropriate models for calculating phase equilibrium data
3. Estimate VLE data for ideal and non-ideal chemical mixtures
4. Solve VLE data using equation of state
5. Explain VLE diagrams for partially miscible and immiscible systems
6. Solve chemical reaction equilibrium related problems using thermodynamic principles

16CH406 Process Heat Transfer

Course Outcomes

1. Solve steady state and Un-steady heat conduction problems in simple geometries
2. Find the rate of heat transfer in laminar and turbulent flow conditions without phase change
3. Illustrate the heat transfer processes involved in boiling and condensation
4. Explain the heat transfer by radiation between ideal, actual surfaces and enclosures
5. Illustrate the construction details for various types of heat exchangers
5. Outline the principles of evaporation and crystallization

16CH407 Mechanical Unit Operations Lab

Course Outcomes

1. Analyze the basic methods of characterization of particles and bulk solids
2. Determine various indices and verify the laws associated with various unit operations
3. Calculate performance characteristics of a filter press, cyclones, flotation cells and clarifiers
3. Experiment the effectiveness of the crushers, mixers, sieves and filtration equipment
4. Examine the range of applicability of various unit operation equipment
5. Estimate the power consumption for various unit operation equipment

16CH408 Momentum Transfer Lab

Course Outcomes

1. Explain the Bernoulli's equation and its applications
2. Assess the rotameter with the actual discharge
3. Compare the variation in orifice and venturi coefficients
4. Examine the centrifugal pump about its efficiency
5. Determine the frictional losses in flow through pipes by experiment and calculations
6. Choose appropriate equipment both individually and in teams through proper communication

16CH409 Process Heat Transfer Lab

Course Outcomes

1. Apply Fourier's law of heat conduction in finding out the thermal conductivity of a given material
2. Compare the heat transfer coefficients and rate of heat transfer between natural and forced convection mechanism
3. Evaluate the efficiency of the pin fin in both natural and forced heat transfer operations
4. Apply Stefan-Boltzmann's law to find out Stefan - Boltzmann constant & unknown body emissivity
5. Identify different boiling regimes and evaluate the critical heat flux through pool boiling of water
6. Evaluate effectiveness of co-current and counter current heat exchanger

16HSX04 Engineering Economics & Project Management

Course Outcomes

1. Explain basic principles of engineering economics
2. Apply cost-volume-profit (CVP) analysis in their business decision making
3. Evaluate investment proposals through various capital budgeting methods
4. Apply the knowledge to prepare the simple financial statements for measuring performance of business firm
5. Analyze key issues of organization, management and administration
6. Evaluate project for accurate cost estimates and plan future activities

B.Tech- 5th Semester

Course Title: Chemical Reactor Theory

Subject code: CHEM 3412

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

1. Analyze and interpret experimental data from batch reactors and determine the order of simple chemical reactions.
2. Compare ideal reactor types (batch, CSTR and PFR) and apply quantitative methods to design and size reactors for simple chemical reaction schemes.

3. Determine optimal ideal reactor design for multiple reactions for yield or selectivity.
4. Predict reactor performance for reactors when the temperature is not uniform within the reactor.

Title: Chemical Technology

Course code: CHEM 3413

Upon successful completion of the course the students will be able to:

1. Make a neat and easy to understand the plant process flow sheet.
2. Keeps up the productivity while maintaining all safety norms stipulated, during their job.
3. Solve Engineering problems that are likely to come across during the operation of plants.
4. Suggest alternative manufacturing process in terms of Economic viability of the product.

Course Title: Principles of Mass Transfer

Course code: CHEM 3414

At the end of the course students are able to:

1. Recognize the various modes of mass transfer, Determine mass transfer rates using Fick's Law
2. Estimate diffusion coefficients, Solve unsteady state diffusion problems
3. Determine convective mass transfer rates, Determine convective mass transfer coefficients
4. Determine the number of transfer units and height requirements for a packed column
5. Differentiate various membrane process and their applications

Course Title: Process Dynamics & Control

Course code: CHEM 3415

After taking this course, students should be able to:

1. Comprehend the basic concepts of process control and outline the importance in process operation and the role of process control engineers.
2. Develop mathematical models of various systems by writing unsteady-state mass and energy balances.
3. Analyze linear dynamical systems using Laplace transforms.
4. Design and tune feedback controllers on real systems as well as simulated systems.
5. Apply different methods to verify the stability and performance of feedback loops using Laplace and frequency domain techniques.
6. Understand the need of advanced control strategies and decide under which

Course Title: Fertilizer Technology

Course code: CHEM 3416

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

1. Define the characteristics of a good fertilizer
2. Explain types of fertilizer and raw materials available.
3. Discuss the production methods for various fertilizers.
4. Draw the production flow sheet and explain the equipments used in production process.
5. Explain about Controlled Released fertilizers.

Course Title: Industrial Pollution Control Engineering

Course code: CHEM 3417

At the end of the course, the students will be able to:

1. Understanding of different types of pollution and apply knowledge for the protection and improvement of the environment
2. Select and use suitable wastewater treatment technique
3. Identify suitable sampling, analysis and equipment for air pollutants.
4. Apply their knowledge in controlling the pollution in process industries

Course Title: Polymer Technology

Course code: CHEM 3418

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

1. Identify chemical formulas for common polymers and distinguish whether a polymer was likely synthesized via a condensation (step growth) or addition (chain) polymerization reaction.
2. Calculate the extent of reaction required to reach a particular degree of polymerization reaction and the time required to reach that extent of reaction given appropriate rate constants.
3. Determine the solubility of a polymer in a solvent given the Flory-Huggins interaction parameter.
4. Identify and analyze data from experimental methods of measuring the radius of gyration, different molecular weight averages, and second virial coefficient for polymer solutions.
5. Determine the volume fraction of crystallinity for a polymer sample and measure the glass transition temperature.

Course Title: Computer Application in Chemical Engineering Lab **Course code:** CHEM 3219

At the end of the laboratory course, the students will be able to:

1. Understand the process flow sheets and how it gives the result.
2. Select proper operating tool to meet process needs and run the program based on the data & method.
3. Understand the application of artificial intelligence based modeling methods using Excel, C Language /MAT Lab/Aspen Plus.
4. Understand the industrial usage of process modeling and simulation.
5. Understand the simulation of steady state lumped, modeling of chemical process
6. equipments like mixers, reactors, distillation, absorption, extraction columns, evaporators, and heat exchangers etc.

Course Title: Process Dynamics & Control

Lab Course code: CHEM 3220

At the end of the course, the students will be able to:

1. Estimate the dynamic behavior of the control systems
2. Understand the controllability, speed of response the control systems.
3. Select proper control valve to meet process needs.
4. Understand direct digital control systems handling and operation.
5. Tuning of a PID control via manual and automatic tuning.
6. Choose PID modes that effect controllability, speed of response the control systems

B.Tech - 6th semester

Course Title: Applications of Mass Transfer

Course code: CHEM 3421

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

1. Describe and differentiate various separation processes
2. Design multistage separation systems for specific operations involving absorption, extraction, leaching, drying and adsorption.
3. Construct McCabe-Thiele, Ponchon-Savarit diagrams for distillation
4. Construct triangular diagrams for multiple contact or counter current liquid-liquid extraction
5. Analyze and design constant rate drying systems

Course Title: Chemical & Catalytic Reaction Engineering

Course code: CHEM 3422

At the end of the course, the students will be able to:

1. Predict reactor performance under non-ideal flow situations using RTD data.
2. Develop rate equation for heterogeneous reactions.
3. Estimate the effects of diffusion, mass and heat transfer in catalyst pellet on reaction rates.
4. Develop the rate-controlling model for heterogeneous catalytic reactions.

Course Title: Chemical Process Economics & Equipment Design **Course code:** CHEM 3423

At the end of the course, the students will be able to:

1. State the basic concepts of process design development and general design considerations.
2. Perform economic analysis for process to calculate equipment cost, and profitability for process.
3. Design internal pressure vessels and external pressure vessels
4. Design of shell & tube heat exchanger
5. Design of sieve tray distillation column.

Course Title: Material Science for Chemical Engineers **Course code:** CHEM 3424
Students would have knowledge about the existence of new materials and their properties.

1. The students will be able to choose appropriate material for process equipment.
2. Understand the failure analysis and select appropriate materials or relevant corrosion protection schemes for corrosion resistance; and
3. Understand the basic aspects of advanced materials and their applications.

Course Title: Petroleum refining and petrochemicals

Course code: CHEM 3425

At the end of the course students are able to:

1. Describe the formation of crude oil, its refining techniques.
2. Describe the chemical composition and physical properties of crude oil
3. Understand various processes employed in petroleum refinery such that we can meet customer demand in terms of quality & quantity.
4. Demonstrate the different methods available for removal of impurities from crude and products manufacture
5. Understand, draw and describe the process flow diagrams of various refinery processes like distillation, cracking and reforming etc.,

Course Title: Pharmaceuticals and Fine chemicals
code: CHEM 3426

Course

At the end of the course, the students will be able to:

1. Learn the principles of limit test for pharmaceuticals and sources of impurities in chemicals.
2. Preparation outlines for the manufacture of pharmaceuticals and fine chemicals.
3. Design various unit operations pertinent to fine chemicals and pharmaceuticals sectors
4. Investigate environmental impacts in the field of pharmaceuticals and fine chemicals

Course Title: Industrial Safety and Hazard Management

Course code: CHEM 3427

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

1. Understand the safety and ethical issues that may arise from industrial processes.
2. Understand and be able to communicate the importance of Safety in chemical engineering practice— both in ethical and economic terms.
3. Evaluate hazards both qualitatively, using techniques like "what if" and "HAZOP" analyses, and quantitatively, using techniques like fault tree and event tree analyses.
4. Understand and be able to communicate the difference between Hazard and Risk. Be able to express Safety in terms of Risk and to recognize unacceptable/inappropriate levels of Risk.
5. Understand hazards arising from runaway reactions, explosions and fires, and how to deal with them.
6. Understand the behavior of accidental releases of hazardous materials from industrial chemical processes, including consequences related to health and property.

Course Title: Chemical Reaction Engineering Lab

Course code: CHEM 3228

At the end of the laboratory course, the students will be able to:

1. Estimation of rate constant by applying Arrhenius theorem.
2. Understand the estimation of rate law parameters for a given reaction in a batch reactor by using two different methods.
3. Determine the rate law parameters in a Mixed Flow Reactor for a given reaction.
4. Estimation of residence time distribution in a Plug Flow Reactor for a given reaction.
5. Find the residence time distribution by applying Non-ideal dispersion model in CSTRs in series.
6. Estimation of mass transfer coefficients in mass transfer with and without chemical reactions.

Course Title: Mass Transfer Operations Lab

Course code: CHEM 3229

At the end of the course students are able to:

1. Perform experiments in relation to the Mass Transfer fundamentals.
2. Find out diffusivity and mass transfer coefficients.
3. Compare the equilibrium data developed with the theoretical data.
4. Evaluate the effectiveness of different separation techniques.

B.Tech - 7th semester

Course Title: Engineering Economics and Project Management **Course code:** HS 3405

At the end of the course students are able to:

1. Understand basic principles of engineering economics.
2. Evaluate investment proposals through various capital budgeting methods.
3. Analyze key issues of organization, management and administration.
4. Evaluate project for accurate cost estimates and plan future activities.

Course Title: Computational Fluid Dynamics **Course code:** ME 4450

At the end of the course, the students will be able to:

1. Understand the basic principles of mathematics and numerical concepts of fluid dynamics.
2. Develop governing equations for a given fluid flow system.
3. Adapt finite difference techniques for fluid flow models.
4. Apply finite difference method for heat transfer problems.
5. Solve computational fluid flow problems using finite volume techniques.
6. Get familiarized to modern CFD software used for the analysis of complex fluid-flow systems.

Course Title: Numerical Methods in Chemical Engineering **Course code:** CHEM 4430

At the end of the course, the students will be able to:

1. Perform an error analysis for a given numerical method
2. Solve a linear system of equations and non-linear algebraic or transcendental equation using an appropriate numerical method
3. Approximate a function using an appropriate numerical method
4. Calculate a definite integral and evaluate a derivative at a value using an appropriate numerical method
5. Solve an Ordinary differential equation using an appropriate numerical method
6. Solve partial differential equations using an appropriate numerical method

Course Title: Scale-up methods in Chemical Engineering **Course code:** CHEM 4431

At the end of the course, the students will be able to:

1. Understand any given chemical process and develop flow chart
2. Develop scale up equations based on physical and chemical laws to design appropriate equipment
3. Test the scale up design and suggest the design of equipment
4. Address the problems related to environmental challenges
5. Evaluate the material and energy requirements

Course Title: Thermodynamic Properties of Crudes and Refinery Design **Course code:** CHEM 4432

At the end of the course, the students will be able to:

1. Get conversant the basic separation and conversion processes used in refining crude oil
2. Apply chemical engineering principles to the analysis of safe and efficient refinery operations
3. Use the Fenske Underwood and Gilliland method in designing oil-water separators, Design of light end units.
4. Design ADU/VDU and absorbers

Course Title: Biochemical Engineering

Course code: CHEM 4433

At the end of the course, the students will be able to:

1. Understand the different cells and their use in biochemical processes
2. Understand the role of enzymes in kinetic analysis of biochemical reaction
3. Apply the basic concepts of thermodynamics, mass and energy balances, reaction kinetics and reactor design for biochemical processes
4. Analyze bioreactors, upstream and downstream processes in production of bio-products
5. Demonstrate the fermentation process and its products for the latest industrial revolution

Course Title: Clean Process Technology

Course code: CHEM 4434

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

1. Understand the concept of environmental sustainability, and the difference between pollution prevention vs. pollution control.
2. Describe cleaner production activities and its benefit.
3. Describe the function of process internal solutions to minimize air pollution emissions (flue gas pollutants and VOC) and emissions through waste water discharges.
4. Explain the function of different process external methods to minimize pollutions to air or water.
5. Explain the concept of industrial ecology and its benefit.

Course Title: Corrosion Engineering

Course code: CHEM 4435

At the end of the course, the students will be able to:

1. Understand the electrochemical and metallurgical behavior of corroding systems.
2. Apply the electrochemical and metallurgical aspects of combating eight forms of corrosion.
3. Select or choose the testing procedures for corroding systems.
4. Evaluate the polarization behavior of corroding systems.
5. Design of suitable materials, methods to combat corrosion.
6. Predict the function of corrosion inhibitors.

Course Title: Fluidization Engineering

Course code: CHEM 4436

At the end of the course, the students will be able to:

1. Understand the fluidization behavior.

2. Estimate pressure drop, bubble size, voidage, heat and mass transfer rates for the fluidized beds.
3. Write model equations for fluidized beds.
4. Design gas-solid fluidized bed reactors.

Course Title: Process Equipment Design and Drawing Lab **Course code:** CHEM 4437

At the end of the course, the students will be able to:

1. Identify equipment and process involved in process flow diagrams.
2. Demonstrate process from process flow diagrams.
3. Explain the different control strategies employed in the process from the instrumentation diagrams
4. State the IS Codes used in the mechanical design.
5. Design and draw fabrication diagrams by scaling.

Course Title: Process Simulation Lab **Course code:** CHEM 4238

At the end of the course, the students will be able to:

1. Identify MATLAB as a simulating tool to solve chemical engineering problems
2. Solve steady state chemical engineering problems using MATLAB
3. Use the commercial simulation tools like ASPEN PLUS
4. Develop solutions for different ideal reactor systems
5. Simulate basic Heat transfer and Mass transfer equipment

B.Tech - 8th semester

Course Title: Process Modeling & Simulation **Course code:** CHEM 4439

At the end of the course, the students will be able to:

1. Understand the stages involved in the development of a process model.
2. Formulate a chemical engineering problem as a mathematical model from basic engineering principles.
3. Identify the appropriate numerical solutions used in solving the models
4. Apply various simulation tools for solving the chemical engineering models developed.
5. Understand the solution techniques for solving ODEs.

Course Title: Transport Phenomena **Course code:** CHEM 4440

At the end of the course, the students will be able to:

1. Use the general equations of change for specific applications.
2. Analyze advanced transport problems in heat, mass, and momentum, both macroscopic and microscopic.
3. Formulate simultaneous energy and mass balances in chemical processes.
4. Solve simple linear partial differential equations arising in transport problems.
5. Recognize initial-value versus boundary-value problems and how to solve them either analytically or numerically.

Course Title: Design and Analysis of Experiments **Course Code:** CHEM 4441

At the end of the course, the students will be able to:

1. Predict how many numbers of experiments are to be carried out, given the number of important factor

2. Design an experiment and calculate the factor levels that optimize a given objective.
3. Use response surface methodology to optimize the process, by considering curvature effects.
4. Understand strategy in planning and conducting experiments
5. Choose an appropriate experiment to evaluate a new product design or process improvement

Course Title: Novel Separation Techniques **Course code: CHEM 4442**

At the end of the course, the students will be able to:

1. Explain different types of adsorptive separations and derive the equations for the same.
2. Design the chromatographic columns
3. Develop design equations for membrane separation processes such as RO&UF.
4. Explain concepts of surfactant based separations
5. Explain physico chemical aspects and applications of Super critical fluid extraction
6. Explain the applicability of electric, magnetic and centrifugal separation processes for practical situations

Course Title: Process Intensification **Course Code: CHEM 4443**

At the end of this course, students are able to:

1. Assess the values and limitations of process intensification, cleaner technologies and waste minimization options
2. Measure and monitor the usage of raw materials and wastes generating from production and frame the strategies for reduction, reuse and recycle.
3. Obtain alternative solutions ensuring a more sustainable future based on environmental protection, economic viability and social acceptance.
4. Analyze data, observe trends and relate this to other variables.
5. Plan for research in new energy systems, materials and process intensification.

Course Title: Process Optimization **Course Code: CHEM 4444**

At the end of the course, the students will be able to:

1. Apply the knowledge of optimization to formulate the problems
2. Analyze the optimization criterion for solving problems
3. Apply different methods of optimization and to suggest a technique for specific problem
4. Apply simplex method for linear optimization problems
5. Understand advanced optimization techniques like Genetic algorithms
6. Understand how optimization can be used to solve the industrial problems of relevance to the chemical industry

Department of Information Technology B.Tech (IT) - 3rdSemester

16EC021 DATA COMMUNICATION SYSTEMS

Course Outcomes

1. Illustrate fundamental concepts of data transmission and to understand the various modulation and demodulation techniques.
2. Outline the design, operation and capabilities of different transmission lines.
3. Interpret the technical specifications of electronic communication design.
4. Identify various Telephone instruments and their signaling systems.
5. Distinguish between various error detection and correction techniques.
6. Explain different synchronous and Asynchronous Data link protocols

16CS304 Database Management Systems

Course Outcomes

1. Identify and define the data models needed to design a database
2. Create conceptual and logical database design for Large enterprises
3. Demonstrate the relational data model
4. Apply Integrity constraints over the relations
5. Apply normalization process on existing database for eliminating redundancy
6. Apply the recovery techniques for managing the database effectively to avoid the data loss

16CS305 Digital Logic Design

Course Outcomes

After undergoing the course students will be able to:

1. Recognize the conversion of one number system to other Number system
2. Classify different logic circuits by using Universal gates
3. Execute Boolean algebra and K-map as a tool to simplify and design logic circuits
4. Implement and analyze the operation of Combinational and Sequential Circuits
5. Check various types of sequential circuits like counters and universal Shift Registers
6. Differentiate between the Mealy and Moore machines

16CS306 Discrete Structures & Graph Theory

Course Outcomes

1. Construct simple Mathematical proofs and possess the ability to verify them and comprehend Formal Logical Arguments via Propositional Logic and Predicate Logic
2. Identify the basic Mathematical objects such as sets-functions-and relations and also verify simple mathematical properties that these objects possess
3. Demonstrate the ability to describe computer programs in a Formal Mathematical manner using Recursive Functions
4. Apply basic Counting techniques to solve Combinatorial Problems
5. Apply various techniques of Mathematical Induction (weak - strong and structural induction) to prove simple Mathematical properties of a variety of Discrete Structures
6. Demonstrate the Graphs and Trees as tools to visualize and simplify situations

16IT305 Data Structures

Course Outcomes

1. Apply the data structure array for various list processing operations such as searching and sorting
2. Apply the data structures like arrays, linked structures, stacks, and queues to solve real world problems.
3. Explain the linked implementation, and its uses both in linear and non-linear data structure.
4. Design and implement an appropriate hashing function for an application.
5. Demonstrate and apply binary tree and height balanced binary trees to solve real world problems.
6. Demonstrate and apply different methods for traversing the graphs

16IT306 Object Oriented Programming through Java

Course Outcomes

1. Summarize object oriented programming concepts
2. Develop applications using different types of inheritances
3. Create and use user defined packages
4. Analyze and recover runtime exceptions arise in the applications
5. Apply parallel processing applications using threads
6. Develop interactive applications for standalone and Internet (applet)

16CS309 Database Management Systems Lab

Course Outcomes

1. Define the structure of SQL query
2. Experiment with different Data Base languages

3. Choose Database packages(Oracle/ MySql/ DB2/ etc)
4. Demonstrate the JDBC and ODBC Connections
5. Interpret Embedded and Nested Queries
6. Design and development of projects in DBMS

16IT308 Data Structures Lab

Course Outcomes

1. Apply the data structure array for various list processing operations such as searching and sorting
2. Implement array - stack - and queue data structures to solve various computing applications
3. Implement linked list data structure to solve various computing problems
4. Design and develop applications using appropriate hashing method
5. Demonstrate and apply binary tree and its applications
6. Demonstrate and apply different methods for traversing graphs

16IT309 Java Lab

Course Outcomes

1. Make use of JAVA SDK environment to create - debug and run java programs
2. Create applications based on code reusability
3. Develop programs using threads
4. Develop and debug real time problems using exception handling
5. Create interactive applications using event handling mechanisms
6. Design Graphical User Interface using AWT components

16CSI01 Tibero ® DB (One Credit Course)

(Course designed and will be delivered by TMaxSoft, Bangalore)

Course Outcomes

1. Demonstrate and understanding of the relational data model
2. Performance analysis between Tibero® DB and Oracle DBMS

16MA405 Probability and Statistics

Course Outcomes

1. Understand basic probability axioms and apply Baye's theorem related to engineering problems.

2. Identify the suitable distribution among Binomial, Poisson, exponential, normal in engineering applications.
3. Make use of the sampling distribution of the sample mean in general situations, using the Central Limit Theorem.
4. Decide the null or alternative hypotheses using the suitable test statistic.
5. Apply the regression analysis to fit the curves.
6. Understand the methods and applications of Control charts like X-bar, p and R-charts.

16CS404 Software Engineering

Course Outcomes

1. Understand the need of Software Life Cycle Models
2. Demonstrate the Requirements of the Software Systems process
3. Summarize the system models of software engineering
4. Choose appropriate software architecture style for real-time software projects
5. Analyze various testing techniques
6. Analyze Risk management and Software quality of the software products

16CS406 Web Technologies

Course Outcomes

1. Understand HTML tags to design static web pages
2. Describe the basic concepts of Java Scripts to design dynamic web pages
3. Familiarize the concepts of PHP and AJAX
4. Develop interactive applications using Servlets and JSP
5. Demonstrate database connectivity
6. Select appropriate tools for designing dynamic and interactive web applications

16IT404 Computer Networks

Course Outcomes

1. Propose appropriate network model for data communication
2. Analyze various protocols in data link layer.
3. Analyze IEEE 802 series protocols.
4. Develop web applications for sending E-mail.
5. Propose and implement appropriate routing algorithm for data routing.
6. Extend the Internet connection to a given system and trouble shoots the same.

16IT405 Computer Organization

Course Outcomes

1. Identify the different components of the computer system, their functions and their interconnections.
2. Demonstrate the various instruction formats that the processor follows.
3. How the control unit generates control signals to execute a particular instruction
4. How the memory system can be suitably designed to improve the performance of the computer.
5. Analyze how high speed computers can be designed by using the pipelining and multiprocessor
6. Illustrate data transfer between central computer and I/O devices may be handles in a variety of modes

16IT406 Operating Systems

Course Outcomes

1. Explain the concepts of process and implement CPU scheduling algorithms
2. Implement concurrency mechanisms
3. Implement various Algorithms to handle deadlocks
4. Design and analyze mechanisms used in memory management
5. Analyze and implement mechanisms used in virtual memory management
6. Analyze and implement various file system and disk storage mechanisms

16CS408 Linux Programming Lab

Course Outcomes

1. Illustrate the knowledge of the basic principles of UNIX system calls
2. Illustrate the basic principles of UNIX IO system
3. Explain the concepts and principles and develop system-level software (e.g. - compiler - and networking software)
4. Apply the Inter Process Communication in UNIX Environment
5. Develop solutions to real-world problems
6. Develop a simple communication application to communicate with various systems in a LAN

16CS409 Web Technologies Lab

Course Outcomes

1. Create a static web pages using HTML and CSS
2. Develop JavaScript code for data validation
3. Integrate frontend and backend technologies in client-server systems
4. Demonstrate Servlet life cycle methods

5. Design dynamic web applications using PHP and JSP
6. Demonstrate database connectivity for developing web applications

16IT409 Computer Networks Lab

Course Outcomes

1. Demonstrate various networking devices to design a network
2. Examine various routing algorithms for reliable data communication networks
3. Categorize the algorithms for data link layer
4. Analyze the communication parameters of routing algorithms
5. Use TCP protocol to configure the network connection
6. Use internal modem and Wi-Fi to analyze the data communication

B. Tech- 5 th Semester

Course Title: SOFTWARE ENGINEERING

Course Code: CSE3409

At the end of the course students are able to :

1. Design and develop real-time software projects with effective cost estimation and plan Make feasibility study of a project
2. Specify the design and architectural style of the software products
Propose testing strategy for a given software

Course Title: COMPILER DESIGN

Course Code: IT3409

At the end of the course the students are able to:

1. Understand the requirement of compiler design.
2. Apply working skills in theory and application of finite state machines, recursive descent, production rules, parsing, and language semantics.
3. Understand about powerful compiler generation tools.
4. Apply the ideas, the techniques, and the knowledge acquired for the purpose of other software design.

Course Title : Management Science

Course Code: HS3406

At the end of the course students are able to:

1. Plan, organize, direct and control the functions and forms of an organization
2. Apply the knowledge of work study and its application in the day-to-day life
3. Synthesize information regarding the effectiveness of recruiting methods and the validity of selection procedure, and make appropriate staffing decisions
4. Analyze companies' internal and external resources and capabilities
5. Evaluate a project, develop the scope of work, provide accurate cost estimates and to plan the various activities

Course Title: COMPUTER NETWORKS

Course Code: IT3410

At the end of the course students are able to:

6. Suggest appropriate network model for data communication.
7. Know how reliable data communication is achieved through data link layer.
Propose appropriate routing algorithm for data routing.

Connect internet to the system and knowledge of trouble shooting.

Course Title: MICROPROCESSORS AND INTERFACING Course Code: ECE 3429

After undergoing the course, students will be able to

1. Understand the full internal workings of a typical simple CPU including the utilization of the various hardware resources during the execution of instructions.
2. Introduce the design of basic I/O hardware and microprocessor interfacing: memory chip selection, memory expansion, I/O interfacing.
3. Interface input and output devices like LCD, LED, Keyboards ADC, DAC and stepper motor to microprocessors.
4. Design the home appliances and toys using Microprocessor chips.

Course Title: COMPUTER GRAPHICS Course Code: CSE3412

At the end of the course students are able to :

1. Be familiarized with contemporary graphics hardware, the actual methodology and techniques to draw computer graphics, animations etc. for the real world presentation and how it is implemented in Computer graphics software
2. Develop new kinds of graphics and animations.
3. Design and develop graphics applications with the implementation of advanced methods such as ray tracing, texture mapping, illumination and shading and be able to build interactive user interface to manipulate objects in a 3D scene and also in the development of Web pages.
4. Demonstrate the ability to develop an animation movie.

Course Title: Real Time Operating System Course Code: CSE3430

At the end of the course students are able to:

1. Present the mathematical model of the system and to develop real time algorithm for task scheduling.
2. Understand capabilities Handling Resource Sharing and dependencies among Real-time Tasks
3. Generate a high-level analysis for Scheduling Real-time tasks in multiprocessor and distributed systems
4. Understand the working of real time operating systems and real time database.

Course Title: COMPUTER NETWORKS LAB Course Code: IT3211

At the end of the course students are able to:

1. • By learning models students suggest appropriate network model for data communication. Know how reliable data communication is achieved through data link layer.
2. • Suggest appropriate routing algorithm for the network. Provide internet connection to the system and its installation.

Course Title: OPERATING SYSTEMS & COMPILER DESIGN LAB Course Code: IT3212

After completion of this course, the students would be able to

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1. Determining the reasons of deadlocks, and their remedial measures in an operating system Comparing and analyzing different file systems being used in different operating systems. Understand, and use Context free grammar, and parse tree construction
2. Evaluating the working of lex and yacc compiler for debugging of programs

Tech- 6 th Semester

Course Title: DATAWAREHOUSING AND DATA MINING Course Code: IT3413

At the end of the course students are able to:

1. Design a data mart or data warehouse for any organization Extract knowledge using data mining techniques
2. Adapt to new data mining tools
3. Explore recent trends in data mining such as web mining, multimedia mining

Course Title: OBJECT ORIENTED ANALYSIS AND DESIGN Course Code: IT3414

After undergoing the course, students will be able to understand:

1. Understand the use of unified modeling language for object oriented analysis and design Know the syntax of different UML diagrams.
2. Develop different models for a software system.
3. Apply object oriented analysis and design to build a software system Apply forward and reverse engineering for a software system.

Course Title: WEB TECHNOLOGIES

Course Code:

IT3415

At the end of the course students are able to:

1. Choose, understand, and analyze any suitable real time web application.
 - Integrate java and server side scripting languages to develop web applications.
2. To develop and deploy real time web applications in web servers and in the cloud.
3. Extend this knowledge to .Net platforms.

Course Title: DISTRIBUTED DATABASES

Course Code:

IT3416

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

1. Decompose global relations into fragments.
2. Apply DDBMS in Data Warehousing, web-based databases and pull/push based technologies. Analyze the principles applied in contemporary distributed database systems.
3. Evaluation of CORBA architecture for interoperable databases.

Course Title : INFORMATION RETRIEVAL SYSTEMS Course Code : IT4423

At the end of the course the students are able to:

1. Learn Classical and advanced techniques employed by Web Search engines
2. Know different ways of representation and retrieval of documents.
3. Apply techniques of preprocessing needed for IRS
4. Develop an IRS by using different user search techniques and text search algorithms

Course Title: Information Security

Course Code: CSE 3413

At the end of the course students are able to :

1. To analyze a given system with respect to security of the system.
2. To create an understanding of Authentication functions the manner in which Message Authentication Codes and Hash Functions works.
3. To examine the issues and structure of Authentication Service and Electronic Mail Security
4. Understand conventional and public key cryptographic approaches used in message encryption.
5. Able to identify various types of attacks and its effect over the networks.

Course Title: CLOUD COMPUTING Course Code: IT3418

1. Articulate the main concepts, key technologies, strengths, and limitations of cloud computing and the possible applications for state-of-the-art cloud computing.
2. Identify the architecture and infrastructure of cloud computing, including SaaS, PaaS, IaaS, public cloud, private cloud, hybrid cloud, etc.
3. Identify problems, and explain, analyze, and evaluate various cloud computing solutions. Attempt to generate new ideas, innovations in cloud
4. computing and Collaboratively research and write a research paper, and present the research online.

Course Title: OBJECT ORIENTED ANALYSIS AND DESIGN LAB Course Code: IT3219

1. **Course Outcomes:** At the end of the course students will be able to Know the syntax of different UML diagrams.
2. Create different UML diagrams for a software system
3. Identify appropriate models to represent a software system.
4. Analyze and design a software system in an object oriented style using tools like Rational Rose.

Course Title: WEB TECHNOLOGIES LAB Course Code: IT3220

At the end of this course the student can answer how to:

1. Integrate frontend and backend web technologies in distributed systems. Facilitate interface between frontend and backend of a web application. Debug, test and deploy web applications in different web servers.
2. Migrate the web applications to the other platforms like .Net

B. Tech- 7 th Semester

Subject Name : NETWORK PROGRAMMING Subject code: IT4422

1. After undergoing this course, students will be able to
2. Comprehend Networking concepts.
3. Differentiate various network protocols like TCP, UDP etc.
4. Compare SOCKETS in IPV4, IPV6 & ICMPV6
5. Implement different types of communications in LAN.
6. Demonstrate Inter Process Communication.

Course Title: ARTIFICIAL INTELLIGENCE Course Code: IT4421

After undergoing the course, Students will be able to:

1. Use the heuristic search techniques for AI related problems. Represent knowledge in suitable forms for computer processing.
2. Apply the natural language processing techniques to solve real life problem. Apply different m/c learning techniques to design computational models .

Course Title: E- Commerce

Course Code: CSE4427

At the end of the course students are able to:

- Examine some typical distributed applications.
- Detail some of the problems that are encountered when developing distributed applications.
- Understand some of the technologies that are used to support distributed applications.
- Illustrate some of the business models used in the internet.

Course Title : **MOBILE COMPUTING** Course Code : CSE4423

At the end of the course students are able to:

1. Demonstrate knowledge of different voice and data communication standards
2. Analyze the need for optimizations in Mobile IP
3. Distinguish between proactive and reactive routing in an Ad hoc network
4. Develop simple app using Android

Course Title: DIGITAL IMAGE PROCESSING Course Code: ECE 4431

After undergoing the course students will be able to

1. appreciate image manipulations and different digital image processing techniques in various fields.
2. Perform basic operations like – Enhancement, Image transform and restoration techniques on image.
3. make use of image segmentation , compression for various applications.
4. Analyze pseudo and full color image processing techniques.
5. Apply the various image transforms used in image processing
6. apply MATLAB to implement the image processing techniques.

Course Title: Software Project Management Course Code: CSE 4422

At the end of the course students are able to:

1. Apply and practice Project Management principles while developing a software.
2. Defining and implementing software project planning.
3. Analyzing software risks and risk management strategies
4. Defining the concepts of software quality and reliability on the basis of international quality standards.
5. Knowing and implementing the software project management tools

Course Title: Human Computer Interaction

Course Code: IT4431

At the end of the course students are able to :

- Define problem space and formulate conceptual models
- Interpret social mechanisms used in communication
- Implement user-centered approaches to interaction design

- Develop cognitive and information processing systems
- Deploy product assessments related to market analysis

Course Title: NETWORK PROGRAMMING LAB

Course Code: IT2227

After undergoing this course, students will be able to

1. Develop and implement distributed applications and protocols over intranet using Network Programming concepts.
2. Apply contemporary theories, processes and tools in the development and evaluation of solutions to problems in network programming.
3. Evaluate basic theories, processes and outcomes of network programming.
4. Apply theory, techniques and relevant tools to the specification, analysis, design, implementation and testing of a simple network programs.
5. Carry out Research and development tasks in networking.

Course Title: Data Warehousing and Data Mining LAB Course Code: IT2226

At the end of the course students are able to:

1. Implement the algorithms to solve data mining problem using WEKA tool Identify an appropriate method to apply in a given situation
2. Communicate results in terms relevant to science, business etc. Apply different clustering techniques to characterize subgroups.

B. Tech- 8 th Semester

Course Title: MIDDLEWARE TECHNOLOGIES

Course Code: IT4421

At the end of the course students are able to:

1. Choose appropriate client server computing model for given problem. Design a dynamic remote application with RMI and JDBC Connectivity. Develop client server applications using C#.net
2. Select appropriate language for homogeneous and heterogeneous objects. Develop real time projects by combining CORBA and database interfacing

Course Title: DESIGN PATTERNS

Course Code: IT4430

At the end of the course students are able to:

- Classify and document design patterns
- Understand patterns to manage algorithms and assign responsibilities to objects
- Apply patterns to solve design problems •
Create new design patterns

Course Title: Multimedia Systems

Course Code: CSE 4424

At the end of the course students are able to:

1. Use different realizations of multimedia tools.
2. Implement various multimedia applications and Action scripts.
3. Analyze various storage technologies.
4. Apply video **compression Techniques for real time applications.**

Course Title: BIO-METRICS

Course Code: IT4428

After undergoing this course, students will be able to

Comprehend the fundamentals of biometrics

1. Analyze the flow of processing in various biometrics modalities
2. Implement some of the biometrics authentication Investigate ways to improve some of the existing techniques Synthesize some of the biometrics authentication systems

Course Title: Network Management Systems Course Code: IT4429

At the end of the course the students are able to:

1. Understand the fundamentals of telecommunication systems necessary for the effective management of organizations that develop and operate them
2. Take short-term and long-term business and technical decisions
3. Analyze and maintain communication networks
4. Design a network project plan for an organization

Department of Power Engineering

Course Title: ENGINEERING THERMODYNAMICS Course Code: ME2404

After undergoing the course, Students will be able to understand

1. Gain the knowledge on open, closed or isolated type of thermodynamic systems in the energy perspective Apply the laws of thermodynamics to the practical problems.
2. Analyze the Isobaric, Isochoric, Isothermal, Adiabatic and polytropic type of flow and non-flow processes.
3. Apply the laws of thermodynamics to the practical problems.
4. Gain the knowledge in relating the performance among heat pump, heat engine and a refrigerator.
5. Gain the knowledge on the concept of entropy
6. Gain the knowledge in analyzing the mixtures of perfect gases.
7. Measure the entropy, enthalpy, internal energy and quality of the steam.
8. Gain the knowledge in estimating the efficiency of the various engines working on Otto, Diesel, Dual Combustion type of cycles

Course Title: FLUID MECHANICS Course Code: ME2405

After the end of the course, Students are able to:

1. Understand the concepts of fluid properties like specific gravity, viscosity, density, surface tension.
2. Determine the pressure head of a fluid in a pipe by using manometer.
3. Understand the friction losses while flowing through a pipe and also used for the designing of pipeline net work.
4. Understand the minor losses and evaluate the performance of a fluid transport system.
5. This study is used for the hydraulic strictures.
6. This study is applied for the design of pipes flows

7. Used for the estimation of flows in pipes, open channels and over head tanks.
8. This study is used for the estimation of shear stress and velocity gradient for the design of submerged bodies.

Course Title: MECHANICS OF SOLIDS Course Code: ME2414

After undergoing the course, Students will be able to

1. Design and conduct experiments on mechanical testing and also could analyze and interpret data
2. Design a component to meet desired needs.
3. Analyze the state of stress and strain at any point in a member.
4. Identify, formulate, and solve structural engineering problems.
5. Learn modern experimental techniques, concepts and tools in mechanical testing of materials.
6. Understand the effect of shape and size of component on stresses and strains.
7. Apply the basic mechanical principles underlying modern approaches for design of various types of structural members subjected to axial load, torsion, bending, transverse shear and combined loading.
8. Apply computational skills to formulate and solve problems related to the determination of the stresses, strains, and deflections produced by loads.

Course Title: ELECTRICAL CIRCUIT AND FIELD THEORY Course Code: EEE2411

After the completion of the course, students are able to

1. Investigate the methods to improve power factor in power system networks.
2. Understand 3-phase ac circuits for designing and analysis of power system networks.
3. Understand network theorems to simplify the complex networks.

Course Title: Solid Mechanics Lab Course code: CE 2207

At the end of course student will be able to

1. Estimate compressive strength of wood/Concrete/Brick materials
2. Check the suitability of wood, steel and concrete in construction works.
3. Find the impact resistance of steel used in construction works.
4. Estimate young's modulus of wood/steel materials

Course Title: Circuits & Simulation Lab Course code: EEE 2213

1. Understand the performance of an ac circuit during resonance conditions.
2. Design the time constants of an electrical circuit for satisfactory performance during transient

Course Title: APPLIED THERMAL ENGINEERING Course Code: ME2410

At the end of the course students are able to:

1. Gain the knowledge about Working principle of two stroke and four stroke SI and CI Engines
2. Gain the knowledge about engine associated systems such as lubricating system, cooling system, fuel feed system, ignition system, their necessity, requirements, construction details, different types and their working

3. Gain the knowledge the concept of combustion in Spark ignition engine, Pressure Vs crank angle diagrams, and pre-ignition
4. Gain the knowledge the concept of combustion in Compression ignition engine, Pressure Vs crank angle diagrams, Knocking, Detonation
5. Gain the knowledge about performance calculations in I.C.Engine
6. Gain the knowledge about engine pollution and working of catalytic converter
7. Gain the knowledge about working principle of reciprocating compressors and its efficiencies
8. Gain the knowledge about Mechanical details of axial flow compressors and its efficiencies

Course Title: HYDRAULIC MACHINERY Course Code: ME 2411

1. Knowledge is useful for the selection of type of turbine required with reference to available head of water and also used for Identification of type of turbine with estimated specific speed.
2. This study is also used for the estimation of efficiency and performance of the turbine with the study of characteristics curves.
3. This study is also used for the estimation of efficiency of different pumps and performance of the pumps with the study of characteristics curves.
4. Study is used for the design and planning of Hydroelectric Power plant with the available water resources and requirement of power.

Course Title: DC MACHINES AND TRANSFORMERS Subject code: EEE 2410

Upon completion of this course the students are able to:

1. Understand the principle of operation, constructional details of DC machines.
3. Analyze armature reaction which helps in investigating the performance of DC machines.
4. Identify the DC Machine to meet various load requirements by analyzing Load characteristics of shunt, series and Compound machines.
5. Analyze the speed control of D.C. motors by understanding the concepts of back e.m.f, torque developed.
6. Understand the necessity of starters for safe starting of dc motors.
7. Evaluate the performance of DC machine by calculating Losses and Efficiency.
8. Design experimental procedure for testing of DC machines.
9. Apply the three phase transformer in the industrial needs like electrical drives and agricultural pumps etc..
10. Understand parallel operation of transformer, three phase transformer, auto transformer and their practical applications.
11. Analyze equivalent circuits of three phase transformers.
12. Understand the different testing methods for evaluating the various losses of the transformers

Course Title: CONTROL SYSTEMS

Upon completion of this course the students are able to:

1. Apply transfer function and state space model in continuous time control systems.
2. Evaluate the overall transfer function of systems using block diagram and signal flow graph techniques.
3. Analyze the transient and steady state performance of control systems.
4. Investigate the stability of a system using time domain and frequency domain techniques.
5. Design different compensators and controllers in time/frequency domain to improve the performance of systems.
6. Investigate the controllability and observability of control systems for pole placement at desired locations.

Course Title: ELECTRICAL MEASUREMENTS & INSTRUMENTATION Subject code: EEE 3417

Upon completion of this course the students are able to:

1. Judge a suitable instrument to obtain accurate readings.
2. Measure high voltage and current in the power system using CT and PT.
3. Measure power, power factor and energy in the power system using watt meter, pf meter and energy meter respectively.
4. Demonstrate the design considerations in basic instruments.
5. Evaluate different methods of measuring R, L and C parameters in an electric network.
6. Apply different methods to measure non electrical quantities (Temperature, Pressure etc) in industries.

Course Title: FLUID MECHANICS & HYDRAULIC MACHINERY LAB Course Code: CE 2213

1. Students can able to explain about units, dimensions and fluid statics and its applications.
2. They can able to explain the fluid flow phenomena, types of fluid and its flow types.
3. They can able to derive the continuity equation, momentum balance equation and also solve problems.
4. They can able to derive the mechanical energy balance equation with friction and without friction.
5. They can able to explain and derive compressible fluid flow and flow processes.
6. Students can capable to design turbines with the available heads.
7. Student can able to identify the type of turbine with known specific speed.
8. Student can able identify and design the pumps with known specific speed and manometric head.

Course Title: DC MACHINES AND TRANSFORMERS LAB Course Code: EEE 2214

After the completion of the course, students are able to

1. Apply the practical methods to find the performance of various types of DC machines.

2. Identify a suitable method to find out performance characteristics of a DC machine.
3. Investigate a suitable DC machine based on its performance characteristics.
4. Design the circuits for safe operation of DC Machines.
5. Apply the speed control techniques of DC motors.
6. Evaluate the performance of transformer by conducting OC and SC tests.
7. Design the practical circuits for safe operation transformers

B.Tech-5th Semester

Course Title : Steam and Gas Turbines Course Code : ME 3421

At the end of the course students are able to:

1. Understand the concept of Rankine cycle.
2. Understand working of boilers including water tube, fire tube and high pressure boilers and determine efficiencies.
3. Analyze the flow of steam through nozzles
4. Evaluate the performance of condensers and steam & gas turbines

Course Title : Design of Heat Transfer Equipment Course Code : PE 3401

At the end of the course students are able to:

1. Understand basic modes of heat transfer and compute temperature distribution in steady state and unsteady state heat conduction
2. Analyze heat transfer through extended surfaces
3. Interpret and analyze free & forced convection heat transfer
4. Comprehend the phenomena and flow regimes of boiling and condensation
5. Understand the principles of radiation heat transfer and apply LMTD and NTU methods to design heat exchangers

Course Title : Induction and Synchronous Machines Course Code : PE 3402

At the end of the course students are able to:

1. Understand the principles of operation, construction details of three phase induction motor
2. Understand methods of speed control and methods of calculating performance characteristics of 3-phase induction motor
3. Evaluate the performance characteristics of 3-phase induction motor using equivalent circuit and voltage regulation of synchronous generator
4. Analyze the performance characteristics of synchronous machine using excitation and power circles.

Course Title : Power Transmission and Distribution Subject Code : PE 3403

Upon completion of this course the students are able to:

1. Understand representation of transmission lines and analyze the circuits as standard two port networks
2. Evaluate the performance of transmission lines with and without loading conditions and voltage at different distribution points in network

3. Evaluate the mechanical integrity of a transmission system in terms of sag of a long stretched lines and fixed costs and tariffs of generation
4. Analyze the effect of proximity, corona, and shunt compensation on the performance of transmission line.

Course Title : Power Plant Pollution and Control Subject code : CHEM 4445

After completion of this course the student is able to:

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

1. Understanding of different types of pollution and apply knowledge for the protection and improvement of the environment
2. Select and use suitable wastewater treatment technique
3. Identify suitable sampling, analysis and equipment for air pollutants.
4. Control the pollution in thermal power plants

Course Title : Power Generation Engineering Course Code : PE 3404

At the end of the course students are able to :

1. Understand the various sources of energy.
2. Gain the knowledge regarding Equipment, Plant layout, principle of working of various diesel and gas turbine plants.
3. Understand the various combustion systems.
4. Familiarize the working principles of various nuclear reactors

Course Title : Power Plant Operation and Maintenance Subject code : PE 3405

At the end of the course students are able to:

1. Identify pre-requisites for power plant operation and maintenance professional
2. Understand the basic concepts of power plant operation and maintenance systems
3. Understand applicable operation and maintenance method and planning related to specific equipment
4. Understand the importance and application of NDT methods applied to power plant

Course Title : Thermal Engineering Lab Course Code : ME 3226

At the end of the course students are able to:

1. Evaluate the performance of IC engines, reciprocating air compressor
2. Perform heat balance analysis of IC engines.
3. Evaluate the performance of refrigeration and air conditioning systems.
4. Plot Valve and Port timing diagrams of 4-stroke and 2-stroke engines
5. Compile and present specifications of two and four wheelers.

Course Title : Electrical Measurements and Control Lab Subject code : EEE 4236

At the end of the course students are able to:

1. Analyze the quality of the metering instruments and find the reasons behind erroneous operation.
2. Evaluate the functioning of insulators as the voltages levels are varied and justify its installation at any given location.

3. Check the performance of different electric machines by doing qualitative analysis on the parameters of that machine.
4. Design the models of dynamic systems and obtain transfer functions used in real time control applications.
5. Analyze stability of linear time-invariant systems along with their properties and characteristics

B.Tech-6th Semester

Course Title : Engineering Economics and Project Management Course Code: HS 3405

At the end of the course students are able to:

1. Understand basic principles of engineering economics.
2. Evaluate investment proposals through various capital budgeting methods.
3. Analyze key issues of organization, management and administration.
4. Evaluate project for accurate cost estimates and plan future activities.

Course Title : Switchgear and Protective Devices Course Code : EEE 3423

After completion of this course the students are able to:

1. Apply the electromechanical energy conversion principles for the protection of power system equipment through relays and breakers.
2. Propose suitable protection schemes for different electrical equipment.
3. Analyze neutral grounding techniques at all locations in a power system.
4. Evaluate the influence of over voltages and over currents in a power system and volt-time characteristics for the insulation coordination to design the proper insulation

Course Title : Power Electronics and Drives Subject Code : PE 3406

After completion of this course student is able to:

1. Calculate the parameters of a circuit with semiconductor power devices, given a specification in terms of power, current, voltage and quality. Understand design and control concepts of Power Electronic devices.
2. Identify suitable converter based on source and load requirements.
3. Understand the speed control and braking methods of electrical drives
4. Design drives for motion control of ac and dc machines.
5. Analyze the performance of a converter control techniques fed drive.

Course Title : Utilization of Electrical Energy Subject code : EEE 3426

After completion of this course the student enables to:

1. Design Electric Drive and elevator used in industries.
2. Maintain various electric heating and welding equipments used in industries.
3. Analyze different schemes of speed control for the traction system.
4. Evaluate Electric Traction system.
5. Identify various domestic electrical appliances

Course Title : Power Plant Safety Systems Subject code : PE 3407

At the end of the course students are able to:

1. Identify hazard and potential hazard areas
2. Develop safety programs to prevent or mitigate damage or losses
3. Assess safety practices and programs
4. Conduct safety audits
5. Improve safety practices

Course Title : Thermal Power Plant Auxiliaries Course Code : PE 3408

At the end of the course students are able to:

1. Acquire the knowledge on the overall process flow in thermal power plant.
2. Understand various parameters taken for site selection and layout considerations.
3. Familiarize with coal handling and ash handling units.
4. Interpret the components of water treatment process.

Course Title : Smart Grid Technology Subject code : PE 3409

Upon completion of this course the students are able to:

1. Understand the smart grid technologies and its components
2. Design smart Grid to meet the needs of Power utility
3. Adopt new technologies into the Power grid

Course Title : Heat Transfer Lab Subject code : ME 3233

At the end of the course students are able to:

1. Apply the knowledge of heat transfer to perform experiments related to conduction heat transfer
2. Evaluate heat transfer coefficient in free and forced convection heat transfer situation and the performance of heat exchangers in parallel & counter flow types
3. Determine fin efficiency and emissivity in respective experiments
4. Observe the phenomena of drop and film wise condensation

Course Title : AC Machines Lab

Course Code : PE 3210

After completion of this course student is able to

1. Evaluate various methods of finding voltage regulation in alternators at different load power factors for finding their performance.
2. Investigate the efficiencies of single phase transformer and induction motors through various tests.
3. Analyze the performance of synchronous motors through V and inverted V curves.
4. Synthesize three phase system from two phase system and vice versa using Scott connection of transformers

B.Tech-7th Semester

Course Title : Power Plant Metallurgy and Material Science Subject Code: PE 4411

1. Understand the structure of metals, transformations in solid state, heat treatment of alloys, ceramic and composite materials
2. Understand the constitution of alloys and fundamental concepts of iron-iron carbide equilibrium diagrams and its application in metallurgy
3. Apply the fundamental concepts of equilibrium diagrams

4. Understand the Apply the concepts of non-ferrous metals and alloys in metallurgical areas

Course Title: Flexible AC Transmission Systems Subject Code: EEE 3425

Upon completion of this course the students are able to:

1. Apply knowledge of FACTS Controllers.
2. Design of different compensators in power system network with constraints.
3. Identify, formulate and solve real network problems with FACTS controllers
4. Evaluate various controllers for the given power system network.

Course Title : Microprocessor and Micro Controllers Course Code : ECE 3421

At the end of the course students are able to :

5. Understand the internal working of a CPU including the utilization of the hardware resources.
6. Introduce the design of basic I/O hardware and microprocessor interfacing: memory chip selection, memory expansion, I/O interfacing.
7. Interface input and output devices like LCD, LED, Keyboards ADC, DAC and stepper motor to microprocessors and microcontrollers.
8. Design the home appliances and toys using Microcontroller chips

Course Title : Refrigeration and Air Conditioning Course Code : ME 3431

At the end of the course students are able to:

9. Understand the principles and applications of refrigeration systems
10. Understand vapor compression refrigeration system and identify methods for performance improvement
11. Analyze air conditioning processes using principles of psychrometry.
12. Evaluate cooling and heating load in an air conditioning system
13. Identify eco-friendly refrigerants and use P-H charts to evaluate the performance of refrigeration systems

Course Title : Power plant Instrumentation and Control Course Code : PE 4412

After completion of this course the student enables to:

1. Understand the instruments and controlling used in power plant
2. Demonstrate instruments used in power plant
3. Analyze the quality of the metering instruments and find the reasons behind erroneous operation.

Course Title : High Voltage Engineering Subject code : EEE 3430

At the end of the course students are able to: Students are able to understand the break down voltage and its importance of various kinds of insulating materials such as solids, liquids, vacuum and gases.

1. Students are able to understand the importance of transients in case of power system elements.
2. Students are able to understand the procedure to measure the high voltages and high currents

Course Title : HV Transmission

Course Code : EEE4438

At the end of the course students are able to:

1. Understand the operational concepts of hv transmission
2. Understand the background and control of HVDC transmission and converters

3. Understands the principle of dc link control
4. Evaluate the fault and protection methods for HVDC transmission.
Transmission.

Course Title : Power System Analysis Course Code : EEE4431

Upon completion of this course the students are able to:

1. Model and represent system components (ex. Transformers, lines, generators etc.) for positive, negative and zero sequence networks.
2. Build nodal admittance and impedance matrices for the power system network.
3. Understand and modify existing system and design for future expansion of the system or subsystems for load flow study.
4. Learn about power system behavior under symmetrical and unsymmetrical faults, symmetrical component theory.
5. Understand the basic concepts of steady state and transient stabilities and their improvement methods

Course Title : Energy Management and Auditing Course Code : PE 4413

After completion of this course the student enables to:

1. Understand the energy demand and supply, energy crisis and future energy scenario
2. Apply Energy management techniques and perform energy audit
3. Develop and Analyze various energy economics, unit commitment table by evaluation optimal power flow
4. Find the requirement for the efficient use of energy resources

Course Title : Power Systems Lab Subject code :EEE 4237

After the completion of the course, students are able to

1. Analyze various characteristics of under/over voltage & current induction relay.
2. Analyze various characteristics of digital distance relay
3. Evaluate breakdown strength of Oil.
4. Analyze the characteristics of a Fuse.
5. Can evaluate the parameters, performance of a long transmission line

Course Title : Power Systems & Power Plant Simulation Lab Subject code : PE4214

Upon completion of this course the students are able to:

1. Analyze various characteristics of Circuit Breaker and PV cell
2. Analyze Various fault conditions in power systems
3. Analyze load flows and economic load scheduling in power systems.
4. Simulate and Analyze networks and power electronic circuits.
5. Suggest the voltage control method in a power system

B.Tech- 8th Semester

Course Title : Power System Operation and Control Subject code : EEE 4439

Upon completion of this course the students are able to:

1. Operate a power system at low cost by allocation of load with equal incremental cost.
2. Prevent voltage collapse condition from security assessment.
3. Analyze the steady state and dynamic responses of control systems.
4. Control the frequency of a single control area by free governor operation and governing system.
5. Interconnect several areas(State Electricity Boards) to grid by tie-line bias

control & make steady state error zero by including proportional and integral control.

Course Title : Advanced Power Generation Technology Course Code : PE 4415

The course content enables students to:

1. Understand the limitations of basic steam turbine and gas turbine power plants.
2. Gain the knowledge on combine cycle power plants.
3. Acquire knowledge in various direct energy conversion technologies.
4. Understand the types and working principles of various fluidized bed technology.

Course Title : Computational Fluid Dynamics Course Code : ME 4450

At the end of the course students are able to:

1. Derive the basic governing equations applied for fluid flow problems.
2. Apply the differential equations to fluid flow problems.
3. Understand the concept of discretization.
4. Solve simple algorithms for incompressible fluid flow.
5. Apply the basics of CFD to heat transfer problems.

Course Title : Power Plant Economics and Tariff Regulations Course Code : PE 4416

After the completion of the course, students are able to

1. Students will have a basic understanding of conversion of coal, oil, gas, nuclear, hydro, solar, geothermal, etc. energy to electrical energy.
2. Analyze comparisons of capital cost allocation, operating cost, including fuel costs.
3. Know percentages and have understanding for magnitudes of energy and resources used.
4. Understand and analyze fixed and operating costs for various energy sources

Course Title : Power Plant Erection and Commissioning Subject code : PE 4417

At the end of the course students are able to:

1. Identify pre-requisites for erection and commission professional
2. Understand the basic elements of power plant mechanical, electrical and instrumentation and control systems
3. Develop activity sequence for effective implementation of erection and commissioning of a system
4. Assess technical problems during erection and commissioning

Course Title: Machine Design

Course Code: PE 4418

Upon completion of this course the students are able to:

1. Design a component subjected to static loads based on strength and stiffness criterion
2. Design bolted joints, shafts, keys and couplings
3. Design power screws and journal bearings, ball and roller bearings
4. Design power transmission systems including power screws, belts, pulleys, spur and helical gears
5. Provide alternate design based on requirements