Civil Engineering

Vision

“The Department of Civil Engineering aims to impart not only knowledge but also excellence in civil engineering and technology with global perspectives to our students and to make them ethically strong engineers to build our nation.”

Mission

“To make the department a centre of excellence in the field of civil engineering and allied research by promoting innovative as well as original thinking in the minds of budding engineers to face the challenges of future with technical skills and ethical values to serve the society and nation.”

Program Educational Objectives

The objective of Civil Engineering department is to prepare graduates who will be successful in their chosen career paths. Specifically, graduates of these programs will be capable of achieving:

1. Graduates of the program will possess strong fundamental concepts in mathematics, science, engineering and Technology to address technological challenges.
2. Possess knowledge and skills in the field of Construction Engineering&Design and Civil Engineering for analyzing, designing and implementing complex engineering problems of anydomain with innovative approaches.
3. Possess an attitude and aptitude for research, entrepreneurship and higher studies in the field of Civil &Construction Engineering and Environmental Aspect.
4. Have commitment to ethical practices, societal contributions through communities and life-long learning.
5. Possess better communication, presentation, time management and team work skills leading to responsible & competent professionals and will be able to address challenges in the field of Civil at global level.

Program Outcomes

Engineering Graduates will be able to:

1. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineeringfundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem analysis**: Identify, formulate, review research literature, and analyze complexengineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/development of solutions**: Design solutions for complex engineering problems anddesign system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct investigations of complex problems**: Use research-based knowledge and researchmethods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modernengineering and civil tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assesssocietal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. **Environment and sustainability**: Understand the impact of the professional engineering solutionsin societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms ofthe engineering practice.
9. **Individual and team work**: Function effectively as an individual, and as a member or leader indiverse teams, and in multidisciplinary settings.
10. **Communication**: Communicate effectively on complex engineering activities with the engineeringcommunity and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project management and finance**: Demonstrate knowledge and understanding of theengineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Life-long learning**: Recognize the need for, and have the preparation and ability to engage inindependent and life-long learning in the broadest context of technological change.

Program Specific Outcomes

PSO1: Enhancing the employability skills by making the students capable of qualifying National level competitive examinations

PSO 2: Inculcating in students technical competencies to deal with practical aspects of civil engineering.

PSO 3: Inculcating in students social awareness and environmental necessity along with ethical responsibility to have a successful career and to become an entrepreneur

Sr.No	Class	Subject	Course Objective	Course outcome
1	**SE(2015 P)**	**201001: Building Technology and Materials**	1) To enumerate different types of structure and their requirement as buildingcomponents. 2) To describe all basic activities of construction from foundation to finishing. 3) To study different types of materials used in construction for civil engineering projects.	On completion of the course, student will be able to– 1) Identify types of building and basic requirements of building components. 2) Explain types of masonry, formwork, casting procedure and necessity of Underpinning and scaffolding. 3) Elucidate different types of flooring and roofing materials. 4) Describe types of doors, windows, arches and lintel. 5) Illuminate means of vertical circulation and protective coatings. 6) Explain different materials especially eco-friendly materials and safety measures tobe adopted at any construction site.
2		**207001: Engineering Mathematics III**	After completion of the course, students will have adequate background, conceptual clarity and knowledge of mathematical principles related to: 1) Ordinary and Partial differential equations applied to structural analysis and fluiddynamics in civil engineering. 2) Numerical methods for	On completion of the course, student will be able to– 1) Solve higher order linear differential equations and apply to civil engineeringproblems such as bending of beams and whirling of shafts. 2) Solve system of linear

			analyzing problems in hydraulics, geotechnics and structuresin civil engineering. 3) Statistical methods such as correlation, regression analysis and probability theory forexperimental data to quantify risk and safety in their designs. 4) Vector differentiation and integration applied to problems in fluid mechanics.	equations using direct and iterative numerical techniques anddevelop solutions to ordinary differential equations using single step and multistepmethods applied to structural systems. 3) Apply statistical methods like correlation, regression analysis in analyzing andinterpreting experimental data and probability theory applied to constructionmanagement. 4) Perform vector differentiation and integration, analyze the vector fields and apply tofluid flow problems. 5) Solve various partial differential equations such as wave equation, one and twodimensional heat flow equations.
3		**201006: Surveying**	1) To learn the basics of plane surveying and different types of instruments used forplane surveying. 2) To learn different methods of surveying. 3) To understand advancements in plane surveying such as electronic	On completion of the course, learner will be able to 1) Operate and use surveying equipment. 2) Draw plan or map of the existing permanent features on the ground.

			instruments andsoftware.	3) Classify the ground features from the map or plan. 4) Analyze temporary adjustments and check permanent adjustments of the Theodolite.
4		**201002: Strength of Materials**	1) To study the different types of stresses due to load, temperature, etc. 2) To learn concept of Shear Force and Bending Moment Diagram for determinatebeams.	On completion of the course, learner will be able to 1) Compute different type of stresses in determinate, indeterminate, homogeneous andcomposite structures. 2) Develop bending and shear stress diagram. 3) Determine the torsional stresses and stresses due to strain energy for different loadingconditions. 4) Explain the concept of principal stresses due to combined loading and able tocompare the values of analytical and graphical (Mohr's circle) method. 5) Plot loading diagram, Shear Force Diagram (SFD) and Bending Moment Diagram (BMD). 6) Analyze axially and eccentrically loaded column
5		**201003: Geotechnical**	1) To describe soil properties,	On completion of the

		Engineering	classification and its behavior under stress. 2) To learn methods for measurements and determination of index & properties of soil. 3) To study the interaction between water and soil and the effects of static vs. flowingwater on soil strength.	course, learner will be able to: 1) Differentiate the different types of soil and their engineering properties and classifythem; 2) Determine the soil properties in laboratory and develop a proficiency in handlingexperimental data; 3) Understand of the concept of effective stress and its influence on soil behavior. 4) Develop an understanding of the influence of water flow on the engineeringbehavior of soils. 5) Analyze engineering properties like compaction, permeability, soil shear strength. 6) Compute the lateral thrust due to backfill on the retaining walls. 7) Classify soil slopes and identify their modes of failure.
6		**Awareness to Civil Engineering Practices Audit Course**	1) To provide basic overview of functioning of different civil engineering relatedindustries / firms. 2) To provide awareness on application of different drawings,	On completion of the course, learner will be able to understand 1) Different types of civil engineering industries and their functioning.

			contract documents incivil engineering. 3) To provide insight of code of ethics, duties and responsibilities as a Civil Engineer.	2) Applications of different documents, drawings, regulations in Civil Engineeringindustries. 3) Code of ethics to be practiced by a Civil Engineer and understand duties and responsibilities as a Civil Engineer 4) Different safety practices on the site.

SEMESTER-II

Sr.No	Class	Subject	Course Objective	Course Outcome
7	SE(2015PAT)	**201004: Fluid Mechanics-I**	1) To study basics of Fluid Mechanics, Fluid properties and concept of submerged &floating structure in a static fluid. 2) To make use of principles of continuity, momentum, and energy as applied to fluidmotions. 3) To apply fundamental principles of fluid mechanics for the solution of practical civilengineering problems.	On completion of the course, learners will be able to: 1) Use fluid properties, dimensional analysis for solving problems of fluid flow. 2) Solve fluid statics problems. 3) Measure fluid pressure. 4) Calibrate discharge measuring instrument like ventrurimeter, orifice meter. 5) Distinguish between various types of fluid flows and find the fluid velocity usingprinciples of Kinematics and Dynamics. 6) Design pipes to carry particular amount of discharge.
8		**201005: Architectural Planning and Design of Buildings**	1) To understand necessity of Town planning, principles of planning, principles ofarchitecture	On completion of the course, learner will be able to: 1) Make use of principles of

			and byelaws. 2) To study the planning for building services such as noise and acoustics, ventilation,lighting, plumbing work and safety practices. 3) To develop the plan, elevation and section of load bearing and framed structures.	planning and principles of architectural Planning. 2) Analyze the available primary or secondary data and plan different types of structuresconsidering futuristic need of an area. 3) Improve the status of existing structures by proposing appropriate green measures. 4) Plan effectively various types of buildings according to their utility with reference todifferent codes. 5) Understand and resolve contemporary issues at multi-dimensional functional levels.
9		**201008: Structural Analysis I**	1) To understand the basics configuration and classification of structures. 2) To analyze the determinate and indeterminate structures.	On completion of the course, learner will be able to: 1) Understand the basic concept of static and kinematic indeterminacy, slope anddeflection of determinate and indeterminate beams for analysis of structures. 2) Analyze indeterminate beams structures and frames. 3) Evaluate determinate and indeterminate trusses and its application in the field. 4) Apply influence line diagrams for the analysis of structures under moving load. 5) Analyze two and three hinged arches and its application.

				6) Apply plastic analysis for indeterminate steel structures by limits state method
10		**207009: Engineering Geology**	1. To study basic of engineering geology and introductory part of the earth science. 2. To understand the utility and application of geological principles in various phases ofcivil engineering activities. 3. To describe the sources, and characterization of common Building materials. 4. To learn the basic aspects occur due to structural features like folds and faults. 5. To explain various natural hazards and their implications on structures and effects onsociety.	After completing this course students of civil engineering will be able to: 1. Explain the basic concepts of engineering geology. 2. Differentiate between the different rock types, their inherent characteristics and theirapplication in civil engineering. 3. Understand physical properties, mechanical properties of the minerals and theirapplication in civil engineering. . 4. Identify favorable and favorable conditions for the buildings, roads, dam,tunneling etc through the rocks. 5. Explain mass wasting processes, effects of mass wasting process on the civilengineering structures and remedial measures. 6. Interpret geohydrological characters of the rocks present at the foundations of thedams, percolation tanks, tunnels. 7. Understand Seismic activities and its effect on the civil engineering construction. 8. Identify geological hazards

				and presence of ground water.
11		. **201007: Concrete Technology**	1) To know properties of various ingredients of concrete and concept of mix design. 2) To learn the behavior of concrete at its fresh and hardened state. 3) To understand special concrete and their application. 4) To explain deterioration of concrete and study methods of repair	On completion of the course, learner will be able to: 1) Understand chemistry, properties, and classification of cement, fly ash, aggregatesand admixtures, and hydration of cement in concrete. 2) Prepare and test the fresh concrete 3) Test hardened concrete with destructive and nondestructive testing instruments 4) Get acquainted to concrete handling equipments and different special concrete types. 5) Design concrete mix of desired grade 6) Predict deteriorations in concrete and repair it with appropriate methods andtechniques.
12		**201010: Soft Skill**	1) To help the students in building interpersonal skills. 2) To develop skill to communicate clearly. 3) To enhance team building and time management skills. 4) To learn active listening and responding skills.	On completion of the course, learner will be able to: 1) Make use of techniques for self-awareness and self-development. 2) Apply the conceptual understanding of communication into everyday practice. 3) Understand the importance of teamwork and group discussions skills. 4) Develop time management and stress management.

				5) Apply business etiquette skills effectively an engineer requires.
13		**Road Safety Management Audit Course**	1) To provide basic overview on road safety & traffic management issues in view of thealarming increase in vehicular population of the country. 2) To explain the engineering & legislative measures for road safety. 3) To discuss measures for improving road safety education levels among the public.	On completion of the course, learners will: 1) Show changes in awareness levels, knowledge and understanding. 2) Demonstrate a change in attitudes / behavior e.g. against drink-drive. 3) Utilize remedial education for those who make mistakes and for low level offenceswhere this is more effective than financial penalties and penalty points. 4) Improve road safety together leading to casualty reduction

THIRD YEAR

(SEMESTER-I)

Sr. No	Class	Subject	Course Objective	Course Outcome
1.	**TE(2015PAT)**	**301001: Hydrology and water resource engineering.**	1. To learn different phases involved in hydrological cycle, precipitation, evaporation and infiltration. 2. To study various methods for irrigation and assessment of canal revenue. 3. To learn hydraulics of wells under steady flow condition in confined and unconfined aquifers. 4. To learn unit hydrograph,	1.To explain different phases involved inhydrological cy precipitation, evaporation and infiltration 2.To understand various methods for irrigation and assessment of canal Revenue. 3. To understand hydraulics of wells under

			S-curve hydrograph, synthetic unit hydrograph and uses of unit hydrograph. 5. To study basics of reservoir planning, fixation of reservoir capacity and useful life of reservoir. 6.To study various components of lift irrigation scheme and their design	steady flow condition in confined and unconfined aquifers. 4. To describe unit hydrograph, S-curve hydrograph, synthetic unit hydrograph and uses of unit hydrograph. 5. To explain basics of reservoir planning, fixation of reservoir capacity and useful life of reservoir. 7. To understand various components of lift irrigation scheme and their design.
2.		**301002: InfrastructureEngineering andConstruction Techniques**	1.To study the meaning and scope of infrastructure engineering 2.to study the cross section of railways, type of sleepers and different components of railways, alignment of railways 3. To study the necessity of mechanizations, use of various construction techniques. 4.to study the tunneling, functions types of tunnel, criteria selection of size and shape of tunnel 5. To study requirements of harbors and ports, classification of harbors with examples.	On completion of the course, learner will be able to: The programme outcomes are the skills and knowledge which the students have at the time of graduation. The outcomes essentially indicate what a student can do from subjectwise Knowledge acquired during the programme. 1) Engineers with the ability to carry out field works and prepare different types of

				project proposals. 2) Engineers having the ability to improve the existing civil engineering projects. 3) Engineers having the ability to function as the leader, or member, of a multidisciplinary team. 4) More and more students going for post graduation in this field. 5) More students working as entrepreneur in this stream.
3.		**301003; Structural Design-I**	1. To study different method of design for steel structure and design of tension member. 2. To design compression member and built up section used as column. 3. To design eccentrically loaded column and its base. 4. To design laterally supported and laterally unsupported beam. 5. To design beam to beam connection, beam to column connection and design of welded plate girder. 6. To design roof truss and gantry girder.	Upon successful completion of this subject student should be able: 1.Students will be learn different method of design of steel structures and design of tension member 2 Students will be able to design compression member and built up section used as column. 3 Students will be able to design eccentrically loaded column and its base. 4 Students will be able to design laterally supported and laterally unsupported

				beam. 5. Students will be learningbeam to beam connection, beam to column connection and design of welded plate girder. 6 Students will be able to design roof truss and gantry girder.
4.		**301004: Structural Analysis-II**	1.To prepare the students to understand the basics of configuration and classification of Structures. 21) To train the students of civil engineering with good scientific and engineering breadth so that they can analyze the structures. 2 To train the students so that they canoptimize structural systems for effectiveness and economy through proper configuration of structure. 3.To train the students to analyze the structures using various software	Upon successful completion of this subject student should be able: 1) Engineers with the ability to analyze the Structures manually and using soft computing tools. 2) Engineers having the ability to improve the existing systems. 3) Engineers having the ability to function as the leader, or member, of multi-disciplinary team. 4) More students working as entrepreneur in the field of analysis and design of structures.

5.		**301005: Fluid Mechanics-II**	1. To produce civil engineering graduates who are introduced with the basics of Hydraulic machineries & Open Channel flow. 2. To produce civil engineering graduates who areintroduced with Flow around submerged bodies & unsteady flow. 3. To produce graduates who have the ability to pursue careers as Hydraulic Engineer. 4. To study and to analyze Characteristics of GVF profiles & computer program on GVF.	Upon successful completion of this subject student should be able: 1) Engineers with the ability to carry out different types of Hydraulic Projects. 2) Engineers having the ability to improve the existing Hydropower Plants. 3) Engineers having the ability to function as the leader, or member, of a multidisciplinary team. 4) More and more students going for post graduation in this field. 5) More students working as entrepreneur in this stream.
6.		**301006: Employability Skills development**		

SEMESTER -II

Sr. No.	Class	Subject	Course Objective	Course Outcome
7	**TE(2015PAT)**	**301007: Advanced Surveying**	1) To produce civil engineering graduates who are introduced with the basics of Geodetic Surveying. 2) To produce civil engineering graduates who are introduced with Horizontal and vertical controls. 3. To learn different types of Instruments used for Geodetic surveying. 4. To learn different methods of advanced surveying. 5.To study and to analyze different types advancements in Geodetic surveying such as electronic instruments and software.	Upon successful completion of this subject student should be able: 1. Aware of Study of applications of GPS in geodetic surveying. 2.Graduates are able to learn MPV of errors as MPE of angles 3.Graduates are able to learn how can collect valuable information of object shape, size, position etc 4.Students are able to learn the techniquesaerial photogrammetric
8		**301008 Project Management and Engineering Economics**	1. To studyimportance, Objectives, principles Functions of Management. 2. To produce civil engineering graduates who are introduced with various techniques such as CPM, PERT, updating, crashing, resource leveling. 3. To study the objective of	Upon successful completion of this subject student should be able: 1. Studentgets knowledge regarding management and different methods of network analysis. 2. Studets will be able to minimize the cost of project as well as saving the time on

			material management. 4. To study different methods of keeping records for material management.	construction site. 3. Engineers with the ability to carry out Computer program-software for programming in Fluid mechanics, Soil mechanics, Project Mgt.4. Engineers having the ability to improve the existing civil engineering projects. 4. Engineers having the ability to function as the leader, or member, of a multi-Disciplinary team. 6. More students working as entrepreneur in this stream.
9		**301009: Foundation Engineering**	1. To produce civil engineering graduates who are introduced with concept ofshear strength & settlement criteria.II. Core Competence. 2. To learn types of foundation of buildings, bearing capacity theories. 3) To study settlement analysis, improvement techniques	Upon successful completion of this subject student should be able: 1) Engineers with the ability to analyze design and execute the foundation works. 2) Engineers having the ability to improve the existing foundation systems. 3) Engineers having the ability to function as the leader, or member, of a multidisciplinary team. 4) More and more students going for post graduation in this field. 5) More students working as entrepreneur in this stream.

10		**301010: Structural Design-II**	1. To produce civil engineering graduates who are introduced with the basics of understanding and designing of R.C.C. Structures. 2. To learn different elements of the structure and their behavior under load. 3. To learn load calculations and load transfer phenomenon of the structure. 4. To analyze the structure for different load combinations. 5. To learn section design and detailing.	Upon successful completion of this subject student should be able: 1. Study of Prestressed Concrete and different types of systems of prestressingalong with concept of losses in prestressing. 2. Analysis and design of PrestressedConcrete Girder and Slab. 3. Analysis of beams of multistoried building subjected to earthquake forces and design of continuous beam. 4. Analysis and design of retaining wall subjected to different types of earth pressure. 5 Analysis and Design of different types of combined footing. 6. Analysis and Design of different types of ground rested water tank.
11		**301011: Environmental Engineering-I**	1. To learn fundamental of Civil Engineering. 2. To learn basic Characteristics of Construction Materials. 3.To understand the differences Method of working and Quality control 4. To understand basics of Durability and Security.	Upon successful completion of this subject student should be able: 1. To explain Noise and Air pollution and its remedies of control. 2. To describe Water Supply Scheme and Population Forecasting. 3. To understand Physical Treatments of potable water.

				4. To understand Chemical treatments on water to purify. 5.To explain how the water is treated Biologically and Special treatments given of water 6. To get knowledge of design of water distribution and Rainwater Harvesting.
12		**301012 Seminar**		

BE 2015 Course Outcomes

Environmental Engineering –II

Outcomes of course:

1. Students understood Sewage quantity and quality for better treatment so as to reduce scarcity by recycling waste water.

2. Students understood industrial waste water quantity and quality for achieving better sanitation in society.

Transportation Engineering

1. Basic concept about Highway Engineering

2. To understand the principles of Highway geometrics design as per IRC standards

3. Perform geometric design for the Highway& Basic concept of Pavement design

4. To understand Types of pavements & Materials required for highway construction.

5. To understand Construction procedure for different type of pavements.

6. To understand maintenance procedure for different type of pavements.

7. To understand the Traffic engineering& different types of traffic control device.

8. Basic idea about the Bridge engineering & Components parts of a bridge

Structural Design and Drawing III

1. Application of different specification of IS 1343: 1980 for prestress concrete

2. Able to differentiate between pretensio0ning and post tensioning systems

3. Able to analyse and design framed structures, Application of IS 1893 :1984 for Earthquake resistant design of structures.

4. Understand and designing of Soil Retaining structures

5. Understanding the behaviour and designing of combined footing

6. Application of IS 3370 part II to part IV for water storage structures

Dams and Hydraulic Structures

1 Students can understand Dam, its Safety and Behavioral aspects of Dam with Instruments.

2 Students can analysed and designed Gravity Dam with different stability condition.

3 Student's awared the Spillway, Gates and layout of Hydropower plant.

4 Students are gained the knowledge in failure aspects of Earthen Dam and Design of Diversion Head Works. 401007.5 Students are able to design canal and canal structures.

6 Students are understood C. D. Work and River Training Works.

Quantity Surveying, Contracts and Tenders

1. Understand Estimates, it's types.

2. Able to take Out Quantities of different Tasks for Load Bearing Structure

3. Able to take Out Quantities of different Tasks for RCC frame Structure and valuation

4. Able to do Rate Analysis for tasks by studing specifications

5. Able to understand Tending and work execution method

6. Able to understand Contracting and arbitration

Elective-I 401 004 SEM-I

Structural Design of Bridges

1. Discuss the IRC standard live loads and design the deck slab type bridges.

2.Analyze the box culverts for the given loading and detail the box culverts.

3. Design and detail of T-Beam bridges.

4. Design and check the stability of piers and abutments.

5. Discuss the bridge foundations and prepare the bar bending schedule

Systems Approach in Civil Engineering

1 Applications of numerical methods like bisection method, false position method,etc

2 Applications of numerical methods like newton Raphson,GaussQuadrature,etc

3 Applications of methods like Gauss legendre, jordan, siedel

4 Concepts of standard deviation, types of data and importance of statistics

5 Concepts of probability distributions like normal, poisson, binomial, etc

6 Concepts and applications of corelation regression, test of hypothesis, inerpolation and extrapolation

Advanced Concrete Technology

1 Students will know recent aggregates and their compatibility in concrete making

2 Understand different types of concrete

3 Students will be able to design modern concrete

4 Students will know basic of fiber reinforced concrete

5 Able to Understand different properties of fresh and hardened fiber reinforced concrete

6 Able to Understand precast elements and concept of ferrocement

Advanced Engineering Geology with Rock Mechanics

1. Apply engineering geological concepts and approaches on rock engineering projects.

2. Analyze the engineering behavior of rocks

3. Evaluation of engineering geological data in construction process of underground openings in rock.

4. Interpret the geologic data to establish the geological framework needed for design and construction of underground openings.

Elective-II 401 005

Matrix Methods of Structural Analysis

1. knowledge of development of stiffness matrix for prismatic members,
2. knowledge of matrix computations,
3. ability to analyse determinate and indeterminate plane and space truss / frame system,

Integrated Water Resources Planning and Management

1 have acquired understanding of water management system components, their characteristics and functioning of such systems;

2 have acquired basic knowledge of integrated water management problems;

3 be able to make appropriate and critical use of water management modelling and integrated water management principles.

TQM & MIS in Civil Engineering

1 Outline the Dimensions and Barriers regarding with Quality.

2 Illustrate the TQM Principles.

3 Demonstrate Tools utilization for Quality improvement.

4 Explain the various types of Techniques are used to measure Quality.

5 Apply various Quality Systems and Auditing on implementation of TQM.

Earthquake Engineering

1. Determine the response of SDOF & MDOF structural system subjected to vibration including earthquake.

2. Apply the concept of Earthquake Resistant Design & concept of lateral load distribution on buildings.

3. Determine the lateral forces generated in the structure due to earthquake.

4. Apply the concept of ductile detailing in RC structures.

Advanced Geotechnical Engineering

1 Explain and differentiate between the nature, formation and behaviour of the following problematic soils: expansive soils, collapsing soils, soft, quick and dispersive clays, liquefiable soils, organic soils and acid sulphate soils;

2 Calculate the characteristic surface movement of a soil profile;

3 Evaluate total soil suction and interpret soil suction profiles;

4 Design residential footings founded on expansive soils using the following methods: deemed-to-comply; engineering principles; and probabilistic charts;

5 Assess and report on the likely cause of distress to residential structures and recommend appropriate remediation options;

6 Recommend appropriate design solutions for each the following problematic soils: collapsing soils, soft, quick and dispersive clays, liquefiable soils, organic soils and acid sulphate soils;

7 Create engineering borelogs by manually logging soils;

8 Estimate soil reactivity using the visual-tactile method;

9 Calculate and interpret soil properties using the critical state soil mechanics theoretical framework; and

10 Calculate effective stresses using unsaturated soil mechanics theory.

Elective-III 401 009Semester-II

Advanced Structural Design

1. Identify the terminology of higher-level Theory of Structures at a professional level

2. Apply Plastic Theory, Structural Dynamics Theory, and Stability Theory to solve structure-related problems

3. Describe features and limitations of common software used in professional practice for advanced structural analysis

Hydropower Engineering

1 Students can understand various sources of energy

2 Students can understand various types of hydropower plant

3 Students can understand design of power plant

4 Students are gained the knowledge of power house.

5 Students can understand design of turbine

6 Students are made aware about electric act

Air Pollution and control

1. The students completing the course will have an understanding of the nature and characteristics of air pollutants, and basic concepts of air quality management.

2. Ability to identify, formulate and solve air pollution problems.

3. Ability to design stacks and particulate air pollution control devices to meet applicable Standards

Finite Element Method in Civil Engineering

1 Know the different methods in finite element analysis

2 Understand the different elements in finite element analysis and its application

3 Understand the concept of shape function

4 Able to formulate 2D and 3D isoparametric elements

5 Understand the different thin plate bending elements

6 Understand the different elements in flat and curved shell

Airport and Bridge Engineering

1. Plan airport layout incorporating its different features
2. Execute construction of runway and taxiway and aprons as per geometric design for all parameters.
3. Assure desire quality in construction of runway
4. Check the requirements of terminal area as per drawing and design
   Check the visual aids for air traffic control system.
5. Explain various elements of Heliports and its planning aspects
6. Discuss the IRC standard live loads and design the deck slab type bridges.
7. Analyze the box culverts for the given loading and detail the box culverts.
8. Design and detail of T-Beam bridges.
9. Design and check the stability of piers and abutments.
10. Discuss the bridge foundations and prepare the bar bending schedule
11.

Construction Management

1. To enrich the students with the concepts and applications of Management
2. To make the learners understand the basic functions of Financial Management
3. To facilitate the students with the fundamental concepts of Technology management
4. To facilitate the students with the fundamental concepts of Technology management

Advanced Transportation Engineering

1 Analysis of future condition of transportation and
2 Understand traffic survey and intelligent transport system.
3 Understand the materials used in the pavement of highways & airports.

4 Understand Analyze and design the highway & airport
5 Understand evaluation and analysis of transportation system.
6 Understand design principles of critical,semi-critical,non-critical airport pavements
7 Understand various components of airport, design criteria of airport pavements, airport terminal amenities

ADVANCED FOUNDATION ENGINEERING

1 Identify a suitable foundation system for a structure.
2 Evaluate the importance of raft foundation and principles of design for buildings and tower structures.
3 Analyse and design pile foundations.
4 Examine and discuss various machine foundations.
5 Analyse and design Sheet piles and cofferdams.

Coastal Engineering

1. Carry out numerical evaluations of linear wave phenomena

2. Carry out analysis of wave data to determine long-term design statistics

3. Understand the theory of wave recording and undertake analysis of raw wave data

4. Apply standard methods to estimate wind-blown wave characteristics

5. Understand the phenomena of tides and how they influence coastal sites

6. Estimate sediment transport rates under combined or separate currents and waves

7. Develop beach management strategies for real-world coastal systems

8. Determine design loads on coastal structures

9. Understand the basis behind climate change and its effect on the coast

10. Undertake a design of a coastal structure

Computer Engineering

Vision

“To develop the department in full fledge center of learning in various fields of computer engineering, keeping in view the latest developments.”

Mission

“To impart value based technical education and train students and to turn out full-fledged engineers in the field of computer engineering with an overall background suitable for making a successful career either in industry or research or higher education in India or aboard.”

Program Educational Objective

1. To prepare globally competent graduates having strong fundamentals and domain knowledge to provide effective solutions for engineering problems.
2. To prepare the graduates to work as committed professionals with strong professional ethics and values, sense of responsibilities, understanding of legal, safety, health, societal, cultural and environmental issues.
3. To prepare committed and motivated graduates with research attitude, lifelong learning, investigative approach, and multidisciplinary thinking.
4. To prepare the graduates with strong managerial and communication skills to work effectively as individual as well as in teams.

Program Specific Outcomes

A graduate of the Computer Engineering Program will demonstrate-

PSO1: Professional Skills-The ability to understand, analyze and develop computer programs in the areas related to algorithms, system software, multimedia, web design, big data analytics, and networking for efficient design of computer-based systems of varying.

PSO2: Problem-Solving Skills- The ability to apply standard practices and strategies in software project development using open-ended programming environments to deliver a quality product for business success.

PSO3: Successful Career and Entrepreneurship- The ability to employ modern computer languages, environments, and platforms in creating innovative career paths to be an entrepreneur, and a zest for higher studies.

Program Outcomes

Students are expected to know and be able -

1. To apply knowledge of mathematics, science, engineering fundamentals, problem solving skills, algorithmic analysis to solve complex engineering problems.
2. To analyze the problem by finding its domain and applying domain specific skills
3. To understand the design issues of the product/software and develop effective solutions with appropriate consideration of public health and safety, cultural, societal, and environmental issues.
4. To find solutions of complex problems by conducting investigations applying suitable techniques.
5. To adapt the usage of modern tools and recent software.
6. To contribute towards the society by understanding the impact of Engineering on global aspect.
7. To understand environment issues and design a sustainable system.
8. To understand and follow professional ethics.
9. To function effectively as an individual and as member or leader in diverse teams and interdisciplinary settings.
10. To demonstrate effective communication at various levels.
11. To apply the knowledge of Computer Engineering for development of projects, and its finance and management.
12. To keep in touch with current technologies and inculcate the practices of lifelong learning.

SE (2015P)

SEM-I

Sr no	class	subject	Course Objective	Course outcome
1	SE(2015P)	210241: Discrete Mathematics	1. To use appropriate set, function and relation models to understand practical examples, and interpret the associated operations and terminologies in context. 2. Determine number of logical possibilities of events. 3. Learn logic and proof techniques to expand mathematical maturity. 4. Formulate problems precisely, solve the problems, apply formal proof techniques, and explain the reasoning clearly.	On completion of the course, student will be able to– 1. Solve real world problems logically using appropriate set, function, and relation models and interpret the associated operations and terminologies in context. 2. Analyze and synthesize the real world problems using discrete mathematics.
2		210242: Digital Electronics & Logic Design	1. To understand the functionality and design of Combinational and	On completion of the course, student will be able to– 1. Realize and simplify Boolean Algebraic

			Sequential Circuits 2. To understand and compare the functionalities, properties and applicability of Logic Families. 3. To understand concept of programmable logic devices and ASM chart and get acquainted with design of synchronous state machines. 4. To design and implement digital circuits using VHDL.	assignments for designing digital circuits using K-Maps. 2. Design and implement Sequential and Combinational digital circuits as per the specifications. 3. Apply the knowledge to appropriate IC as per the design specifications. 4. Design simple digital systems using VHDL. 5. Develop simple embedded system for simple real world application.
3		210243: Data Structures and Algorithms	1. To understand the standard and abstract data representation methods. 2. To acquaint with the structural constraints and advantages in usage of the data. 3. To understand the memory requirement for various data structures.	On completion of the course, student will be able to– 1. To discriminate the usage of various structures in approaching the problem solution. 2. To design the algorithms to solve the programming

			4. To operate on the various structured data. 5. To understand various data searching and sorting methods with pros and cons. 6. To understand various algorithmic strategies to approach the problem solution.	problems. 3. To use effective and efficient data structures in solving various Computer Engineering domain problems. 4. To analyze the problems to apply suitable algorithm and data structure. 5. To use appropriate algorithmic strategy for better efficiency
4		210244: Computer Organization and Architecture	1. To understand the structure, function and characteristics of computer systems. 2. To understand the design of the various functional units and components of digital computers. 3. To identify the elements of modern instructions sets and explain their impact on processor design. 4. To explain the function of each element of a memory hierarchy, identify and compare different methods	On completion of the course, student will be able to– 1. Demonstrate computer architecture concepts related to design of modern processors, memories and I/Os. 2. Analyze the principles of computer architecture using examples drawn from commercially available computers. 3. Evaluate various design alternatives in

			for computer I/O. 5. To compare simple computer architectures and organizations based on established performance metrics.	processor organization.
5		210245: Object Oriented Programming	1. To explore the principles of Object Oriented Programming (OOP). 2. To understand object-oriented concepts such as data abstraction, encapsulation, inheritance, dynamic binding, and polymorphism. 3. To use the object-oriented paradigm in program design. 4. To lay a foundation for advanced programming. 5. Provide programming insight using OOP constructs.	On completion of the course, student will be able to– 1. Analyze the strengths of object oriented programming 2. Design and apply OOP principles for effective programming 3. Develop programming application using object oriented programming language C++ 4. Percept the utility and applicability of OOP
6		210249: Soft Skills	1. To encourage the all round development of students by focusing on soft skills. 2. To make the engineering students aware of the	On completion of the course, student will be able to– 1. Effectively communicate through verbal/oral communication and

			importance, the role and the content of soft skills through instruction, knowledge acquisition, demonstration and practice. 3. To develop and nurture the soft skills of the students through individual and group activities. 4. To expose students to right attitudinal and behavioral aspects and to build the same through activities	improve the listening skills 2. Write precise briefs or reports and technical documents. 3. Actively participate in group discussion / meetings / interviews and prepare & deliver presentations. 4. Become more effective individual through goal/target setting, self motivation and practicing creative thinking. 5. Function effectively in multi-disciplinary and heterogeneous teams through the knowledge of team work, Inter-personal relationships, conflict management and leadership quality.
7		AC1-II: Humanities and Social Sciences	Human and social development; 1. Contemporary national and international affairs; 2. Emergence of Indian society and Economics	On completion of the course, student will be able to– 1. Making engineering and technology students aware of the

				various issues concerning man and society. 2. These issues will help to sensitize students to be broader towards the social, cultural, economic and human issues, involved in social changes 3. Able to understand the nature of the individual and the relationship between the self and the community 4. Understanding major ideas, values, beliefs, and experiences that have shaped human history and cultures
8		AC1-III: Environmental Studies	1. Understanding the importance of ecological balance for sustainable development. 2. Understanding the impacts of developmental activities and mitigation measures. 3. Understand and realize the multi-disciplinary nature of	On completion of the course, student will be able to– 1. Comprehend the importance of ecosystem and biodiversity 2. To correlate the human population growth and its trend to the

			the environment, its components, and inter-relationship between man and environment 4. Understand the relevance and importance of the natural resources in the sustenance of life on earth and living standard	environmental degradation and develop the awareness about his/her role towards environmental protection and prevention 3. Identify different types of environmental pollution and control measures 4. To correlate the exploitation and utilization of conventional and non-conventional resources
9		AC1-IV: Smart Cities	1. To identify urban problems 2. To study Effective and feasible ways to coordinate urban technologies. 3. To study models and methods for effective implementation of Smart Cities. 4. To study new technologies for Communication and Dissemination. 5. To study new forms of Urban Governance and Organization.	On completion of the course, learner will be able to– 1. Better understanding of the dynamic behavior of the urban system by going beyond the physical appearance and by focusing on representations, properties and impact factors 2. Exploration of the city as the most complex human-made organism

				with a metabolism that can be modeled in terms of stocks and flows 3. Knowledge about data-informed approaches for the development of the future city, based on crowd sourcing and sensing 4. Knowledge about the latest research results in for the development and management of future cities 5. Understanding how citizens can benefit from data-informed design to develop smart and responsive cities
10		AC1-V: Foreign Language-Japanese (Module 1)	1. To meet the needs of ever growing industry with respect to language support. 2. To get introduced to Japanese society and culture through language.	On completion of the course student 1.will have ability of basic communication. 2.will have the knowledge of Japanese script. 3.will get introduced to reading , writing and listening skills 4.will develop interest to

				pursue professional Japanese Language course.

SEM-II

Sr no	class	subject	Course objective	Course outcome
1	SE(2015P)	207003: Engineering Mathematics III	After completing this course, student will have adequate mathematical background, conceptual clarity, computational skills and algorithm design for problem solving related to: 1. Linear differential equations of higher order applicable to Control systems, Computer vision and Robotics. 2. Transform techniques such as Fourier transform, Z-transform and applications to Image processing. 3. Statistical methods such as correlation, regression analysis and probability theory to analyze data and to make predictions applicable to machine intelligence. 4. Vector calculus necessary to analyze and design complex electrical and electronic devices as appropriate to Computer engineering. 5. Complex functions,	On completion of the course, student will be able to– 1. Solve higher order linear differential equation using appropriate techniques for modeling and analyzing electrical circuits. 2. Solve problems related to Fourier transform, Z-Transform and applications to Signal and Image processing. 3. Apply statistical methods like correlation, regression analysis and probability theory for analysis and prediction of a given data as applied to machine intelligence. 4. Perform vector

			conformal mappings and contour integration applicable to Image processing, Digital filters and Computer graphics.	differentiation and integration to analyze the vector fields and apply to compute line, surface and volume integrals. 5. Analyze conformal mappings, transformations and perform contour integration of complex functions required in Image processing, Digital filters and Computer graphics.
2		210251: Computer Graphics	1. To acquaint the learner with the basic concepts of Computer Graphics 2. To learn the various algorithms for generating and rendering graphical figures 3. To get familiar with mathematics behind the graphical transformations 4. To understand and apply various methods and techniques regarding projections, animation,	1. On completion of the course, student will be able to– 2. Apply mathematics and logic to develop Computer programs for elementary graphic operations 3. Develop scientific and strategic approach to solve complex problems in the domain of Computer Graphics 4. Develop the

			shading, illumination and lighting	competency to understand the concepts related to Computer Vision and Virtual reality 5. Apply the logic to develop animation and gaming programs
3		210252: Advanced Data Structures	1. To develop a logic for graphical modelling of the real life problems. 2. To suggest appropriate data structure and algorithm for graphical solutions of the problems. 3. To understand advanced data structures to solve complex problems in various domains. 4. To operate on the various structured data 5. To build the logic to use appropriate data structure in logical and computational solutions. 6. To understand various algorithmic strategies to approach the problem solution.	On completion of the course, student will be able to– 1.To apply appropriate advanced data structure and efficient algorithms to approach the problems of various domain. 2.To design the algorithms to solve the programming problems. 3.To use effective and efficient data structures in solving various Computer Engineering domain problems. 4.To analyze the algorithmic solutions for resource requirements and optimization 5.To use appropriate

				modern tools to understand and analyze the functionalities confined to the data structure usage
4		210253: Microprocessor	1. To learn the architecture and programmer‘s model of advanced processor 2. To understand the system level features and processes of advanced processor 3. To acquaint the learner with application instruction set and logic to build assembly language programs. 4. To understand debugging and testing techniques confined to 80386 DX	On completion of the course, student will be able to– 1. To apply the assembly language programming to develop small real life embedded application. 2. To understand the architecture of the advanced processor thoroughly to use the resources for programming 3. To understand the higher processor architectures descended from 80386 architecture
5		210254: Principles of Programming Languages	1. To learn principles of programming language 2. To understand structural, computational and logical implications regarding	On completion of the course, student will be able to– 1. To analyze the strengths and

			programming languages 3. To explore main programming paradigms 4. To understand and apply Object Oriented Programming (OOP) principles using C++ and Java	weaknesses of programming languages for effective and efficient program development. 2. To inculcate the principles underlying the programming languages enabling to learn new programming languages. 3. To grasp different programming paradigms 4. To use the programming paradigms effectively in application development.
6		210258: Audit Course 2 AC2-I: Water Management	1. To develop understanding of water recourses. 2. To study global water cycle and factors that affect this cycle. 3. To analyze the process for water resources and	On completion of the course, learner will be able to– 1. Understanding of the global water cycle and its various processes 2. Understanding of climate change and

			management. 4. To study the research and development areas necessary for efficient utilization and management of water recourses.	their effects on water systems 3. Understanding of Drinking treatment and quality of groundwater and surface water 4. Understanding of the Physical, chemical, and biological processes involved in water treatment and distribution.
7		AC2-II: Intellectual Property Rights and Patents	1. To encourage research, scholarship, and a spirit of inquiry 2. To encourage students at all levels to develop patentable technologies. 3. To provide environment to the students of the Institute for creation, protection, and commercialization of intellectual property and to stimulate innovation.	On completion of the course, learner will be able to– 1. Understand the fundamental legal principles related to confidential information, copyright, patents, designs, trademarks and unfair competition 2. Identify, apply and assess principles of law relating to each of these areas of intellectual property 3. Apply the appropriate ownership rules to

				intellectual property you have been involved in creating
8		AC2-III : The Science of Happiness	1. To understand the feeling of happiness 2. To study the sources of positive feelings 3. To analyze the anatomy of the happiness system 4. To study the effect of thoughts and emotions on the happiness system	On completion of the course, learner will be able to– 1. Ability to understand what happiness is and why it matters to you 2. Ability to learn how to increase your own happiness 3. Understanding of the power of social connections and the science of empathy 4. Ability to understand what is mindfulness and its real world applications
9		AC2-IV: Stress Relief: Yoga and Meditation	1. To impart knowledge about the basic technique and practice of yoga, including instruction in breath control, meditation, and physical postures 2. To gain an intellectual and theoretical understanding of the principles embodied in the Yoga Sutras, the	On completion of the course, learner will be able to– 1. Students understanding of philosophy and religion as well as daily life issues will be challenged and enhanced. 2. Enhances the immune

			Bhagavad-Gita, and other important texts and doctrines 3. Relaxation and stress reduction ,Personal insight and self understanding, Personal empowerment, Gaining wisdom and spiritual discernment 4. Awakening the abilities or powers of the Super conscious mind	system. 3. Intellectual and philosophical understanding of the theory of yoga and basic related Hindu scriptures will be developed. 4. Powers of concentration, focus, and awareness will be heightened.
10		AC2-V: Foreign Language (Japanese) Module 2	1. To meet the needs of ever growing industry with respect to language support. 2. To get introduced to Japanese society and culture through language.	On completion of the course student- 1.will have ability of basic communication. 2.will have the knowledge of Japanese script. 3.will get introduced to reading, writing and listening skills for language Japanese. 4.will develop interest to pursue professional Japanese Language course.

TE (2015P)

Program Educational Objectives

1. To prepare globally competent graduates having strong fundamentals, domain knowledge, updated with modern technology to provide the effective solutions for engineering problems.
2. To prepare the graduates to work as a committed professional with strong professional ethics and values, sense of responsibilities, understanding of legal, safety, health, societal, cultural and environmental issues.
3. To prepare committed and motivated graduates with research attitude, lifelong learning, investigative approach, and multidisciplinary thinking.
4. To prepare the graduates with strong managerial and communication skills to work effectively as individual as well as in teams.

Program Outcomes

Students are expected to know and be able –

1. To apply knowledge of mathematics, science, engineering fundamentals, problem solving skills, algorithmic analysis and mathematical modeling to the solution of complex engineering problems.
2. To analyze the problem by finding its domain and applying domain specific skills
3. To understand the design issues of the product/software and develop effective solutions with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.
4. To find solutions of complex problems by conducting investigations applying suitable techniques.
5. To adapt the usage of modern tools and recent software.
6. To contribute towards the society by understanding the impact of Engineering on global aspect.
7. To understand environment issues and design a sustainable system.
8. To understand and follow professional ethics.
9. To function effectively as an individual and as member or leader in diverse teams and interdisciplinary settings.

10. To demonstrate effective communication at various levels.
11. To apply the knowledge of Computer Engineering for development of projects, and its finance and management.
12. To keep in touch with current technologies and inculcate the practice of lifelong learning.

Program Specific Outcomes (PSO)

A graduate of the Computer Engineering Program will demonstrate-

PSO1: Professional Skills-The ability to understand, analyze and develop computer programs in the areas related to algorithms, system software, multimedia, web design, big data analytics, and networking for efficient design of computer-based systems of varying.
PSO2: Problem-Solving Skills- The ability to apply standard practices and strategies in software project development using open-ended programming environments to deliver a quality product for business success.
PSO3: Successful Career and Entrepreneurship- The ability to employ modern computer languages, environments, and platforms in creating innovative career paths to be an entrepreneur, and a zest for higher studies.

SEM-I

Sr no.	Class	Subject	Course objective	Course Outcomes
1	TE(2015P)	310241: Theory of Computation	• To Study abstract computing models • To learn Grammar and Turing Machine • To learn about the theory of computability and complexity.	On completion of the course, student will be able to– 1. design deterministic Turing machine for all inputs and all outputs 2. subdivide problem space based on input subdivision using constraints 3. apply linguistic theory
2		310242 : Database Management Systems	• To understand the fundamental concepts of database management. These concepts include aspects of database design, database languages, and database-system implementation • To provide a strong formal foundation in database concepts, technology and practice • To give systematic database design approaches covering conceptual design, logical design and an overview of physical design	On completion of the course, student will be able to– Design E-R Model for given requirements and convert the same into database tables. Use database techniques such as SQL & PL/SQL. Use modern database techniques such as NOSQL. Explain transaction Management in relational database System. Describe different database architecture and

			• Be familiar with the basic issues of transaction processing and concurrency control • To learn and understand various Database Architectures and Applications • To learn a powerful, flexible and scalable general purpose database to handle big data	analyses the use of appropriate architecture in real time environment. Use advanced database Programming concepts
3		310243: Software Engineering and Project Management	To learn and understand the principles of Software Engineering • To be acquainted with methods of capturing, specifying, visualizing and analyzing software requirements. • To apply Design and Testing principles to S/W project development. • To understand project management through life cycle of the project. • To understand software quality attributes.	On completion of the course, student will be able to– Decide on a process model for a developing a software project Classify software applications and Identify unique features of various domains Design test cases of a software system. Understand basics of IT Project management. Plan, schedule and execute a project considering the risk management. Apply quality attributes in software development life cycle.

4		310244: Information Systems and Engineering Economics	To prepare the students to various forms of the Information Systems and its application in organizations. • To expose the students to the managerial issues relating to information systems and help them identify and evaluate various options in Information Systems. • To Prepare engineering students to analyze cost / revenue data and should be able to do economic analyses in the decision making process to justify or reject alternatives / projects on an economic basis for an organization.	On completion of the course, student will be able to– Understand the need, usage and importance of an Information System to an organization. Understand the activities that are undertaken while managing, designing, planning, implementation, and deployment of computerized information system in an organization. Further the student would be aware of various Information System solutions like ERP, CRM, Data warehouses and the issues in successful implementation of these technology solutions in any organizations Outline the past history, present position and expected performance of a company engaged in engineering practice or in the computer industry. Perform and evaluate present worth, future worth and annual worth analyses on one of more economic

				alternatives. Be able to carry out and evaluate benefit/cost, life cycle and breakeven analyses on one or more economic alternatives.
5		310245: Computer Networks	To understand the fundamental concepts of networking standards, protocols and technologies. • To learn different techniques for framing, error control, flow control and routing. • To learn role of protocols at various layers in the protocol stacks. • To learn network programming. • To develop an understanding of modern network architectures from a design and performance perspective	On completion of the course, student will be able to– Analyze the requirements for a given organizational structure to select the most appropriate networking architecture, topologies, transmission mediums, and technologies Demonstrate design issues, flow control and error control Analyze data flow between TCP/IP model using Application, Transport and Network Layer Protocols. Illustrate applications of Computer Network capabilities, selection and usage for various sectors of user community. Illustrate Client-Server architectures and prototypes by the means of correct standards and technology.

				Demonstrate different routing and switching algorithms
6		310246: Skill Development Lab	To adapt the usage of modern tools and recent software. • To evaluate problems and analyze data using current technologies • To learn the process of creation of data-driven web applications using current technologies • To understand how to incorporate best practices for building enterprise applications • To learn how to employ Integrated Development Environment(IDE) for implementing and testing of software solution • To construct software solutions by evaluating alternate architectural patterns.	On completion of the course, student will be able to– Evaluate problems and analyze data using current technologies in a wide variety of business and organizational contexts. Create data-driven web applications Incorporate best practices for building applications Employ Integrated Development Environment(IDE) for implementing and testing of software solution Construct software solutions by evaluating alternate architectural patterns.
7		310247: Database Management System Lab	To develop basic, intermediate and advanced Database programming skills • To develop basic Database administration skills • To percept transaction	On completion of the course, student will be able to– • Develop the ability to handle databases of varying complexities • Use advanced database

			processing	Programming concepts
8		310248: Computer Networks Lab	To establish communication among the computing nodes in P2P and Client-Server architecture • Configure the computing nodes with understanding of protocols and technologies. • Use different communicating modes and standards for communication • Use modern tools for network traffic analysis • To learn network programming.	On completion of the course, student will be able to– Demonstrate LAN and WAN protocol behavior using Modern Tools. Analyze data flow between peer to peer in an IP network using Application, Transport and Network Layer Protocols. Demonstrate basic configuration of switches and routers. Develop Client-Server architectures and prototypes by the means of correct standards and technology.
		310249: Audit Course 3 AC3 – I: Cyber Security	To assess the current security landscape, including the nature of the threat, the general status of common vulnerabilities, and the likely consequences of security failures; • To critique and assess the strengths and weaknesses of general cyber security models, including the CIA triad	On completion of the course, learner will be able to– Compare the interrelationships among security roles and responsibilities in a modern information-driven enterprise—to include interrelationships across security do mains (IT, physical, classification,

			• To appraise the interrelationships among elements that comprise a modern security system, including hardware, software, policies, and people; • To assess how all domains of security interact to achieve effective system-wide security at the enterprise level.	personnel, and so on) Assess the role of strategy and policy in determining the success of information security; Estimate the possible consequences of misaligning enterprise strategy, security policy, and security plans;
		AC3 – II: Professional Ethics and Etiquettes	To create awareness on professional ethics and Human Values. • To provide basic familiarity about Engineers as responsible Experimenters, Research Ethics, Codes of Ethics, Industrial Standards. • To inculcate knowledge and exposure on Safety and Risk. • To expose students to right attitudinal and behavioral aspects	On completion of the course, learner will be able to– understand the basic perception of profession, professional ethics, various moral issues & uses of ethical theories Understand various social issues, industrial standards, code of ethics and role of professional ethics in engineering field. Follow Ethics as an engineering professional and adopt good standards & norms of engineering practice. apply ethical principles

				to resolve situations that arise in their professional lives
		AC3 – III: Emotional Intelligence	To develop an awareness of EI models • To recognize the benefits of EI • To understand how you use emotion to facilitate thought and behavior • To know and utilize the difference between reaction and considered response	On completion of the course, learner will be able to– Expand your knowledge of emotional patterns in yourself and others Discover how you can manage your emotions, and positively influence yourself and others Build more effective relationships with people at work and at home Positively influence and motivate colleagues, team members, managers Increase your leadership effectiveness by creating an atmosphere that engages others Apply EI behaviors and supports high performance
		AC3 – IV: MOOC-learn New Skill	• To promote interactive user forums to support community interactions among students, professors, and experts • To promote learn additional skills anytime and anywhere	On completion of the course, learner will acquire additional knowledge and skill.

			• To enhance teaching and learning on campus and online	
		AC3 – V: Foreign Language(Japanese Module 3)	To meet the needs of ever growing industry with respect to language support. • To get introduced to Japanese society and culture through language	On completion of the course, learner will be able to– Have ability of basic communication. Have the knowledge of Japanese script. Get introduced to reading, writing and listening skills for language Japanese. Develop interest to pursue professional Japanese Language course

SEM-II

Sr No	Class	Subject	Course objective	Course outcome
1	TE(2015p)	310250: Design and Analysis of Algorithms	To develop problem solving abilities using mathematical theories • To analyze the performance of algorithms • To study algorithmic design strategies	On completion of the course, student will be able to– Formulate the problem Analyze the asymptotic performance of algorithms Decide and apply algorithmic strategies to solve given problem Find optimal solution by applying various methods
2		310251: Systems Programming and Operating System	To understand basics of System Programming. • To learn and understand data structures used in design of system software. • To learn and understand basics of compilers and tools. • To understand functions of operating system. • To learn and understand process, resource and memory management.	On completion of the course, student will be able to– Analyze and synthesize system software Use tools like LEX & YACC. Implement operating system functions.
3		310252: Embedded Systems and	To understand fundamentals of IoT and embedded system	On completion of the course, student will be able to–

		Internet of Things	including essence, basic design strategy and process modeling. To introduce students a set of advanced topics in embedded IoT and lead them to understand research in network. To develop comprehensive approach towards building small low cost embedded IoT system. To understand fundamentals of security in IoT, To learn to implement secure infrastructure for IoT To learn real world application scenarios of IoT along with its societal and economic impact using case studies	Implement an architectural design for IoT for specified requirement Solve the given societal challenge using IoT Choose between available technologies and devices for stated IoT challenge
4		310253: Software Modeling and Design	To understand and apply Object Oriented(OO) concept for designing OO based model/application • To transform Requirement document to Appropriate design • To understand different architectural designs and to transform them into proper	On completion of the course, student will be able to– Analyze the problem statement (SRS) and choose proper design technique for designing web-based/ desktop application Design and analyze an application using UML modeling as fundamental tool

			model • To choose and use modern design tools for project development and implementation. • To choose and use appropriate test tool for testing web-based/desktop application	Apply design patterns to understand reusability in OO design Decide and apply appropriate modern tool for designing and modeling Decide and apply appropriate modern testing tool for testing web-based/desktop application
5		310254: Web Technology	To understand the principles and methodologies of web based applications development process • To understand current client side and server side web technologies • To understand current client side and server side frameworks • To understand web services and content management	On completion of the course, student will be able to– analyze given assignment to select sustainable web development and design methodology develop web based application using suitable client side and server side web technologies develop solution to complex problems using appropriate method, technologies, frameworks, web services and content management
6		310255: Seminar and Technical Communication	To explore the basic principles of communication (verbal and non-verbal) and active, empathetic listening, speaking and writing techniques.	On completion of the course, student will– be able to be familiar with basic technical writing concepts and terms, such as audience analysis, jargon, format, visuals, and

			• To expose the student to new technologies, researches, products, algorithms, services	presentation. be able to improve skills to read, understand, and interpret material on technology. improve communication and writing skills
7		310256: Web Technology Lab	To use current client side and server side web technologies • To implement communication among the computing nodes using current client side and server side technologies • To design and implement web services with content management	On completion of the course, student will be able to– develop web based application using suitable client side and server side web technologies develop solution to complex problems using appropriate method, technologies, frameworks, web services and content management
8		310257: System Programming & Operating System Lab	To implement basic language translator by using various needed data structures • To implement basic Macroprocessor • To design and implement Dynamic Link Libraries • To implement scheduling schemes	On completion of the course, student will be able to– Understand the internals of language translators Handle tools like LEX & YACC. Understand the Operating System internals and functionalities with implementation point of view
9		310258: Embedded Systems & Internet of Things Lab	To understand functionalities of various single board embedded platforms fundamentals	On completion of the course, student will be able to– Design the minimum system for sensor based application

			• To develop comprehensive approach towards building small low cost embedded IoT system. • To understand different sensory inputs.	Solve the problems related to the primitive needs using IoT Develop full fledgedIoT application for distributed environment
10		310259: Audit Course AC4-I4Digital and Social Media Marketing	Identify best practices for Social Media Marketing, including platform level best practices. • Connect business objectives to appropriate Social Media tactics. • Create strong content that engages their target audience with their marketing message.	On completion of the course, learner will be able to– Create editorial calendars to manage content distribution. Use Social Listening tools to create timely, relevant content. Create Social Media policies that combine business objectives with appropriate use of social media channels and content.
11		AC4-II Green Computing	To acquire knowledge to adopt green computing practices to minimize negative impacts on the environment. • To examine technology tools that can reduce paper waste and carbon footprint by user. • To understand how to minimize equipment disposal requirements. • To gain skill in energy	On completion of the course, learner will be able to– Understand the concept of green IT and relate it to sustainable development. Apply the green computing practices to save energy. Discuss how the choice of hardware and software can facilitate a more sustainable operation, Use methods and tools to measure energy consumption

			saving practices in their use of hardware	
12		AC4-III Sustainable Energy Systems	To understand the impact of engineering solutions on a global, economic, environmental, and societal context. • To design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.	On completion of the course, learner will be able to– Demonstrate an overview of the main sources of renewable energy. Understand benefits of renewable and sustainable energy systems.
13		AC4-IV Leadership and Personality Development	To develop inter personal skills and be an effective goal oriented team player. • To develop professionals with idealistic, practical and moral values. • To develop communication and problem solving skills. • To re-engineer attitude and understand its influence on behavior	On completion of the course, learner will be able to– Enhance holistic development of students and improve employability skills
14		AC4-V Foreign Language (one of Japanese/ Spanish/French/German).	To meet the needs of ever growing industry with respect to language support.	On completion of the course, learner will be able to– Possess ability of basic

			• To get introduced to Japanese society and culture through language.	communication. Possess the knowledge of Japanese script. Get introduced to reading, writing and listening skills for language Japanese. Develop interest to pursue professional Japanese Language course

BE(2015P)

Program Educational Objectives

_ To create competencies and opportunities for Higher Education;
_ To create professional manpower skilled for the IT Industry;
_ To write laboratory practicals with advanced FOSS Tools;
_ To create inter-disciplinary opportunities;
_ To create opportunities of developing technical documents and presentation skills.
_ to create opportunities of industry-Institute interactions;
_ To create opportunities to promote Entrepreneurship and start-ups;
_ To nurture and practice professional and social ethics.

Program Objectives

_ To expose students to the Systems and Applications Programming, Organizations and Architectures;
_ To provide conceptual knowledge in the Computing domain;
_ To provide interdisciplinary knowledge;
_ To expose students with advanced tools used in industry;
_ To develop written and soft-skill competencies;
_ To develop team work experience of professionals skills for IT Industry.

Program Outcomes

_ To write applications with concepts and skills in the domain subjects;
_ To practice skills in programming techniques and open source technologies;
_ To practice oral and written skills for technical presentations and documentation using FOSS tools;
_ To write and practice IT project as a team-work;
_ To practice social and Professional ethical practices;

SEM-I

Sr No	Class	Subject	Course Objective	Course outcome
1	BE(2015P)	410241: High Performance Computing	-To study parallel computing hardware and programming models. -To be conversant with performance analysis and modeling of parallel programs -To understand the options available to parallelize the programs -To know the operating system requirements to qualify in handling the parallelization	-Describe different parallel architectures, inter-connect networks, programming models -Develop an efficient parallel algorithm to solve given problem -Analyze and measure performance of modern parallel computing systems -Build the logic to parallelize the programming task
2		410242: Artificial Intelligence and Robotics	-To understand the concept of Artificial Intelligence (AI) To learn various peculiar search strategies for AI -To acquaint with the fundamentals of mobile robotics -To develop a mind to solve real world problems unconventionally with optimality	-Identify and apply suitable Intelligent agents for various AI applications. -Design smart system using different informed search / uninformed search or heuristic approaches. -Identify knowledge associated and represent it by ontological engineering to plan a strategy -To solve given problem. Apply the suitable algorithms to solve AI problems
3		410243: Data Analytics	-To develop problem	-Write case studies in Business

			solving abilities using Mathematics -To apply algorithmic strategies while solving problems -To develop time and space efficient algorithms -To study algorithmic examples in distributed, concurrent and parallel environments	Analytic and Intelligence using mathematical models - Present a survey on applications for Business Analytic and Intelligence - Provide problem solutions for multi-core or distributed, concurrent/Parallel environments
4		Elective I 410244(A): Digital Signal Processing	-To Study and understand representation and properties of signals and systems. - To learn methodology to analyze signals and systems. -To study transformed domain representation of signals and systems -To explore Design and analysis of Discrete Time (DT) signals and systems -To Understand Design of filters as DT systems -To get acquainted with the DSP Processors and DSP applications	- Understand the mathematical models and representations of DT Signals and Systems - Apply different transforms like Fourier and Z-Transform from applications point of view. -Understand the design and implementation of DT systems as DT filters with filter structures and different transforms. - Demonstrate the knowledge of signals and systems for design and analysis of system. - Apply knowledge and use the signal transforms for digital processing applications
5		Elective I 410244(B): Software	- To introduce basic concepts and principles	- Express the analysis and design of an application

		Architecture and Design	about software design and software architecture - To learn practical approaches and methods for creating and analyzing software architecture - To acquaint with the interaction between quality attributes and software architecture - To experience with examples in design pattern application and case studies in software architecture	- Specify functional semantics of an application - Evaluate software architectures - Select and use appropriate architectural styles and software design patterns
6		Elective I 410244(C): Pervasive and Ubiquitous Computing	- To understand the characteristics and principles of Pervasive computing - To introduce to the enabling technologies of pervasive computing - To understand the basic issues and performance requirements of pervasive computing applications - - To learn the trends of pervasive computing	- Design and implement primitive pervasive applications - Analyze and estimate the impact of pervasive computing on future computing applications and society - Develop skill sets to propose solutions for problems related to pervasive computing system - Design a preliminary system to meet desired needs within the constraints of a particular problem space
7		Elective I 410244(D): Data Mining and	- To understand the fundamentals of Data	- Apply basic, intermediate and advanced techniques to mine

		Warehousing	Mining -To identify the appropriateness and need of mining the data - To learn the preprocessing, mining and post processing of the data - To understand various methods, techniques and algorithms in data mining	the data - Analyze the output generated by the process of data mining - Explore the hidden patterns in the data - Optimize the mining process by choosing best data mining technique
8		Elective II 410245(A): Distributed Systems	- To understand the concept of Distributed system, remote method invocation and Remote Procedure Calls. - To learn communication methodology in distributed systems. -To acquaint with the Distributed File Systems. -To know the concepts of shared memory and security aspects in distributed system.	- Able to learn and apply the concept of remote method invocation and Remote Procedure Calls -Able to analyze the mechanism of peer to peer systems and Distributed File Systems - Demonstrate an understanding of the challenges faced by current and future distributed systems
9		Elective II 410245(B): Software Testing and Quality Assurance	- Introduce basic concepts of software testing - Understand white box, block box, object oriented, web based and cloud testing - Know in details	- Describe fundamental concepts in software testing such as manual testing, automation testing and software quality assurance. - Design and develop project test plan, design test cases, test

			automation testing and tools used for automation testing - Understand the importance of software quality and assurance software systems development.	data, and conduct test operations - Apply recent automation tool for various software testing for testing software - Apply different approaches of quality management, assurance, and quality standard to software system - Apply and analyze effectiveness Software Quality Tools
10		Elective II 410245(C): Operations Research	-To introduce the learners the quantitative methods and techniques for effective analysis of decisions making - To understand the model formulation and applications that is used in solving business decision problems. - To introduce the optimization approaches and fundamental solution. -To learn a variety of ways in which deterministic and stochastic models in Operations Research can be used	- Identify the characteristics of different types of decision-making environments -Use appropriate decision making approaches and tools - Build various dynamic and adaptive models - Develop critical thinking and objective analysis of decision problems - Apply the OR techniques for efficacy

11		Elective II 410245(D): Mobile Communication	- To understand the Personal Communication Services -To learn the design parameters for setting up mobile network - To know GSM architecture and support services - To learn current technologies being used on field	- Justify the Mobile Network performance parameters and design decisions. - Choose the modulation technique for setting up mobile network. - Formulate GSM/CDMA mobile network layout considering futuristic requirements which conforms to the technology. - Use the 3G/4G technology based network with bandwidth capacity planning. - Percept to the requirements of next generation mobile network and mobile applications.
12		410246:Laboratory Practice I	- Practical hands on is the absolute necessity as far as employability of the learner is concerned. The presented course is solely intended to enhance the competency by undertaking the laboratory assignments of the core courses.	
13		410247:Laboratory Practice II	-Practical hands on is the absolute necessity as far as employability of the	

			learner is concerned. The presented course is solely intended to enhance the competency by undertaking the laboratory assignments of the core courses. Enough choice is provided to the learner to choose an elective of one‟s interest.	
14		410248:Project Work Stage I	- To Apply the knowledge for solving realistic problem - To develop problem solving ability - To Organize, sustain and report on a substantial piece of team work over a period of several months - To Evaluate alternative approaches, and justify the use of selected tools and methods, - To Reflect upon the experience gained and lessons learned, - To Consider relevant social, ethical and legal issues, - To find information for yourself from appropriate	- Solve real life problems by applying knowledge. - Analyze alternative approaches, apply and use most appropriate one for feasible solution. - Write precise reports and technical documents in a nutshell. - Participate effectively in multi-disciplinary and heterogeneous teams exhibiting team work,Inter-personal relationships, conflict management and leadership quality.

			sources such as manuals, books, research journals and from other sources, and in turn increase analytical skills. - To Work in TEAM and learn professionalism.	

SEM-II

Sr no	Class	subject	Course objective	Course outcomes
1	BE(2015P)	410250: Machine Learning	- To understand human learning aspects and relate it with machine learning concepts. - To understand nature of the problem and apply machine learning algorithm. - To find optimized solution for given problem.	- Distinguish different learning based applications - Apply different preprocessing methods to prepare training data set for machine learning. - Design and implement supervised and unsupervised machine learning algorithm. - Implement different learning models - Learn Meta classifiers and deep learning concepts
2		410251: Information and Cyber Security	-To offer an understanding of principle concepts, central topics and basic approaches in information and cyber security. - To know the basics of cryptography. - To acquire knowledge of standard algorithms and protocols employed to provide confidentiality, integrity and authenticity. - To enhance awareness about Personally Identifiable Information (PII),	- Gauge the security protections and limitations provided by today's technology. - Identify information security and cyber security threats. - Analyze threats in order to protect or defend it in cyberspace from cyber-attacks. - Build appropriate security solutions against cyber-attacks

			Information Management, cyber forensics.	
3		Elective III 410252(A): Advanced Digital Signal Processing	- To study the parametric methods for power spectrum estimation. - To study adaptive filtering techniques and applications of adaptive filtering. - To learn and understand Multi-rate DSP and applications - To explore appropriate transforms - Understand basic concepts of speech production, speech analysis, speech coding and parametric representation of speech - Acquire knowledge about different methods used for speech coding and understand various applications of speech processing - Learn and understand basics of Image Processing and various image filters with its applications	- Understand and apply different transforms for the design of DT/Digital systems - Explore the knowledge of adaptive filtering and Multi-rate DSP - Design DT systems in the field/area of adaptive filtering, spectral estimation and multi-rate DSP -Explore use of DCT and WT in speech and image processing - Develop algorithms in the field of speech , image processing and other DSP applications
4		Elective III 410252(B): Compilers	-To introduce process of compilation - To introduce complier writing tools	- Design and implement a lexical analyzer and a syntax analyzer - Specify appropriate

			- To address issues in code generation and optimization	translations to generate intermediate code for the given programming language construct - Compare and contrast different storage management schemes - Identify sources for code optimization
5		Elective III 410252(C): Embedded and Real Time Operating Systems	-To understand a typical embedded system and its constituents - To learn the selection process of processor and memory for the embedded systems - To learn communication buses and protocols used in the embedded and real-time systems - To understand real-time operating system (RTOS) and the types of RTOS -To learn various approaches to real-time scheduling - To learn software development process and tools for RTOS applications	- Recognize and classify embedded and real-time systems - Explain communication bus protocols used for embedded and real-time systems - Classify and exemplify scheduling algorithms - Apply software development process to a given RTOS application - Design a given RTOS based application
6		Elective III 410252(D): Soft Computing and Optimization	-To know the basics behind the Design and development intelligent systems in the	- Apply soft computing methodologies, including artificial neural networks,

		Algorithms	framework of soft computing - To acquire knowledge of Artificial Neural Networks Fuzzy sets, Fuzzy Logic, Evolutionary computing and swarm intelligence - To explore the applications of soft computing - To understand the need of optimization	fuzzy sets, fuzzy logic, fuzzy inference systems and genetic algorithms - Design and development of certain scientific and commercial application using computational neural network models, fuzzy models, fuzzy clustering applications and genetic algorithms in specified applications.
7		Elective IV 410253(A): Software Defined Networks	-To understand the challenges of the traditional networks and evolution of next generation networks. - To gain conceptual understanding of Software Defined Networking (SDN) and its role in Data Center. - - To understand role of Open Flow protocol and SDN Controllers. - To study industrial deployment use-cases of SDN - To Understand the Network Functions Virtualization and SDN.	- Interpret the need of Software Defined Networking solutions. - Analyze different methodologies for sustainable Software Defined Networking solutions. - Select best practices for design, deploy and troubleshoot of next generation networks. - Develop programmability of network elements. - Demonstrate virtualization and SDN Controllers using Open Flow protocol
8		Elective IV 410253(B): Human Computer	- To design, implement and evaluate effective and usable	- Evaluate the basics of human and computational

		Interface	Human Computer Interfaces. - To describe and apply core theories, models and methodologies from the field of HCI. - Learn a variety of methods for evaluating the quality of a user interface -To implement simple graphical user interfaces based on principles of HCI.	abilities and limitations. - Inculcate basic theory, tools and techniques in HCI. - Apply the fundamental aspects of designing and evaluating interfaces. - Apply appropriate HCI techniques to design systems that are usable by people
9		Elective IV 410253(C): Cloud Computing	-To understand cloud computing concepts -To study various platforms for cloud computing -To explore the applications based on cloud computing	- To install cloud computing environments. - To develop any one type of cloud - To explore future trends of cloud computing
10		410256:Project Work Stage II	- To follow SDLC meticulously and meet the objectives of proposed work - To test rigorously before deployment of system - To validate the work undertaken - To consolidate the work as furnished report.	- Show evidence of independent investigation - Critically analyze the results and their interpretation. - Report and present the original results in an orderly way and placing the open questions in the right perspective. - Link techniques and results from literature as well as actual research and future research lines with the

				research. - Appreciate practical implications and constraints of the specialist subject

Electronics and Telecommunication Engineering

Vision
"Striving towards producing world class Engineers for continuous innovation and up gradation of telecommunication technology and seeking to inspire and empower students to make sure an environmentally sustainable society"

Mission
"Educating students to become learned individuals concerned for peaceful society. "
"To expose students to complex problems, solution and structuring techniques. "

Program Educational Objectives:
PEO 1: Graduates shall have abilities for pursuing professional career.
PEO 2: Graduates shall have abilities to work in diversified domain exhibiting team work and leadership ethically.
PEO 3: Graduates shall have ability to adopt emerging trends to address challenges and deliver sustainable solutions.

Program specific outcome
PSO1 – To learn and understand the concept of electronics, communication, signal processing, VLSI, Control system, Embedded System, Computer Networks, semiconductor technology
PSO1 – Demonstrate ideas and methodologies with help of modern design tools and analyze the design of a system for a variety of application.
PSO3 – To enlighten with the social and environmental responsibilities with ethical values and to have a successful carrier in real world application by updating in technology

Program Outcomes: On completion of the B.E. degree the Electronics and Communication graduates will be able to

1) Utilize the basic knowledge in mathematics, science and engineering in Electronics and Communication Engineering field.
2) Identify, formulate and solve complex problems to achieve demonstrated conclusions using mathematical principles and engineering sciences.
3) Design system components that meet the requirement of public safety and offer solutions to the societal and environmental concerns.
4) Apply research based knowledge to design and conduct experiments, analyze, synthesize and interpret the data pertaining to Electronics and Communication Engineering problems and arrive at valid conclusions.
5) Construct, choose and apply the techniques, resources and modern engineering tools required for Electronics and Communication Engineering applications.
6) Apply the contextual knowledge to assess societal, health, safety and cultural issues and endure the consequent responsibilities relevant to the professional engineering practice.
7) Examine the impact of engineering solutions in global and environmental contexts and utilize the knowledge for sustained development.
8) Develop consciousness of professional, ethical and social responsibilities as experts in the field of Electronics and Communication Engineering.
9) Perform effectively as a member/leader in multidisciplinary teams.
10) Communicate the engineering activities to engineering society for documentation and presentation.
11) Demonstrate knowledge and understanding of the engineering and management principles to manage projects in multidisciplinary environment.
l2) Demonstrate resourcefulness for contemporary issues and lifelong learning.

Department	Course	Semester	Subjects	Course Objectives	Course Outcomes
E&TC	BE_2012	I	VLSI Design & Technology (404181)	• To study HDL based design approach. • To learn digital CMOS logic design. • To nurture students with CMOS analog circuit designs. • To realize importance of testability in logic circuit design. • To overview SoC issues and understand PLD architectures with advanced features.	• Model digital circuit with HDL, simulate, synthesis and prototype in PLDs. • Understand chip level issues and need of testability. • Design analog & digital CMOS circuits for specified applications.
			Computer Networks (404182)	• Understand state-of-the-art in network protocols, architectures, and applications • To provide students with a theoretical and practical base in computer networks issues • Define the basic terminology of computer networks • Recognize the individual components of the big picture of computer networks • Outline the basic network configurations • List the layers of the TCP/IP and OSI model and describe the duties of each layer • Understand the transmission methods underlying LAN and WAN technologies.	• Understand fundamental underlying principles of computer networking • Describe and analyze the hardware, software, components of a network and the interrelations. • Analyze the requirements for a given organizational structure and select the most appropriate networking architecture and technologies; • Have a basic knowledge of the use of cryptography and network security; • Have a basic knowledge of installing and configuring networking applications. • Specify and identify deficiencies in existing protocols, and then go onto select new and better protocols.
			Microwave Engineering (404183)	• To lay the foundation for microwave engineering • To understand the applications of microwave engineering • Carryout the microwave network analysis.	• Formulate the wave equation in wave guide for analysis. • Identify the use of microwave components and devices in microwave applications. • Understand the working principles of all the microwave tubes • Understand the working principles of all the solid state devices • Choose a suitable microwave tube and solid state device for a particular application • Carry out the microwave network analysis • Choose a suitable microwave measurement instruments and carry out the required measurements.
			Digital Image Processing (404184)	• To learn the fundamental concepts of Digital Image Processing. • To study basic image processing operations. • To understand image analysis algorithms. • To expose students to current applications in the field of digital image processing.	• Develop and implement algorithms for digital image processing. • Apply image processing algorithms for practical object recognition applications.
			Electronic Product Design (404185)	• To understand the stages of product (hardware/ software) design and development. • To learn the different considerations of analog, digital and mixed circuit design. • To be acquainted with methods of PCB design and different tools used for PCB Design. • To understand the importance of testing in product design cycle. ` • To understand the processes and importance of documentation.	• Understand various stages of hardware, software and PCB design. • Importance of product test & test specifications. • Special design considerations and importance of documentation.
			Mobile Communication (404189)	• To learn and understand the basic principles of Telecommunication switching, traffic and networks • To learn and understand basic concepts of cellular system, wireless propagation and the techniques used to maximize the capacity of cellular network. • To learn and understand architecture of GSM and CDMA system. • To understand mobile management, voice signal processing and coding in GSM and CDMA system	• Explain and apply the concepts telecommunication switching, traffic and networks • Analyze the telecommunication traffic. • Analyze radio channel and cellular capacity. • Explain and apply concepts of GSM and CDMA system.

		II	Broadband Communication Systems (404190)	• To understand the three primary components of a fiber-optic communication system. • To understand the system design issues and the role of WDM components in advanced light wave systems. • To understand the basics of orbital mechanics and the look angles from ground stations to the satellite. • To apply their subject understanding in Link Design.	• Carry out Link power budget and Rise Time Budget by proper selection of components and check its viability. • Carry out Satellite Link design for Up Link and Down Link.
			Audio Video Engineering (404191)	• After learning AVE course, students will get benefit to learn and understand the working of real life video system and the different elements of video system plus the encoding/decoding techniques. • The learners will be groomed up to understand different channel allocations, difference between various systems present in this world, their transmission and reception techniques. • Students will get insight on functioning of individual blocks, different standards of compression and they will be acquainted with different types of analog, digital TV and HDTV systems. • The students will gate overview of fundamentals of Audio systems and basics Acoustics	• To study the analysis and synthesis of TV Pictures, Composite Video Signal, Receiver, Picture Tubes and Television Camera Tubes. • To study the various Colour Television systems with a greater emphasis on television standards. • To study the advanced topics in Digital Television and High Definition Television. • To study audio recording systems such CD/DVD recording, Audio Standards, and Acoustics principles.
			Wireless Networks (404192)	• To study the evolving wireless technologies and standards • To understand the architectures of various access technologies such as 3G, 4G, WiFi etc. • To understand various protocols and services provided by next generation netwoks.	• Keep himself updated on latest wireless technologies and trends in the communication field • Understand the transmission of voice and data through various networks.
E&TC	BE_2008	I	ELECTRONICS PRODUCT DESIGN (404181)	• To understand the stages of product (hardware/ software) design and development. • To learn the different considerations of analog, digital and mixed circuit design. • To be acquainted with methods of PCB design and different tools used for PCB Design. • To understand the importance of testing in product design cycle. ` • To understand the processes and importance of documentation.	• Understand various stages of hardware, software and PCB design. • Importance of product test & test specifications. • Special design considerations and importance of documentation.
			VLSI DESIGN & TECHNOLOGY (404182)	• To study HDL based design approach. • To learn digital CMOS logic design. • To nurture students with CMOS analog circuit designs. • To realize importance of testability in logic circuit design. • To overview SoC issues and understand PLD architectures with advanced features.	• Model digital circuit with HDL, simulate, synthesis and prototype in PLDs. • Understand chip level issues and need of testability. • Design analog & digital CMOS circuits for specified applications.
			COMPUTER NETWORK (404183)	• Understand state-of-the-art in network protocols, architectures, and applications • To provide students with a theoretical and practical base in computer networks issues • Define the basic terminology of computer networks • Recognize the individual components of the big picture of computer networks • Outline the basic network configurations • List the layers of the TCP/IP and OSI model and describe the duties of each layer • Understand the transmission methods underlying LAN and WAN technologies.	• Understand fundamental underlying principles of computer networking • Describe and analyze the hardware, software, components of a network and theinterrelations. • Analyze the requirements for a given organizational structure and select the most appropriate networking architecture and technologies; • Have a basic knowledge of the use of cryptography and network security; • Have a basic knowledge of installing and configuring networking applications. • Specify and identify deficiencies in existing protocols, and then go onto select new and better protocols.
			Digital Image Processing (404184)	• To learn the fundamental concepts of Digital Image Processing. • To study basic image processing operations. • To understand image analysis algorithms. • To expose students to current applications in the field of digital image processing.	• Develop and implement algorithms for digital image processing. • Apply image processing algorithms for practical object recognition applications.
			Mobile Communication (404185)	• To learn and understand the basic principles of Telecommunication switching, traffic and networks • To learn and understand basic concepts of cellular system, wireless propagation and the techniques used to maximize the capacity of cellular network. • To learn and understand architecture of GSM and CDMA system. • To understand mobile management, voice signal processing and coding in GSM and CDMA system	• Explain and apply the concepts telecommunication switching, traffic and networks • Analyze the telecommunication traffic. • Analyze radio channel and cellular capacity. • Explain and apply concepts of GSM and CDMA system.
		II	TELECOMMUNICATION & SWITCHING SYSTEM (404187)	• This subject aims at introducing to the students the knowledge about the telecommunication industry: its services and market, the theoretical basis about performance (queuing theory) and operation (multiplexing, switching, routing, and signaling) in telecom networks.	• Describe and apply fundamentals of telecommunication systems and associated technologies. • Apply the principles of queuing theory in evaluating the performance of congested telecommunication networks. • Solve problems and design simple systems related to tele-traffic and trunking efficiency. • Understand and explain the reasons for switching, and the relative merits of the possible switching modes, e.g. packet and circuit switching. • Understand the principles of the internal design and operation of telecommunication switches, and the essence of the key signaling systems that are used in telecommunication networks .
			OPTICAL FIBER COMMUNICATION (404188)	• To learn the basic elements of optical fiber transmission link, fiber modes configurations and structures • To understand the different kind of losses, signal distortion in optical wave guides and other signal degradation factors • To learn the various optical source materials, LED structures, quantum efficiency, Laser diodes • To learn the fiber optical receivers such as PIN APD diodes, noise performance in photo detector, receiver operation and configuration • To learn the fiber optical network components, variety of networking aspects, FDDI, SONET/SDH and operational principles WDM	• To learn the basic elements of optical fiber transmission link, fiber modes configurations and structures. • To understand the different kind of losses, signal distortion in optical wave guides and other signal degradation factors. • To learn the various optical source materials, LED structures, quantum efficiecy, Laser diodes • To learn the fiber optical receivers such as PINAPD diodes, noise performance in photo detector, receiver operation and configuration • To learn the fiber optical network components,variety of networking aspects, FDDI, SONET/SDH and operational principles WDM
			Television and Video Engineering (404189)	• To study the analysis and synthesis of TV Pictures, Composite Video Signal, Receiver Picture tubes and Television Camera Tubes. • To study the various Color Television systems with a greater emphasis on television standards. • To study the advanced topics in digital television and High definition television.	• The students will be able to understand the transmission of video signals and importance of television standards to effectively work with broadcasting applications. Also he acquires sound knowledge of latest topics in digital video transmission.

			Automotive Electronics (404190)	• To understand the concepts of Automotive Electronics and it's evolution and trends • Automotive systems & subsystems overview. • To understand sensors and sensor monitoring mechanisms aligned to automotive systems, different signal conditioning techniques, interfacing techniques and actuator mechanisms. • To understand, design and model various automotive control systems using Model based development technique. • To understand role of Microcontrollers in ECU design and choice of appropriate Hardware and Software. • To describe various communication systems, wired and wireless protocols used in vehicle networking. • To understand Safety standards, advances in towards autonomous vehicles. • To understand vehicle on board and off board diagnostics.	• Obtain an overview of automotive components, subsystems, design cycles, communication protocols and safety systems employed in today's automotive industry • Interface automotive sensors and actuators with microcontrollers • Develop, simulate and integrate control algorithms for ECUs with hardware
E&TC	TE_2015	I	Digital Communication (304181)	• To understand the building blocks of digital communication system. • To prepare mathematical background for communication signal analysis. • To understand and analyze the signal flow in a digital communication system. • To analyze error performance of a digital communication system in presence of noise and other interferences. • To understand concept of spread spectrum communication system.	• Understand working of waveform coding techniques and analyse their performance. • Analyze the performance of a baseband and pass band digital communication system in terms of error rate and spectral efficiency. • Perform the time and frequency domain analysis of the signals in a digital communication system. • Design of digital communication system. • Understand working of spread spectrum communication system and analyze its performance.
			Digital Signal Processing (304182)	• To introduce students with transforms for analysis of Discrete time signals and systems. • To understand the digital signal processing, sampling and aliasing • To use and understand implementation of digital filters.	• Analyze the discrete time signals and system using different transform domain techniques. • Design and implement LTI filters for filtering different real world signals. • Develop different signal processing applications using DSP processor.
			Electromagnetics (304183)	• To introduce the basic mathematical concepts related to electromagnetic vector fields. • To impart knowledge on the concepts of electrostatics, electric potential, energy density and their applications. • To impart knowledge on the concepts of magnetostatics, magnetic flux density, scalar and vector potential and its applications. • To impart knowledge on the concepts of Faraday's law, induced emf and Maxwell's equations • To impart knowledge on the concepts of Concepts of electromagnetic waves and Transmission lines.	• Understand the basic mathematical concepts related to electromagnetic vector fields. • Apply the principles of electrostatics to the solutions of problems relating to electric field and electric potential, boundary conditions and electric energy density. • Apply the principles of magnetostatics to the solutions of problems relating to magnetic field and magnetic potential, boundary conditions and magnetic energy density. • Understand the concepts related to Faraday's law, induced emf and Maxwell's equations. • Apply Maxwell's equations to solutions of problems relating to transmission lines and uniform plane wave propagation.
			Microcontrollers (304184)	• To understand architecture and features of typical Microcontroller. • To understand need of microcontrollers in real life applications. • To learn interfacing of real world peripheral devices • To study various hardware and software tools for developing applications.	• Learn importance of microcontroller in designing embedded application. • Learn use of hardware and software tools. • Develop interfacing to real world devices.
			Mechatronics (304185)	• To understand the concept and key elements of Mechatronics system, representation into block diagram • To understand principles of sensors their characteristics • To Understand of various data presentation and data logging systems • To Understand concept of actuator • To Understand various case studies of Mechatronics systems	• Identification of key elements of mechatronics system and its representation in terms of block diagram • Understanding basic principal of Sensors and Transducer. • Able to prepare case study of the system given.
		II	Power Electronics (304186)	• To introduce students to different power devices to study their construction, characteristics and turning on circuits. • To give an exposure to students of working & analysis of controlled rectifiers for different loads, inverters, DC choppers, AC voltage controllers and resonant converters. • To study the different motor drives, various power electronics applications like UPS, SMPS, etc. and some protection circuits.	• Design & implement a triggering / gate drive circuit for a power device • Understand, perform & analyze different controlled converters. • Evaluate battery backup time & design a battery charger. • Design & implement over voltage / over current protection circuit.
			Information Theory, Coding and Communication Networks (304187)	• To understand information theoretic behavior of a communication system. • To understand various source coding techniques for data compression • To understand various channel coding techniques and their capability. • To Build and understanding of fundamental concepts of data communication and networking.	• Perform information theoretic analysis of communication system. • Design a data compression scheme using suitable source coding technique. • Design a channel coding scheme for a communication system. • Understand and apply fundamental principles of data communication and networking. • Apply flow and error control techniques in communication networks.
			Business Management (304188)	• To get awareness about various domains in Business Management. • To understand concept of Quality Management, Financial Management and Project Management. • To learn Human Resource Management, marketing management are the major tasks in Business • To promote Entrepreneurship.	• Get overview of Management Science aspects useful in business. • Get motivation for Entrepreneurship • Get Quality Aspects for Systematically Running the Business • To Develop Project Management aspect and Entrepreneurship Skills.
			Advanced Processors (304189)	• To understand need and application of ARM Microprocessors in embedded system. • To study the architecture of ARM series microprocessor • To understand architecture and features of typical ARM7& DSP Processors. • To learn interfacing of real world input and output devices • To learn embedded communication systems.	• Describe the ARM microprocessor architectures and its feature. • Interface the advanced peripherals to ARM based microcontroller • Design embedded system with available resources. • Use of DSP Processors andresources for signal processing applications.
			System Programming and Operating Systems (304190)	• To understand system software concepts, like the use and implementation of assembler, macros, linker, loaders and compiler. • To get acquainted with software tools for program development. • To explore memory allocation methods, input output devices and file system w. r. t. various operating system. • To study and implement various processes scheduling techniques and dead lock avoidance schemes in operating system.	• Demonstrate the knowledge of Systems Programming and Operating Systems • Formulate the Problem and develop the solution for same. • Compare and analyse the different implementation approach of system programming operating system abstractions. • Interpret various OS functions used in Linux / Ubuntu
			Digital Communication (304181)	• To understand the building blocks of digital communication system. • To prepare mathematical background for communication signal analysis. • To understand and analyze the signal flow in a digital communication system. • To analyze error performance of a digital communication system in presence of noise and other interferences. • To understand concept of spread spectrum communication system.	• Analyze the performance of a baseband and pass band digital communication system in terms of error rate and spectral efficiency. • Perform the time and frequency domain analysis of the signals in a digital communication system. • Select the blocks in a design of digital communication system. • Analyze Performance of spread spectrum communication system.
			Digital Signal Processing (304182)	• To introduce students with transforms for analysis of Discrete time signals and systems. • To understand the digital signal processing, sampling and aliasing • To use and understand implementation of digital filters. • To understand concept of sampling rate conversion and DSP processor architecture.	• Understand use of different transforms and analyze the discrete time signals and systems. • Realize the use of LTI filters for filtering different real world signals. • Capable of calibrating and resolving different frequencies existing in any signal. • Design and implement multistage sampling rate converter.

E&TC	TE_2012	I	Micro Controller and Applications (304183)	• To understand the applications of Microprocessors and Microcontrollers. • To understand need of microcontrollers in embedded system. • To understand architecture and features of typical Microcontroller. • To learn interfacing of real world input and output devices • To study various hardware and software tools for developing applications	• Learn importance of microcontroller in designing embedded application. • Learn use of hardware and software tools. • Develop interfacing to real world devices.
			Electromagnetics and Transmission Lines (304184)	• To study Basic Electrostatic and Magneto static Laws, Theorems. • To understand Maxwell"s Equation and apply to the basic electromagnetic problem. • To interpret the given problem, and solve it using Maxwell"s equations. • To analyze boundary conditions, and understand the field at the interface of two different media. • To analyze time varying electric and magnetic fields, wave propagation in different types of media. • To understand transmission line fundamentals and apply them to the basic problem. • Tounderstand the fundamentals of electromagnetic theory and transmission lines.	• Interpret the electromagnetic problem and solve using Maxwell"s equations. • Apply boundary conditions to different media, and formulate uniform plane wave equation, which is the basic of Antenna and wave propagation. • Analyze the transmission line problem, use the Smith chart for impedance calculations
			System Programming and Operating System (304185)	• To understand fundamentals of system programming and operating systems. • To study and understand how the system programming and operating system abstractions can be implemented. • To develop comprehensive skills to design Assembler, Macro Processor, Compiler and Interpreters. • To understand the importance of application of linkers, loaders and Software tools in system programming • To Implement System Programming concepts and Operating systems components • To analyze memory allocation methods, input output devices and file system w. r. t. various operating system. • To study and implement various process scheduling techniques and dead lock avoidance schemes in operating system	• Demonstrate the knowledge of Systems Programming and Operating Systems • Formulate the Problem and develop the solution for same. • Compare and analyze the different implementation approach of system programming and operating system abstractions. • Interpret various OS functions used in Linux / Ubuntu
		II	Information Theory and Coding Techniques (304189)	• To understand information theoretic behavior of a communication system. • To understand various source coding techniques for data compression • To understand various channel coding techniques and their capability. • To analyze performance of communication system with coding and modulation.	• Perform information theoretic analysis of communication system. • Design a data compression scheme using suitable source coding technique. • Design a channel coding scheme for a communication system. • Evaluate performance of a communication system.
			Antenna and Wave (Propagation (304190)	• To understand the applications of electromagnetic engineering. • To formulate and solve the Helmholtz wave equation and solve it for Uniform plane wave • To analyze and understand the Uniform plane wave propagation in various media • To solve the electric field and magnetic fields for a given wire antenna.	• Formulate the wave equation and solve it for uniform plane wave • Analyze the given wire antenna and its radiation characteristics • Identify the suitable antenna for a given communication system
			Embedded Processors (304191)	• To understand need and application of ARM Microprocessors in embedded system. • To study the architecture of ARM series microprocessor • To understand architecture and features of typical ARM7& ARM CORTEX-M3 mIcrocontroller. • To learn interfacing of real world input and output devices • To learn embedded communication systems.	• Describe the ARM microprocessor architectures and its feature. • Interface the advanced peripherals to ARM based microcontroller • Design embedded system with available resources.
			Industrial Management (304192)	• To get awareness about various domains in Business Management. • To understand concept of Quality Management, Financial Management and Project Management. • To learn Human Resource Management, marketing management are the major tasks in Business • To promote Entrepreneurship.	• Get overview of Management Science aspects useful in business. • Get motivation for Entrepreneurship
			Power Electronics (304193)	• To introduce students to different power devices to study their construction, characteristics and turning on circuits. • To give an exposure to students of working & analysis of controlled rectifiers for different loads, inverters, DC choppers, AC voltage controllers and resonant converters. • To study the different motor drives, various power electronics applications like UPS, SMPS, etc. and some protection circuits.	• Design & implement a triggering / gate drive circuit for a power device • Understand, perform & analyze different controlled converters. • Evaluate battery backup time & design a battery charger. • Design & implement over voltage / over current protection circuit.
		I	Control systems (304181)	• To introduce the elements of control system and their modelling using various Techniques. • To introduce methods for analyzing the time response, the frequency response and the stability of systems. • To introduce the concept of root locus, Bode plots, Nyquist plots. • To introduce the state variable analysis method. • To introduce concepts of PID controllers and digital and control systems. • To introduce concepts programmable logic controller.	• Determine and use models of physical systems in forms suitable for use in the analysis and design of control systems. • Determine the (absolute) stability of a closed-loop control system. • Perform time domain and frequency domain analysis of control systems required for stability analysis. • Perform time domain and frequency domain correlation analysis. • Apply root-locus, Frequency Plots technique to analyze control systems. • Express and solve system equations in state variable form.
			Digital communication (304182)	• To understand the building blocks of digital communication system. • To prepare mathematical background for communication signal analysis. • To understand and analyze the signal flow in a digital communication system. • To analyze error performance of a digital communication system in presence of noise and other interferences. • To understand concept of spread spectrum communication system.	• Analyze the performance of a baseband and pass band digital communication system in terms of error rate and spectral efficiency. • Perform the time and frequency domain analysis of the signals in a digital communication system. • Select the blocks in a design of digital communication system. • Analyze Performance of spread spectrum communication system.
			Network synthesis and Filter Design (304183)	• The objective of the course is to introduce the student to fundamentals of Network theory including its concepts, initial and final conditions of components, transient ant steady state response, network theorems, two-port network, network parameters, resonance and LC filters. With this the students will have the knowledge of how to evaluate and analyze any complex network.	• Understand, Analyze the basic AC and DC circuits using KCL,KVL and network Theorems • Determine the voltages, currents, power and impedances at various nodes and loops using all the simplification techniques. • Understand and apply graph theory to solve network equations • Understand, and calculate the initial conditions of RL, RC circuits • Formulate, solve the differential equations for RL, RC, and RLC circuits and carry out the transient analysis. • Understand, identify and analyze the series, parallel resonance circuits, calculate the bandwidth, selectivity, Q-factor also. • Understand, analyze and design prototype LC filters and Resistive attenuators. • Characterize; model the network in terms of all network parameters and analyze. • Understand and formulate the network transfer function in s-domain and pole, zero concept.

			Microcontrollers & Application (304184)	• To understand the applications of Microprocessors and Microcontrollers. • To understand need of microcontrollers in embedded system. • To understand architecture and features of typical Microcontroller. • To learn interfacing of real world input and output devices • To study various hardware and software tools for developing applications	• Learn importance of microcontroller in designing embedded application. • Learn use of hardware and software tools. • Develop interfacing to real world devices.
			Digital Signal Processing (304185)	• To introduce students with transforms for analysis of Discrete time signals and systems. • To understand the digital signal processing, sampling and aliasing • To use and understand implementation of digital filters.	• Analyze the discrete time signals and system using different transform domain techniques. • Design and implement LTI filters for filtering different real world signals. • Develop different signal processing applications using DSP processor.
E&TC	TE_2008	II	Signal Coding and Estimation Theory (304187)	• To understand information theoretic behavior of a communication system. • To understand various source coding techniques for data compression • To understand various channel coding techniques and their capability. • To Build and understanding of fundamental concepts of data communication and networking.	• Perform information theoretic analysis of communication system. • Design a data compression scheme using suitable source coding technique. • Design a channel coding scheme for a communication system. • Understand and apply fundamental principles of data communication and networking. • Apply flow and error control techniques in communication networks.
			System programming and OS (304188)	• To understand fundamentals of system programming and operating systems. • To study and understand how the system programming and operating system abstractions can be implemented. • To develop comprehensive skills to design Assembler, Macro Processor, Compiler and Interpreters. • To understand the importance of application of linkers, loaders and Software tools in system programming • To Implement System Programming concepts and Operating systems components • To analyze memory allocation methods, input output devices and file system w. r. t. various operating system. • To study and implement various process scheduling techniques and dead lock avoidance schemes in operating system	• Demonstrate the knowledge of Systems Programming and Operating Systems • Formulate the Problem and develop the solution for same. • Compare and analyze the different implementation approach of system programming and operating system abstractions. • Interpret various OS functions used in Linux / Ubuntu
			Computer Organization and Architecture (304189)	• Computer has become an integral part across all the branches of engineering. It is essential for an electronics and telecommunication engineering student to know the fundamental concepts of computer organization and its architecture. In spite of the variety and pace of change in the computer field, certain fundamental concepts apply consistently throughout. The objective of this course is to provide a thorough discussion of the fundamentals of computer organization and architecture and to relate these contemporary computer organization, architecture and design issues.	• Understand and describe the basic structure of a computer, machine instruction and their execution. • Understand and analyze performance issues in computer system. • Understand, apply and carry out binary arithmetic operations such as high speed addition, multiplier including the algorithms • Understand, and explain the instruction execution, internal functions of processor and control unit design. • Understand and describe the various way of communication with I/O devices and standard I/O interfaces. • Understand and describe the memory organization and hierarchical memory system. • Understand and explain the various aspects of 8086 (16 bit microprocessor) processor as a case study.
			Industrial management (304190)	• To get awareness about various domains in Business Management. • To understand concept of Quality Management, Financial Management and Project Management. • To learn Human Resource Management, marketing management are the major tasks in Business • To promote Entrepreneurship.	• Get overview of Management Science aspects useful in business. • Get motivation for Entrepreneurship
			Wave Theory and Antennas (304191)	• To understand the applications of electromagnetic engineering. • To formulate and solve the Helmholtz wave equation and solve it for Uniform plane wave • To analyze and understand the Uniform plane wave propagation in various media • To solve the electric field and magnetic fields for a given wire antenna.	• Formulate the wave equation and solve it for uniform plane wave • Analyze the given wire antenna and its radiation characteristics • Identify the suitable antenna for a given communication system
		I	Signals & Systems (204181)	• To understand the mathematical description of continuous and discrete time signals and systems. • To classify signals into different categories. • To analyse Linear Time Invariant (LTI) systems in time and transform domains. • To build basics for understanding of courses such as signal processing, control system and Communication. • To develop basis of probability and random variables.	• Understand mathematical description and representation of continuous and discrete time signals and systems. • Develop input output relationship for linear shift invariant system and understand the convolution operator for continuous and discrete time system. • Understand and resolve the signals in frequency domain using Fourier series and Fourier transforms. • Understand the limitations of Fourier transform and need for Laplace transform and develop the ability to analyze the system in s-domain. • Understand the basic concept of probability, random variables & random signals and develop the ability to find correlation, CDF, PDF and probability of a given event.
			Electronic Devices & Circuits (204182)	• To introduce semiconductor devices FET and MOSFET, their characteristics, operations, circuits and applications. • To introduce concepts of both positive and negative feedback in electronic circuits. • To analyse and interpret FET and MOSFET circuits for small signal at low and high frequencies. • To simulate electronics circuits using computer simulation software and verify desired results. • To study the different types of voltage regulators.	• Comply and verify parameters after exciting devices by any stated method. • Implement circuit and test the performance. • Analyze small signal model of FET and MOSFET. • Explain behavior of FET at low frequency. • Design an adjustable voltage regulator circuits.
			Electrical Circuits and Machines (204183)	• To analyse AC and DC networks with network simplification techniques. • To gain basic knowledge of transformers and their types. • To conduct experimental procedures on different types of electrical machines. • To understand the constructional details, characteristics, features and application areas ofvarious types of electric motors.	• Analyze basic AC & DC circuit for voltage, current and power by using KVL, KCL, andnetwork theorems. • Explain the working principle of different electrical machines. • Select proper electrical motor for given application. • Design and analyze transformers.
			Data structures & Algorithms (204184)	• To assess how the choice of data structures and algorithm design methods impacts the performance of programs. • To choose the appropriate data structure and algorithm design method for a specified application. • To study the systematic way of solving problems, various methods of organizing large amounts of data. • To solve problems using data structures such as linear lists, stacks, queues, binary trees, binary search trees, and graphs and writing programs for these solutions. To employ the different data structures to find the solutions for specific problems	• Discuss the computational efficiency of the principal algorithms such as sorting & searching. • Write and understand the programs that use arrays & pointers in C • Describe how arrays, records, linked structures are represented in memory and use them in algorithms. • Implement stacks & queues for various applications. • Understand various terminologies and traversals of trees and use them for various applications. • Understand various terminologies and traversals of graphs and use them for various applications.

E&TC	SE_2015		Digital Electronics (204185)	• To acquaint the students with the fundamental principles of two-valued logic and various devices used to implement logical operations on variables. • To lay the foundation for further studies in areas such as communication, VLSI, computer, microprocessor.	• Use the basic logic gates and various reduction techniques of digital logic circuit in detail. • Design combinational and sequential circuits. • Design and implement hardware circuit to test performance and application. • Understand the architecture and use of microcontrollers for basic operations and Simulate using simulation software.
		II	Engineering Maths-III (207005)	• Linear differential equations of higher order using analytical methods and numerical methods applicable to Control systems and Network analysis. • Transforms such as Fourier transform, Z-transform and applications to Communication systems and Signal processing. • Vector differentiation and integration required in Electro-Magnetics and Wave theory. • Complex functions, conformal mappings, contour integration applicable to Electrostatics, Digital filters, Signal and Image processing.	• Solve higher order linear differential equation using appropriate techniques for modeling and analyzing electrical circuits. • Solve problems related to Fourier transform, Z-transform and applications to Communication systems and Signal processing. • Obtain Interpolating polynomials, numerically differentiate and integrate functions, numerical solutions of differential equations using single step and multi-step iterative methods used in modern scientific computing. • Perform vector differentiation and integration, analyze the vector fields and apply to Electro-Magnetic fields. • Analyze conformal mappings, transformations and perform contour integration of complex functions in the study of electrostatics and signal processing.
			Integrated Circuits (204187)	• To understand characteristics of IC and Op-Amp and identify the internal structure. • To introduce various manufacturing techniques. • To study various op-amp parameters and their significance for Op-Amp. • To learn frequency response, transient response and frequency compensation techniques for Op-Amp. • To analyse and identify linear and nonlinear applications of Op-Amp. • To understand functionalities of PLL and its use in various applications in communication and control systems.	• Understand the characteristics of IC and Op-Amp and identify the internal structure. • Understand and identify various manufacturing techniques. • Derive and determine various performances based parameters and their significance for Op-Amp. • Comply and verify parameters after exciting IC by any stated method. • Analyze and identify the closed loop stability considerations and I/O limitations. • Analyze and identify linear and nonlinear applications of Op-Amp. • Understand and verify results (levels of V & I) with hardware implementation. • Implement hardwired circuit to test performance and application for what it is being designed. • Understand and apply the functionalities of PLL to Frequency synthesizer, multiplier, FM, and AM demodulators
			Control Systems (204188)	• To introduce the elements of control system and their modelling using various Techniques. • To introduce methods for analyzing the time response, the frequency response and the stability of systems. • To introduce the concept of root locus, Bode plots, Nyquist plots. • To introduce the state variable analysis method. • To introduce concepts of PID controllers and digital and control systems. • To introduce concepts programmable logic controller.	• Determine and use models of physical systems in forms suitable for use in the analysis and design of control systems. • Determine the (absolute) stability of a closed-loop control system. • Perform time domain and frequency domain analysis of control systems required for stability analysis. • Perform time domain and frequency domain correlation analysis. • Apply root-locus, Frequency Plots technique to analyze control systems. • Express and solve system equations in state variable form.
			Analog Communication (204189)	• Describe and analyze the mathematical techniques of generation, transmission and reception of amplitude modulation (AM), frequency modulation (FM) and phase modulation (PM) signals. • Evaluate the performance levels (Signal-to-Noise Ratio) of AM, FM and PM systems in the presence of additive white noise. • Convert analog signals to digital format and describe Pulse and digital Modulation techniques.	• Understand and identify the fundamental concepts and various components of analogcommunication systems. • Explain signal to noise ratio, noise figure and noise temperature for single and cascaded stages in a communication system. • Describe analog pulse modulation techniques and digital modulation technique. • Develop the ability to compare and contrast the strengths and weaknesses of variouscommunication systems.
			Object Oriented Programming (204190)	• Make the students familiar with basic concepts and techniques of object oriented programming in C++ & Java. • Develop an ability to write programs in C++ and Java for problem solving.	• Describe the principles of object oriented programming. • Apply the concepts of data encapsulation, inheritance in C++. • Understand basic program constructs in Java • Apply the concepts of classes, methods and inheritance to write programs Java. • Use arrays, vectors and strings concepts and interfaces to write programs in Java. • Describe and use the concepts in Java to develop user friendly program,
			Signals & Systems (204181)	• The main objective of this course is to lay the foundation for further studies in areas such as communication, signal processing, and control systems etc. This course will explore the basic concepts of signals and systems.	• Understand the basic signals and their classification, perform operations on signals. • Understand and identify the systems based on their properties • Understand, identify the system based on their properties in terms impulse response and also solve the convolution integral and sum. • Understand, and resolve the signals in frequency domain using Fourier series and Fourier transform. Find the amplitude spectrum, phase spectrum of the various signals and also systems. Analyze the system in frequency domain. • Understand, and resolve the signals in complex frequency domain using Laplace Transform. Analyze the system in s – domain. Characterize the system in s- domain. Apply Laplace transforms to analyze electrical circuits. • Understand, apply and determine the correllogram, auto correlation, cross correlation, energy spectral density, and power spectral density of discrete and continuous signals. Carry out the system analysis and inter play between frequency and time domain. • Understand the basic concept of probability, random variables and random signals. Calculate the CDF, PDF and probability of a given event. Calculate the mean, mean square, variance and standard deviation for given random variables using pdf.
			Electronic Devices & Circuits (204182)	• The objective of the course is to introduce the students to semiconductor devices (such as BJT, MOSFET) and their characteristics, analysis, operation, circuits and applications.	• Understand and apply basic and semiconductor principles to the device to observe its performance. • Comply and verify parameters after exciting devices by any stated method. • Simulate electronics circuits using computer simulation software to obtain desired results. • Understand and verify simulated circuit with hardware implementation. • Implement hardwired circuit to test performance and application for what it is being designed. • Analyze and model BJT and MOSFET for small signal. • Understand and apply concept of feedback to improve stability of circuits. • Understand behavior of transistors at low and high frequency.

E&TC	SE_2012	I	Network Theory (204183)	• The objective of the course is to introduce the student to fundamentals of Network theory including its concepts, initial and final conditions of components, transient ant steady state response, network theorems, two-port network, network parameters, resonance and LC filters. With this the students will have the knowledge of how to evaluate and analyze any complex network.	• Understand, Analyze the basic AC and DC circuits using KCL,KVL and network Theorems • Determine the voltages, currents, power and impedances at various nodes and loops using all the simplification techniques. • Understand and apply graph theory to solve network equations • Understand, and calculate the initial conditions of RL, RC circuits • Formulate, solve the differential equations for RL, RC, and RLC circuits and carry out the transient analysis. • Understand, identify and analyze the series, parallel resonance circuits, calculate the bandwidth, selectivity, Q-factor also. • Understand, analyze and design prototype LC filters and Resistive attenuators. • Characterize; model the network in terms of all network parameters and analyze. • Understand and formulate the network transfer function in s-domain and pole, zero concept.
			Data structures & Algorithms (204184)	• This course provides an introduction to the theory, practice and methods of data structures and algorithm design. Students will learn elementary data structures such as stacks, queues, linked lists, trees and graphs in C language, and the algorithms designed for manipulating these data structures. The objective of this course is to introduce students to both data structures and algorithm design.	• Choose the data structures that effectively model the information in a problem. • Judge efficiency trade-offs among alternative data structure implementations or combinations. • Apply algorithm analysis techniques to evaluate the performance of an algorithm and to compare data structures. • Implement and know when to apply standard algorithms for searching and sorting. • Design, implement, test, and debug programs using a variety of data structures including lists, sacks, queues, hash tables, binary tree structures, search trees, heaps, graphs.
			Digital Electronics (204185)	• The concept and theory of digital Electronics are needed in almost all electronics and telecommunication engineering fields and in many other engineering and scientific disciplines as well. • The main objective of this course is to lay the foundation for further studies in areas such as communication, VLSI, computer, microprocessor etc. One of the most important reasons for the unprecedented growth of digital electronics is the advent of integrated circuit. This course will explore the basic concepts of digital electronics.	• Understand the basic logic gates and various variable reduction techniques of digital logic circuit in detail. • Understand, identify and design combinational and sequential circuits • Design and implement hardware circuit to test performance and application for what it is being designed. • Simulate and verify using computer simulation software to obtain desired result. • Understand and verify simulated circuit model with hardware implementation.
		II	Engineering Maths-III (207005)	• Linear differential equations of higher order using analytical methods and numerical methods applicable to Control systems and Network analysis. • Transforms such as Fourier transform, Z-transform and applications to Communication systems and Signal processing. • Vector differentiation and integration required in Electro-Magnetics and Wave theory. • Complex functions, conformal mappings, contour integration applicable to Electrostatics, Digital filters, Signal and Image processing.	• Solve higher order linear differential equation using appropriate techniques for modeling and analyzing electrical circuits. • Solve problems related to Fourier transform, Z-transform and applications to Communication systems and Signal processing. • Obtain Interpolating polynomials, numerically differentiate and integrate functions, numerical solutions of differential equations using single step and multi-step iterative methods used in modern scientific computing. • Perform vector differentiation and integration, analyze the vector fields and apply to Electro-Magnetic
			Integrated Circuits (204187)	• Operational amplifier is one of the most important building blocks of any electronic system. It has been in use for many years, and it is used in wide range of application such as linear, non linear, mathematical interfacing, communication and control system. • The main objective of this course is to introduce the characteristics, analysis, working principle and applications of Operational Amplifiers.	• Understand the characteristics of IC and Op-Amp and identify the internal structure. • Understand and identify various manufacturing techniques. • Derive and determine various performances based parameters and their significance for Op-Amp. • Comply and verify parameters after exciting IC by any stated method. • Analyze and identify the closed loop stability considerations and I/O limitations. • Analyze and identify linear and nonlinear applications of Op-Amp. • Understand and verify results (levels of V & I) with hardware implementation. • Implement hardwired circuit to test performance and application for what it is being designed. • Understand and apply the functionalities of PLL to Frequency synthesizer, multiplier, FM, and AM demodulators
			Control Systems (204188)	• The concept and theory of control systems are needed in almost all electronics and telecommunication engineering fields and in many other engineering and scientific disciplines as well. • The main objective of this course is to introduce and give an exposure to the students the fundamentals of control systems, various components in the control system, time domain, frequency domain analysis and also the system stability analysis. This course would also provide the basis for control system analysis using state space analysis and finally the digital control systems and their applications.	• Model a physical system and express its internal dynamics and input-output relationships by means of block diagrams, mathematical model and transfer functions. • Understand and explain the relationships between the parameters of a control system and its stability, accuracy, transient behavior. • Identify the parameters that the system is sensitive to. Determine the stability of a system and parameter ranges for a desired degree of stability. • Plot the Bode, Nyquist, Root Locus diagrams for a given control system and identify the parameters and carry out the stability analysis. • Determine the frequency response of a control system and use it to evaluate or adjust the relative stability, • Design a P, PD, PI, or PID controller based on the transient and steady state response criteria. • Model and analyze the control systems using state space analysis.
			Analog Communication (204189)	• The basic objective of this is course is to introduce the students to analog communication, AM, FM modulation techniques, their analysis, bandwidth calculations, receivers. It also focuses on the performance analysis of analog communications systems under the presence of noise and finally introduces the pulse and digital modulation techniques.	• Understand and identify the fundamental concepts and various components of analog communication systems. • Understand, analyze and explain various analog modulation schemes. • Understand the performance of analog communications systems under the presence of noise. • Understand and apply concepts and techniques from Fourier analysis and circuit analysis to communication systems. • Develop the ability to compare and contrast the strengths and weaknesses of various communication systems • Analyze Basic communications systems and their performance under the presence of noise • Describe various pulse and digital modulation techniques.
			Computer Organization (204190)	• Computer has become an integral part across all the branches of engineering. It is essential for an electronics and telecommunication engineering student to know the fundamental concepts of computer organization and its architecture. In spite of the variety and pace of change in the computer field, certain fundamental concepts apply consistently throughout. The objective of this course is to provide a thorough discussion of the fundamentals of computer organization and architecture and to relate these contemporary computer organization, architecture and design issues.	• Understand and describe the basic structure of a computer, machine instruction and their execution. • Understand and analyze performance issues in computer system. • Understand, apply and carry out binary arithmetic operations such as high speed addition, multiplier including the algorithms • Understand, and explain the instruction execution, internal functions of processor and control unit design. • Understand and describe the various way of communication with I/O devices and standard I/O interfaces. • Understand and describe the memory organization and hierarchical memory system. • Understand and explain the various aspects of 8086 (16 bit microprocessor) processor as a case study.

E&TC	SE_2008	I	Signal and Systems (204181)	• To understand the mathematical description of continuous and discrete time signals and systems. • To classify signals into different categories. • To analyse Linear Time Invariant (LTI) systems in time and transform domains. • To build basics for understanding of courses such as signal processing, control system and communication. • To develop basis of probability and random variables.	• Understand mathematical description and representation of continuous and discrete time signals and systems. • Develop input output relationship for linear shift invariant system and understand the convolution operator for continuous and discrete time system. • Understand and resolve the signals in frequency domain using Fourier series and Fourier transforms. • Understand the limitations of Fourier transform and need for Laplace transform and develop the ability to analyze the system in s-domain. • Understand the basic concept of probability, random variables & random signals and develop the ability to find correlation, CDF, PDF and probability of a given event.
			Solid states Devices & circuits (204182)	• The objective of the course is to introduce the students to semiconductor devices (such as Diode, FET, BJT, MOSFET) and their characteristics, analysis, operation, circuits and applications.	• Understand and apply basic and semiconductor principles to the device to observe its performance. • Comply and verify parameters after exciting devices by any stated method. • Simulate electronics circuits using computer simulation software to obtain desired results. • Understand and verify simulated circuit with hardware implementation. • Implement hardwired circuit to test performance and application for what it is being designed. • Analyze and model BJT and MOSFET for small signal. • Understand and apply concept of feedback to improve stability of circuits. • Understand behavior of transistors at low and high frequency.
			Network analysis (204183)	• The objective of the course is to introduce the student to fundamentals of Network theory including its concepts, initial and final conditions of components, transient ant steady state response, network theorems, two-port network, network parameters, resonance and LC filters. With this the students will have the knowledge of how to evaluate and analyze any complex network.	• Understand, Analyze the basic AC and DC circuits using KCL,KVL and network Theorems • Determine the voltages, currents, power and impedances at various nodes and loops using all the simplification techniques. • Understand and apply graph theory to solve network equations • Understand, and calculate the initial conditions of RL, RC circuits • Formulate, solve the differential equations for RL, RC, and RLC circuits and carry out the transient analysis. • Understand, identify and analyze the series, parallel resonance circuits, calculate the bandwidth, selectivity, Q-factor also. • Understand, analyze and design prototype LC filters and Resistive attenuators. • Characterize; model the network in terms of all network parameters and analyze. • Understand and formulate the network transfer function in s-domain and pole, zero concept.
			Digital Logic Design (204184)	• The concept and theory of digital Electronics are needed in almost all electronics and telecommunication engineering fields and in many other engineering and scientific disciplines as well. The main objective of this course is to lay the foundation for further studies in areas such as communication, VLSI, computer, microprocessor etc. One of the most important reasons for the unprecedented growth of digital electronics is the advent of integrated circuit. This course will explore the basic concepts of digital electronics.	• Understand the basic logic gates and various variable reduction techniques of digital logic circuit in detail. • Understand, identify and design combinational and sequential circuits • Design and implement hardware circuit to test performance and application for what it is being designed. • Simulate and verify using computer simulation software to obtain desired result. • Understand and verify simulated circuit model with hardware implementation.
			Power Devices & Machines (204185)	• To introduce students to different power devices to study their construction, characteristics and turning on circuits. • To give an exposure to students of working & analysis of controlled rectifiers for different loads, inverters, DC choppers, AC voltage controllers and resonant converters. • To study the different motor drives, various power electronics applications like UPS, SMPS, etc. and some protection circuits.	• Design & implement a triggering / gate drive circuit for a power device • Understand, perform & analyze different controlled converters. • Evaluate battery backup time & design a battery charger. • Design & implement over voltage / over current protection circuit.
		II	EM-III	• Linear differential equations of higher order using analytical methods and numerical methods applicable to Control systems and Network analysis. • Transforms such as Fourier transform, Z-transform and applications to Communication systems and Signal processing. • Vector differentiation and integration required in Electro-Magnetics and Wave theory. • Complex functions, conformal mappings, contour integration applicable to Electrostatics, Digital filters, Signal and Image processing.	• Solve higher order linear differential equation using appropriate techniques for modeling and analyzing electrical circuits. • Solve problems related to Fourier transform, Z-transform and applications to Communication systems and Signal processing. • Obtain Interpolating polynomials, numerically differentiate and integrate functions, numerical solutions of differential equations using single step and multi-step iterative methods used in modern scientific computing. • Perform vector differentiation and integration, analyze the vector fields and apply to Electro-Magnetic
			Integrated Circuits Applications (204188)	• To understand characteristics of IC and Op-Amp and identify the internal structure. • To introduce various manufacturing techniques. • To study various op-amp parameters and their significance for Op-Amp. • To learn frequency response, transient response and frequency compensation techniques for Op-Amp. • To analyse and identify linear and nonlinear applications of Op-Amp. • To understand functionalities of PLL and its use in various applications in communication and control systems.	• Understand the characteristics of IC and Op-Amp and identify the internal structure. • Understand and identify various manufacturing techniques. • Derive and determine various performances based parameters and their significance for Op-Amp. • Comply and verify parameters after exciting IC by any stated method. • Analyze and identify the closed loop stability considerations and I/O limitations. • Analyze and identify linear and nonlinear applications of Op-Amp. • Understand and verify results (levels of V & I) with hardware implementation. • Implement hardwired circuit to test performance and application for what it is being designed. • Understand and apply the functionalities of PLL to Frequency synthesizer, multiplier, FM, and AM demodulators
			Electromagnetic (204189)	• To introduce the basic mathematical concepts related to electromagnetic vector fields. • To impart knowledge on the concepts of electrostatics, electric potential, energy density and their applications. • To impart knowledge on the concepts of magnetostatics, magnetic flux density, scalar and vector potential and its applications. • To impart knowledge on the concepts of Faraday‘s law, induced emf and Maxwell‘s equations • To impart knowledge on the concepts of Concepts of electromagnetic waves and Transmission lines.	• Understand the basic mathematical concepts related to electromagnetic vector fields. • Apply the principles of electrostatics to the solutions of problems relating to electric field and electric potential, boundary conditions and electric energy density. • Apply the principles of magnetostatics to the solutions of problems relating to magnetic field and magnetic potential, boundary conditions and magnetic energy density. • Understand the concepts related to Faraday‘s law, induced emf and Maxwell‘s equations. 5) Apply Maxwell‘s equations to solutions of problems relating to transmission lines and uniform plane wave propagation.
			Data Structures (204190)	• This course provides an introduction to the theory, practice and methods of data structures and algorithm design. Students will learn elementary data structures such as stacks, queues, linked lists, trees and graphs in C language, and the algorithms designed for manipulating these data structures. The objective of this course is to introduce students to both data structures and algorithm design.	• Choose the data structures that effectively model the information in a problem. • Judge efficiency trade-offs among alternative data structure implementations or combinations. • Apply algorithm analysis techniques to evaluate the performance of an algorithm and to compare data structures. • Implement and know when to apply standard algorithms for searching and sorting. • Design, implement, test, and debug programs using a variety of data structures including lists, sacks, queues, hash tables, binary tree structures, search trees, heaps, graphs.

			Communication Theory (204191)	• Describe and analyze the mathematical techniques of generation, transmission and reception of amplitude modulation (AM), frequency modulation (FM) and phase modulation (PM) signals. • Evaluate the performance levels (Signal-to-Noise Ratio) of AM, FM and PM systems in the presence of additive white noise. • Convert analog signals to digital format and describe Pulse and digital Modulation techniques.	• Understand and identify the fundamental concepts and various components of analogcommunication systems. •. Explain signal to noise ratio, noise figure and noise temperature for single and cascaded stages in a communication system. • Describe analog pulse modulation techniques and digital modulation technique. • Develop the ability to compare and contrast the strengths and weaknesses of variouscommunication systems.

BE(2015P)

SEM-I

	Sr.No.	Class	Subjects	Course Objectives	Course Outcomes
				• To understand state-of-the-art in network protocols, architectures, and applications	• Understand fundamental underlying principles of computer networking
				• To provide students with a theoretical and practical base in computer networks issues	• Describe and analyze the hardware, software, components of a network and their interrelations.
				• To outline the basic network configurations	• Analyze the requirements for a given organizational structure and select the most appropriate networking architecture and technologies
				• To understand the transmission methods underlying LAN and WAN technologies.	• Have a basic knowledge of installing and configuring networking applications.
			Computer Networks & Security	• To understand security issues involved in LAN and Internet.	• Specify and identify deficiencies in existing protocols, and then go onto select new and better protocols.
	1	BE_2015	(404182)		• Have a basic knowledge of the use of cryptography and network security.
				• To introduce fundamental theory of radiation and microwaves.	• Differentiate various performance parameters of radiating elements.
				• To understand design principles of various radiating elements.	• Analyze various radiating elements and arrays.
				• To understand theory of passive and active components of microwave systems.	• Apply the knowledge of waveguide fundamentals in design of transmission lines.
				• To learn microwave measurement techniques.	• Design and set up a system consisting of various passive microwave components.
					• Analyze tube based and solid state active devices along with their applications.
			Radiation & Microwave		• Measure various performance parameters of microwave components.
	2	BE_2015	Techniques (404183)		.
			Digital Image and Video Processing		
			-404184	• Understand the fundamental concepts of Digital Image Processing with basic relationship of pixels and mathematical operations on 2-D data.	• Develop and implement basic mathematical operations on digital images.
				• Learn design and integrate image enhancement and image restoration techniques	• Analyze and solve image enhancement and image restoration problems.
				• Understand object segmentation and image analysis techniques	• Identify and design image processing techniques for object segmentation and recognition.
				• Learn the need for effective use of resources such as storage and bandwidth and ways to provide effective use of them by data compression techniques	• Represent objects and region of the image with appropriate method.
				• Learn basic concepts of video processing	• Apply 2-D data compression techniques for digital images.
	3	BE_2015			• Explore video signal representation and different algorithm for video processing.
			VLSI Design & Technology		
			-404181	• To explore HDL and related design approach.	• Write effective HDL coding for digital design.
				• To nurture students with CMOS circuit designs.	• Apply knowledge of real time issues in digital design.
				• To realize importance of testability in logic circuit design.	• Model digital circuit with HDL, simulate, synthesis and prototype in PLDs.
				• To overview ASIC issues and understand PLD architectures with advanced features.	• Design CMOS circuits for specified applications.
					• Analyze various issues and constraints in design of an ASIC
	4	BE_2015			• Apply knowledge of testability in design and build self test circuit.
			Electronic Product Design (Elective-II)		
			-404185	• To understand the stages of product (hardware/ software) design and development.	• Understand various stages of hardware, software and PCB design.
				• To learn the different considerations of analog, digital and mixed circuit design.	• Importance of product test & test specifications.
				• To be acquainted with methods of PCB design and different tools used for PCB Design.	• Special design considerations and importance of documentation
				• To understand the importance of testing in product design cycle.`	
	5	BE_2015		• To understand the processes and importance of documentation.	
ENTC			Audit Course 5 (2)		• Change in awareness levels, knowledge and understanding of student
			Human Behavior	• To develop understanding of Behavioral Aspects.	• Change in attitudes / behavior of students with regards to their education improved teamwork, institutional leadership and other life skills
				• To identify and develop Attitude and Core Faith values	• Improvement in social health and attitude.
				• To expose students to Family Relations, time and career management	
	6	BE_2015		• To enable student to understand Creative Thinking and Problem solving	

Sem-II

				• To understand switching techniques for voice and data traffic.	• Apply the concepts of switching technique and traffic engineering to design multistage networks.
				• To nurture students with knowledge of traffic engineering to design networks.	• Explore the architecture of GSM.
				• To realize importance of cellular concepts and its propagation mechanism.	• Differentiate thoroughly the generations of mobile technologies.
				• To understand architecture of GSM system.	
	7	BE_2015	404189 Mobile Communication	• To overview 4G LTE and 5G technologies	
				• To comprehend the three primary components of a fiber optic communication system.	• Perform Link power budget and Rise Time Budget by proper selection of components and check its viability.
				• To understand the system design issues and the role of WDM components in advanced light wave systems.	• Perform Satellite Link design for Up Link and Down Link.

	8	BE_2015	404190 Broadband Communication Systems	• To understand the basics of orbital mechanics and the look angles from ground stations to the satellite. • To apply subject understanding in Link Design.	
	9	BE_2015	404191 Audio Video Engineering (Elective III)	• After learning AVE course, students will get benefit to learn and understand the working of real life video system and the different elements of video system plus the encoding/decoding techniques. • The learners will be groomed up to understand different channel allocations, difference between various systems present in this world, their transmission and reception techniques. • Students will get insight on functioning of individual blocks, different standards of compression techniques and they will be acquainted with different types of analog, digital TV and HDTV systems. • The students will get overview of fundamentals of Audio systems and basics of Acoustics	• Apply the fundamentals of Analog Television and Colour Television standards. • Explainthe fundamentals of Digital Television, DTV standards and parameters. • Study and understand various HDTV standards and Digital TV broadcasting systems and acquainted with different types of analog, digital TV and HDTV systems. • Understand acoustic fundamentals and various acoustic systems.
	10	BE_2015	404194 Wireless Sensor Networks (Elective-IV)	• To learn basic concepts of Wireless sensor networks • To be familiar with architecture and protocols used in Wireless sensor networks • To provide knowledge of deployment and security issued of Wireless sensor networks	• Explain various concepts and terminologies used in WSN • Describe importance and use of radio communication and link management in WSN • Explain various wireless standards and protocols associated with WSN • Recognize importance of localization and routing techniques used in WSN • Understand techniques of data aggregation and importance of security in WSN • Examine the issues involved in design and deployment of WSN
	11	BE_2015	Audit Course 6 (2) Environmental Issues And Disaster Management	• To develop understanding of Environment Issues and Biodiversity • To introduce to the students the environment, Disaster Management • To enable students to understand ecosystem and preservation of environment • To understand Disaster Management and handling them	• To learn the different environmental issues and disasters. • To deal with problems associated with environment and effectively handle the disasters.

First Year Engineering

Vision

"To develop the department in full fledge center of learning in various fields of computer engineering, keeping in view the latest developments."

Mission

"To impart value based technical education and train students and to turn out full-fledged engineers in the field of computer engineering with an overall background suitable for making a successful career either in industry or research or higher education in India or aboard."

FE(2019P)

Program Educational Objective

1. To prepare globally competent graduates having strong fundamentals and domain knowledge to provide effective solutions for engineering problems.
2. To prepare the graduates to work as committed professionals with strong professional ethics and values, sense of responsibilities, understanding of legal, safety, health, societal, cultural and environmental issues.
3. To prepare committed and motivated graduates with research attitude, lifelong learning, investigative approach, and multidisciplinary thinking.
4. To prepare the graduates with strong managerial and communication skills to work effectively as individual as well as in teams.

Program Outcomes

Students are expected to know and be able -

1. To apply knowledge of mathematics, science, engineering fundamentals, problem solving skills, algorithmic analysis to solve complex engineering problems.
2. To analyze the problem by finding its domain and applying domain specific skills
3. To understand the design issues of the product/software and develop effective solutions with appropriate consideration of public health and safety, cultural, societal, and environmental issues.
4. To find solutions of complex problems by conducting investigations applying suitable techniques.
5. To adapt the usage of modern tools and recent software.
6. To contribute towards the society by understanding the impact of Engineering on global aspect.
7. To understand environment issues and design a sustainable system.

8. To understand and follow professional ethics.

9. To function effectively as an individual and as member or leader in diverse teams and interdisciplinary settings.

10. To demonstrate effective communication at various levels.

11. To apply the knowledge of Computer Engineering for development of projects, and its finance and management.

12. To keep in touch with current technologies and inculcate the practices of lifelong learning.

FE (2019P)

SEM-I & II

Sr no	class	subject	Course Objective	Course outcome
1	FE(2019P)	**107001 – Engineering Mathematics – I**	To make the students familiarize with concepts and techniques in Calculus, Fourier series and Matrices. The aim is to equip them with the techniques to understand advanced level mathematics and its applications that would enhance analytical thinking power, useful in their disciplines.	On completion of the course, Learner will be able to– **CO1**: Mean value theorems and its generalizations leading to Taylors and Maclaurin's series useful in the analysis of engineering problems. **CO2:** the Fourier series representation and harmonic analysis for design and analysis of periodic continuous and discrete systems. **CO3:** to deal with derivative of functions of several variables that is essential in various branches of Engineering. **CO4:** to apply the concept of Jacobian to find partial derivative of implicit function and functional dependence. Use of partial derivatives in estimating error and approximation and finding extreme values of the function. **CO5**: the essential tool of matrices and linear algebra in a comprehensive manner for analysis of system of linear equations, finding linear and orthogonal transformations, Eigen values and Eigen vectors applicable to engineering problems

2	FE(2019P)	**107002: Engineering Physics**	To teach students basic concepts and principles of physics, relate them to laboratory experiments and their applications	On completion of the course, Learner will be able to– **CO1**: Develop understanding of interference, diffraction and polarization; connect it to few engineering applications. **CO2**: Learn basics of lasers and optical fibers and their use in some applications. **CO3**: Understand concepts and principles in quantum mechanics. Relate them to some applications. **CO4**: Understand theory of semiconductors and their applications in some semiconductor devices. **CO5**: Summarize basics of magnetism and superconductivity. Explore few of their technological applications. **CO6**: Comprehend use of concepts of physics for Non Destructive Testing. Learn some properties of nano materials and their application

3	FE(2019P)	**102003 - Systems in Mechanical Engineering**	1. To identify the sources of energy and their conversions 2. To explain the basic concept of engineering thermodynamics and its application 3. To understanding the specifications of vehicles 4. To get acquainted with vehicle systems 5. To introduce manufacturing processes applying proper method to produce components 6. To be able to select and compare domestic appliances	On completion of the course, Learner will be able to– **CO1**: Describe and compare the conversion of energy from renewable and non-renewable energy sources **CO2**: Explain basic laws of thermodynamics, heat transfer and their applications **CO3**: List down the types of road vehicles and their specifications **CO4**: Illustrate various basic parts and transmission system of a road vehicle **CO5**: Discuss several manufacturing processes and identify the suitable process **CO6**: Explain various types of mechanism and its application
4	FE(2019P)	103004: Basic Electrical Engineering	1. To introduce fundamental concepts, various laws-principles and theorems associated with electrical systems. 2. To impart basic knowledge of all electrical quantities such as current, voltage, power, energy, frequency along with different types of fields. 3. To provide knowledge about fundamental parameters such as resistance, inductance and capacitance and magnetic circuits, AC and DC circuits. 4. To provide knowledge of the concepts of transformer,	At the end of course students will be able to **CO1**: Differentiate between electrical and magnetic circuits and derive mathematical relation for self and mutual inductance along with coupling effect. **CO2**: Calculate series, parallel and composite capacitor as well as characteristics parameters of alternating quantity and phasor arithmetic **CO3**: Derive expression for impedance, current, power in series and parallel RLC circuit with AC supply along with phasor diagram. **CO4**: Relate phase and line electrical quantities in polyphase networks, demonstrate the operation of single phase transformer and calculate efficiency and regulation at

			different energy conversions techniques. .	different loading conditions **CO5**: Apply and analyze the resistive circuits using star-delta conversion KVL, KCL and different network theorems under DC supply. **CO6**: Evaluate work, power, and energy relations and suggest various batteries for different applications, concept of charging and discharging and depth of charge.
5	FE(2019P)	**110005: Programming and Problem Solving**	Prime objective is to give students a basic introduction to programming and problem solving with computer language Python. And to introduce students not merely to the coding of computer programs, but to computational thinking, the methodology of computer programming, and the principles of good program design including modularity and encapsulation. 1. To understand problem solving, problem solving aspects, programming and to know about various program design tools. 2. To learn problem solving with computers 3. To learn basics, features and future of Python programming. 4. To acquaint with data	On completion of the course, learner will be able to– CO1: Inculcate and apply various skills in problem solving. CO2: Choose most appropriate programming constructs and features to solve the problems in diversified domains. CO3: Exhibit the programming skills for the problems those require the writing of well-documented programs including use of the logical constructs of language, Python. CO4: Demonstrate significant experience with the Python program development environment.

			types, input output statements, decision making, looping and functions in Python 5. To learn features of Object Oriented Programming using Python 6. To acquaint with the use and benefits of files handling in Python	
6	FE(2019P)	**111006 - Workshop Practice**	1. To understand the construction and working of machine tools and functions of its parts. 2. To develop the skill through hands-on practices using hand tools, power tools, machine tools in manufacturing and assembly shop leading to understanding of a production processes. 3. To understand workshop layout and safety norms.	**CO1**: Familiar with safety norms to prevent any mishap in workshop. **CO2**: Able to handle appropriate hand tool, cutting tool and machine tools to manufacture a job. **CO3**: Able to understand the construction, working and functions of machine tools and their parts. **CO4**: Able to know simple operations (Turning and Facing) on a centre lathe.
7	FE(2019P)	**101007: Environmental Studies-I**	1. To explain the concepts and strategies related to sustainable development and various components of environment. 2. To examine biotic and abiotic factors within an ecosystem, to identify food chains, webs, as well as energy flow and relationships.	**CO1**: Demonstrate an integrative approach to environmental issues with a focus on sustainability. **CO2**: Explain and identify the role of the organism in energy transfers in different ecosystems. **CO**3: Distinguish between and provide examples of renewable and nonrenewable resources & analyze personal consumption of resources. **CO4:** Identify key threats to

			3. To identify and analyze various conservation methods and their effectiveness in relation to renewable and nonrenewable natural resources. 4. To gain an understanding of the value of biodiversity and current efforts to conserve biodiversity on national and local scale.	biodiversity and develop appropriate policy options for conserving biodiversity in different settings
8	FE(2019P)	**107008 – Engineering Mathematics – II**	To make the students familiarize with Mathematical Modeling of physical systems using differential equations advanced techniques of integration, tracing of curve, multiple integrals and their applications. The aim is to equip them with the techniques to understand advanced level mathematics and its applications that would enhance thinking power, useful in their disciplines	The students will be able to learn **CO1:** the effective mathematical tools for solutions of first order differential equations that model physical processes such as Newton's law of cooling, electrical circuit, rectilinear motion, mass spring systems, heat transfer etc. **CO2:** advanced integration techniques such as Reduction formulae, Beta functions, Gamma functions, Differentiation under integral sign and Error functions needed in evaluating multiple integrals and their applications. **CO3:** to trace the curve for a given equation and measure arc length of various curves. **CO4:** the concepts of solid geometry using equations of sphere, cone and cylinder in a comprehensive manner. **CO5:** evaluation of multiple integrals and its application to find area bounded by curves, volume bounded by surfaces, Centre of gravity and Moment of inertia.

9	FE(2019P)	**107009: Engineering Chemistry**	1. To understand technology involved in analysis and improving quality of water as commodity. 2. To acquire the knowledge of electro-analytical techniques that facilitates rapid and precise understanding of materials. 3. To understand structure, properties and applications of specialty polymers and nano material. 4. To study conventional and alternative fuels with respect to their properties and applications. 5. To study spectroscopic techniques for chemical analysis. **6.** To understand corrosion mechanisms and preventive methods for corrosion control.	On completion of the course, learner will be able to– **CO1**: Apply the different methodologies for analysis of water and techniques involved in softening of water as commodity. **CO2:** Select appropriate electro-technique and method of material analysis. **CO3:** Demonstrate the knowledge of advanced engineering materials for various engineering applications. **CO4:** Analyze fuel and suggest use of alternative fuels. **CO5:** Identify chemical compounds based on their structure. **CO6:** Explain causes of corrosion and methods for minimizing corrosion.
10	FE(2019P)	**104010:Basic Electronics Engineering**	1. The principle of electronics and working principle of PN junction diode and special purpose diodes. 2. The functioning of transistors like BJT, MOSFETs and OPAMP. 3. Basics of various logic gates, digital circuits and their applications. 4. Working and	**CO1:** Explain the working of P-N junction diode and its circuits. **CO2:** Identify types of diodes and plot their characteristics and also can compare BJT with MOSFET. **CO3:** Build and test analog circuits using OPAMP and digital circuits using universal/basic gates and flip flops. **CO4:** Use different electronics measuring instruments to measure various electrical parameters. **CO5:** Select sensors for specific

			functions of various electronic instruments. 5. The operating principles and applications of various active and passive sensors. 6. Basic principles of communication systems.	applications. **CO6**: Describe basic principles of communication systems.
11	FE(2019P)	**101011: Engineering Mechanics**	1. To impart knowledge about force systems and methods to determine resultant centroid and moment of inertia 2. To teach methods to calculate force of friction 3. To impart knowledge to determine reaction of beams, calculate member forces in trusses, cables and frames using principles of equilibrium 4. To teach space force systems 5. To train students to solve problems related to particle mechanics using principles of kinematics, kinetics and work power energy	On completion of the course, learner will be able to– **CO1:** Determine resultant of various force systems **CO2:** Determine centroid, moment of inertia and solve problems related to friction **CO3:**Determine reactions of beams, calculate forces in cables using principles of equilibrium **CO4:** Solve trusses, frames for finding member forces and apply principles of equilibrium to forces in space **CO5:** Calculate position, velocity and acceleration of particle using principles of kinematics **CO6:** Calculate position, velocity and acceleration of particle using principles of kinetics and Work, Power, Energy

12	FE(2019P)	**102012: Engineering Graphics**	1. To acquire basic knowledge about engineering drawing language, line types, dimension methods, and simple geometrical construction. 2. To draw conic sections by various methods, involutes, cycloid and spiral. 3. To acquire basic knowledge about physical realization of engineering objects and shall be able to draw its different views. 4. To visualize three dimensional engineering objects and shall be able to draw their isometric views. 5. To imagine visualization of lateral development of solids. 6. To acquire basic knowledge about the various CAD drafting software's and its basic commands required to construct the simple engineering objects.	On completion of the course, learner will be able to **CO1**: Draw the fundamental engineering objects using basic rules and able to construct the simple geometries. **CO2:** Construct the various engineering curves using the drawing instruments. **CO3:** Apply the concept of orthographic projection of an object to draw several 2D views and its sectional views for visualizing the physical state of the object. **CO4**: Apply the visualization skill to draw a simple isometric projection from given orthographic views precisely using drawing equipment. **CO5:** Draw the development of lateral surfaces for cut section of geometrical solids. **CO6:** Draw fully-dimensioned 2D, 3D drawings using computer aided drafting tools.
13	FE(2019P)	**110013: Project Based Learning**	1. To emphasizes learning activities that are long-term, interdisciplinary and student-centric. 2. To inculcate independent learning by problem solving with	**CO1:** Project based learning will increase their capacity and learning through shared cognition. **CO2:** Students able to draw on lessons from several disciplines and apply them in practical way. **CO3:** Learning by doing approach in PBL will promote long-term

			social context. 3. To engages students in rich and authentic learning experiences. 4. To provide every student the opportunity to get involved either individually or as a group so as to develop team skills and learn professionalism.	retention of material and replicable skill, as well as improve teachers' and students' attitudes towards learning
14	FE(2019P)	**101014: Environmental Studies-II**	1. To provide a comprehensive overview of environmental pollution and the science and technology associated with the monitoring and control. 2. To understand the evolution of environmental policies and laws. 3. To explain the concepts behind the interrelations between environment and the development. 4. To examine a range of environmental issues in the field, and relate these to scientific theory	On completion of the course, learner will be able to– **CO1:** Have an understanding of environmental pollution and the science behind those problems and potential solutions. **CO2:** Have knowledge of various acts and laws and will be able to identify the industries that are violating these rules. **CO3:** Assess the impact of ever increasing human population on the biosphere: social, economic issues and role of humans in conservation of natural resources. **CO4:** Learn skills required to research and analyze environmental issues scientifically and learn how to use those skills in applied situations such as careers that may involve environmental problems and/or issues.

Information Technology Engineering

Vision

"To Provide platform to Innovative minds to show their core competency"

Mission

"To offer high quality education in Information Technology to enhance employability and higher education."

SE(2015 Course)

PROGRAM EDUCATIONAL OBJECTIVES

The students of Information Technology course after passing out will

1. Possess strong fundamental concepts in mathematics, science, engineering and Technology to address technological challenges.
2. Possess knowledge and skills in the field of Computer Science and Information Technology for analyzing, designing and implementing complex engineering problems of any domain with innovative approaches.
3. Possess an attitude and aptitude for research, entrepreneurship and higher studies in the field of Computer Science and Information Technology.
4. Have commitment to ethical practices, societal contributions through communities and life-long learning.
5. Possess better communication, presentation, time management and team work skills leading to responsible & competent professionals and will be able to address challenges in the field of IT at global level.

PROGRAM SPECIFIC OUTCOMES

PSO1: Professional Skills: The ability to understand, analyze and develop computer programs in the areas related to algorithms, system software, multimedia, web design, big data analytics, and networking for efficient design of computer-based systems of varying complexity.
PSO2: Problem-Solving Skills: The ability to apply standard practices and strategies in software project development using open-ended programming environments to deliver a quality product for business success.
PSO3: Successful Career and Entrepreneurship: The ability to employ modern computer languages, environments, and platforms in creating innovative career paths to be an entrepreneur, and a zest for higher studies.

PROGRAM OUTCOMES

The students in the Information Technology course will attain:

1. an ability to apply knowledge of mathematics, computing, science, engineering and technology;
2. an ability to define a problem and provide a systematic solution with the help of conducting experiments, analyzing the problem and interpreting the data;
3. an ability to design, implement, and evaluate a software or a software/hardware system, component, or process to meet desired needs within realistic constraints;
4. an ability to identify, formulate, and provide systematic solutions to complex engineering/Technology problems;
5. an ability to use the techniques, skills, and modern engineering technology tools, standard processes necessary for practice as a IT professional;
6. an ability to apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computer-based systems with necessary constraints and assumptions;
7. an ability to analyze and provide solution for the local and global impact of information technology on individuals, organizations and society;
8. an ability to understand professional, ethical, legal, security and social issues and responsibilities;
9. an ability to function effectively as an individual or as a team member to accomplish a desired goal(s);
10. an ability to engage in life-long learning and continuing professional development to cope up with fast changes in the technologies/tools with the help of electives, professional organizations and extra-curricular activities;
11. an ability to communicate effectively in engineering community at large by means of effective presentations, report writing, paper publications, demonstrations;
12. an ability to understand engineering, management, financial aspects, performance, optimizations and time complexity necessary for professional practice;
13. an ability to apply design and development principles in the construction of software systems of varying complexity.

SE(2015 Course)

Year and Course	Subject	Course Objectives	Course Outcomes
	Discrete Structures	1. Learn the use of set, proof techniques and determine logical possibilities in a given situation. 2. Learn relations, functions among various entities in real world. 3. Learn to apply relations and functions in real life. 4. Learn to formulate problem mathematically using graph theory and trees.	By the end of the course, students should be able to 1. Use set, relation and function to formulate a problem and solve it 2. Use graph theory and trees to formulate the problems and solve them 3. Use mathematical propositions and proof techniques to check the truthfulness of a real life situation.

Computer Organization & Architecture	1. To understand the structure, function & characteristics of computer systems. 2. To understand the design of the various functional units of digital computers. 3. To understand instruction level parallelism & parallel organization of multi-processor & multi core systems	On completion of the course, learner will be able to– 1. Solve problems based on computer arithmetic. 2. Explain processor structure & its functions. 3. Obtain knowledge about micro-programming of a processor. 4. Understand concepts related to memory & IO organization. 5. Acquire knowledge about instruction level parallelism & parallel organization of multi-processor & multi core
Digital Electronics and Logic Design	1. To learn and understand basic digital design techniques. 2. To develop design and implementation skills of combinational and sequentiallogic circuits. 3. To introduce digital logic design software such as VHDL Programming.	1. Spectacle an awareness and apply knowledge of number systems, codes, Boolean algebra and use necessary A.C, D.C Loading characteristics as well as functioning while designing with logic gates. 2. Use logic function representation for simplification with K-Maps and analyze as well as design Combinational logic circuits using SSI & MSI chips. 3. Analyze Sequential circuits like Flip-Flops (Truth Table, Excitation table), their conversion & design the applications. 4. Identify the Digital Circuits, Input/Outputs to replace by FPGA 5. Use VHDL programming technique with different modeling styles for any digital circuits
Fundamentals of Data Structures	1. To learn C language constructs and pointers in depth. 2. To learn algorithm development and analysis of algorithms. 3. To learn linear data structures and their applications 4. To learn different searching and sorting techniques	After successful completion of this course, student will be able to 1. Apply appropriate constructs of C language, coding standards for application development. 2. Use dynamic memory allocation concepts and file handling in various application developments. 3. Perform basic analysis of algorithms with respect to time and space complexity 4. Select appropriate searching and/or sorting techniques in the application development 5. Select and use appropriate data structures for problem solving and programming 6. Use algorithmic foundations for solving problems and
Problem Solving and Object Oriented programming	1. Employ a problem-solving strategy to breakdown a complex problem into a series of simpler tasks. 2. Execute problem-solving actions appropriate to completing a variety of sub problems. 3. Apply analytical and logical thinking to extract facts from a problem description and determine how they relate to one another and to the problems to be solved. 4. Design and implement an object oriented solution to solve a real life problem. 5. Develop problem-solving and programming skills using OOP concept.	After studying this subject student should be able to 1. Develop algorithms for solving problems by using modular programming concepts 2. Abstract data and entities from the problem domain, build object models and design software solutions using object-oriented principles and strategies 3. Discover, explore and apply tools and best practices in object-oriented programming. 4. Develop programs that appropriately utilize key object-oriented concepts
Digital Laboratory	1. To learn and understand basic digital design techniques. 2. To learn and understand design and construction of combinational and sequential circuits. 3. To introduce digital logic design software such as VHDL Programming.	After completion of this course student will be able to 1. Spectacle an awareness and apply knowledge and concepts and methods of digital system design techniques as hands-on experiments with the use of necessary A.C, D.C Loading characteristics. 2. Use logic function representation for simplification with K-Maps and analyze as well as design Combinational logic circuits using SSI & MSI chips. 3. Analyze Sequential circuits like Flip-Flops (Truth Table, Excitation table) & design the applications like Asynchronous and Synchronous Counters. 4. Design Sequential Logic circuits: Sequence generators, MOD counters with registers/Counters using synchronous /asynchronous counters. 5. Understand the need of skills, techniques and learn state-of-the-art engineering tools through hands-on experimentation on the Xilinx tools for design as well as the basics of VHDL. 6. Understand and implement the design Steps, main programming technique with different modeling styles for any digital circuits with VHDL Programming

SE(2015 Course)	**Programming Laboratory**	1. To learn C language constructs and pointers in depth. 2. To learn algorithm development and analysis of algorithms. 3. To learn linear data structures and their applications 4. To learn different searching and sorting techniques	After successful completion of this course, student will be able to 1. Apply appropriate constructs of C language, coding standards for application development. 2. Use dynamic memory allocation concepts and file handling in various application developments. 3. Perform basic analysis of algorithms with respect to time and space complexity 4. Select appropriate searching and/or sorting techniques in the application development 5. Select and use appropriate data structures for problem solving and programming 6. Use algorithmic foundations for solving problems and programming
	Object Oriented programming Lab.	1. Employ a problem-solving strategy to breakdown a complex problem into a series of simpler tasks. 2. Execute problem-solving actions appropriate to completing a variety of sub problems. 3. Apply analytical and logical thinking to extract facts from a problem description and determine how they relate to one another and to the problems to be solved. 4. Design and implement an object oriented solution to solve a real life problem. 5. Develop problem-solving and programming skills using OOP concept.	After studying this subject student should be able to 1. Develop and implement algorithms for solving simple problems using modular programming concept. 2. Abstract data and entities from the problem domain, build object models and design software solutions using object-oriented principles and strategies. 3. Discover, explore and apply tools and best practices in object-oriented programming. 4. Develop programs that appropriately utilize key object-oriented concepts 5. Create a data base using files
	Communication Skills	1. Improve students' overall linguistic & communicative competence in English 2. Enhance their pronunciation, vocabulary and LSRW skills 3. Foster their confidence in public speaking and group communication skills	After successful completion of this course, student will be able to 1. Provides an ability to understand, analyze and interpret the essentiality of grammar and its proper usage. 2. Build the students' vocabulary by means of communication via web, direct Communication and indirect communication. 3. Improves Students' Pronunciation skills and understanding between various phonetic sounds during communication. 4. Understanding the various rules and means of written communication. 5. Effective communication with active listening, facing problems while communication and how to overcome it
	Audit Course		
	Engineering Mathematics -III	After completing this course, students will have adequate mathematical background, conceptual clarity, computational skills and algorithm design for problem solving related to: 1. Linear differential equations of higher order applicable to Control systems, Computer vision, and Robotics. 2. Transform techniques such as Fourier transform, Z-transform and applications to Image processing. 3. Statistical methods such as correlation, regression analysis and probability theory to analyze data and to make predictions applicable to machine intelligence. 4. Vector calculus necessary to analyze and design complex electrical and electronic devices as appropriate to Computer engineering. 5. Complex functions, conformal mappings and contour integration applicable to Image processing, Digital filters and Computer graphics.	At the end of this course, students will be able to: 1. Solve higher order linear differential equation using appropriate techniques for modeling and analyzing electrical circuits. 2. Solve problems related to Fourier transform, Z-Transform and applications to Signal and Image processing. 3. Apply statistical methods like correlation, regression analysis and probability theory for analysis and prediction of a given data as applied to machine intelligence. 4. Perform vector differentiation and integration to analyze the vector fields and apply to compute line, surface and volume integrals. 5. Analyze conformal mappings, transformations and perform contour integration of complex functions required in Image processing, Digital filters and Computer graphics.

Computer Graphics	1. To acquaint the learners with the basic concepts of Computer Graphics 2. To learn the various algorithms for generating and rendering graphical figures 3. To get familiar with mathematics behind the graphical transformations 4. To understand and apply various methods and techniques regarding projections, animation, shading, illumination and lighting	On completion of the course, learner will be able to – 1. Apply mathematics and logic to develop Computer programs for elementary graphic operations 2. Develop scientific and strategic approach to solve complex problems in the domain of Computer Graphics 3. Develop the competency to understand the concepts related to Computer Vision and Virtual reality 4. Apply the logic to develop animation and gaming programs
Processor Architecture and Interfacing	1. To study architecture and features of 80386 microprocessors and 8051 microcontroller 2. To learn design of minimum system using 8051 micro-controller.	After successful completion of this course, student will be able to 1. Learn architectural details of 80386 microprocessor 2. Understand memory management and multitasking of 80386 microprocessor 3. Understand architecture and memory organization of 8051microcontroller 4. Explain timers and interrupts of 8051 microcontroller and its interfacing with I/O devices
Data Structures & Files	1. To study data structures and their implementations using OOP (C++) and their applications. 2. To study some advanced data structures such as trees, graphs and tables. 3. To learn different file organizations	After successful completion of this course, student will be able to 1. Analyze algorithms and to determine algorithm correctness and time efficiency class. 2. Understand different advanced abstract data type (ADT) and data structures and their implementations. 3. Understand different algorithm design techniques (brute -force, divide and conquer, greedy, etc.) and their implementation 4. Apply and implement learned algorithm design
Foundations of Communication and Computer Network	1. To understand fundamentals of communication systems 2. To acquaint themselves with layered model used computer networks	After successful completion of this course, student will be able to 1. Understand data/signal transmission over communication media 2. Recognize usage of various modulation techniques in communication 3. Analyze various spread spectrum and multiplexing techniques 4. Use concepts of data communication to solve various related problems 5. Understand error correction and detection techniques. 6. Acquaint with transmission media and their standards
Processor Interfacing Laboratory	1. To learn assembly language programming of 80386 microprocessors and 8051 microcontrollers. 2. To learn interfacing of real world input and output devices to 8051 microcontroller	After successful completion of this course, student will be able to 1. Learn and apply concepts related to assembly language programming 2. Write and execute assembly language program to perform array addition, code conversion, block transfer, sorting and string operations 3. Learn and apply interfacing of real world input and output devices to 8051 microcontroller
Data Structure and Files Laboratory	1. To study data structures and their implementations using OOP (C++) and their applications 2. To study some advanced data structures such as trees, graphs and tables 3. To learn different file organizations	After successful completion of this course, student will be able to 1. Apply and implement algorithm to illustrate use of linear data structures such as stack, queue 2. Apply and implement algorithms to create/represent and traverse non-linear data structures such as trees, graphs etc 3. Apply and implement algorithms to create and manipulate database using different file organizations 4. Learn and apply the concept of hashing in database creation and manipulation

	Computer Graphics Laboratory	1. To acquaint the learners with the basic concepts of Computer Graphics 2. To learn the various algorithms for generating and rendering graphical figures 3. To get familiar with mathematics behind the graphical transformations 4. To understand and apply various methods and techniques regarding projections, animation, shading, illumination and lighting	On completion of the course, learner will be able to – 1. Apply and implement line drawing and circle drawing algorithms to draw specific shape given in the problem 2. Apply and implement polygon filling algorithm for a given polygon 3. Apply and implement 2-D and 3-D transformation algorithms for given input shape 4. Apply and implement polygon clipping algorithm for given input polygon 5. Apply and implement fractal generation algorithm for a given input 6. Apply and implement animation concepts for generating simple animation without using any animation tool
	Audit Course		

TE(2015 Course)

PROGRAM EDUCATIONAL OBJECTIVES
The students of Information Technology course after passing out will 1. Possess strong fundamental concepts in mathematics, science, engineering and Technology to address technological challenges. 2. Possess knowledge and skills in the field of Computer Science and Information Technology for analyzing, designing and implementing complex engineering problems of any domain with innovative approaches. 3. Possess an attitude and aptitude for research, entrepreneurship and higher studies in the field of Computer Science and Information Technology. 4. Have commitment to ethical practices, societal contributions through communities and lifelong learning. 5. Possess better communication, presentation, time management and teamwork skills leading to responsible & competent professionals and will be able to address challenges in the field of IT at global level.

PROGRAM OUTCOMES
The students in the Information Technology course will attain: a. an ability to apply knowledge of mathematics, computing, science, engineering and technology; b. an ability to define a problem and provide a systematic solution with the help of conducting experiments, analyzing the problem and interpreting the data; c. an ability to design, implement, and evaluate a software or a software/hardware system,component, or process to meet desired needs within realistic constraints; d. an ability to identify, formulate, and provide systematic solutions to complex engineering/Technology problems; e. an ability to use the techniques, skills, and modern engineering technology tools, standard processes necessary for practice as a IT professional; f. an ability to apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computer-based systems with necessary constraints and assumptions; g. an ability to analyze and provide solution for the local and global impact of information technology on individuals, organizations and society; h. an ability to understand professional, ethical, legal, security and social issues and responsibilities; i. an ability to function effectively as an individual or as a team member to accomplish a desired goal(s); j. an ability to engage in life-long learning and continuing professional development to cope up with fast changes in the technologies/tools with the help of electives, professional organizations and extra-curricular activities; k. an ability to communicate effectively in engineering community at large by means of effective presentations, report writing, paper publications, demonstrations;

TE(2015 Course)

Year and Course	Subject	Course Objectives	Course Outcomes
	Theory of Computation	1. To understand problem classification and problem solving by machines. 2. To understand the basics of automata theory and its operations. 3. To study computing machines by describing, classifying and comparing different types of computational models. 4. Encourage students to study theory of computability and complexity. 5. To understand the P and NP class problems and	1. To construct finite state machines to solve problems in computing. 2. To write mathematical expressions for the formal languages 3. To apply well defined rules for syntax verification. 4. To construct and analyze Push Down, Post and Turing Machine for formal languages. 5. To express the understanding of the decidability and decidability problems. 6. To express the understanding of computational

Database Management Systems	1. To understand the fundamental concepts of database management. These concepts include aspects of database design, database languages, and database-system implementation. 2. To provide a strong formal foundation in database concepts, technology and practice. 3. To give systematic database design approaches covering conceptual design, logical design and an overview of physical design. 4. To be familiar with the basic issues of transaction processing and concurrency control. 5. To learn and understand various Database Architectures and Applications. 6. To understand how analytics and big data affect various functions now and in the future.	1. To define basic functions of DBMS & RDBMS. 2. To analyze database models & entity relationship models. 3. To design and implement a database schema for a given problem-domain. 4. To populate and query a database using SQL DML/DDL commands. 5. Do Programming in PL/SQL including stored procedures, stored functions, cursors and packages. 6. To appreciate the impact of analytics and big data on the information industry and the external ecosystem for analytical and data services
Software Engineering &Project Management	1. To understand the nature of software complexity in various application domains, disciplined way of software development and software lifecycle process models. 2. To introduce principles of agile software development, the SCRUM process and agile practices. 3. To know methods of capturing, specifying, visualizing and analyzing software requirements. 4. To understand project management through life cycle of the project. 5. To understand current and future trends and practices in the IT industry. 6. To learn about project planning, execution,	1. To identify unique features of various software application domains and classify software applications. 2. To choose and apply appropriate lifecycle model of software development. 3. To describe principles of agile development, discuss the SCRUM process and distinguish agile process model from other process models. 4. To analyze software requirements by applying various modeling techniques. 5. To list and classify CASE tools and discuss recent trends and research in software engineering. 6. To understand IT project management through life cycle of the project and future trends in IT Project Management
Operating System	1. To introduce basic concepts and functions of modern operating systems. 2. To understand the concept of process and thread management. 3. To understand the scheduling of processes and threads. 4. To understand the concept of concurrency control. 5. To understand the concept of I/O and File	1. Fundamental understanding of the role of Operating Systems. 2. To understand the concept of a process and thread. 3. To apply the cons of process/thread scheduling. 4. To apply the concept of process synchronization, mutual exclusion and the deadlock. 5. To realize the concept of I/O management and File system. 6. To understand the various memory management
Human-Computer Interaction	1. To introduce to the field of human-computer-interaction study. 2. To gain an understanding of the human part of human-computer-interactions. 3. To learn to do design and evaluate effective human-computer-interactions. 4. To study HCI models and theories. 5. To understand HCI design processes. 6. To apply HCI to real life use cases.	1. To explain importance of HCI study and principles of user-centred design (UCD) approach. 2. To develop understanding of human factors in HCI design. 3. To develop understanding of models, paradigms and context of interactions. 4. To design effective user-interfaces following a structured and organized UCD process. 5. To evaluate usability of a user-interface design. 6. To apply cognitive models for predicting human-computer-interactions.
Software Laboratory-I	1. Data structures and files. 2. Discrete Structure. 3. Software engineering principles and practices	1. To install and configure database systems. 2. To analyze database models & entity relationship models. 3. To design and implement a database schema for a given problem-domain 4. To understand the relational and document type database systems. 5. To populate and query a database using SQL

TE(2015 Course)	**Software Laboratory-II**	1. To introduce and learn Linux commands required for administration. 2. To learn shell programming concepts and applications. 3. To demonstrate the functioning of OS basic building blocks like processes, threads under the LINUX. 4. To demonstrate the functioning of OS concepts in user space like concurrency control (process synchronization, mutual exclusion & deadlock) and file handling in LINUX. 5. To aware Linux kernel source code details. 6. To demonstrate the functioning of OS concepts in kernel space like embedding the system call in any LINUX kernel.	1. To understand the basics of Linux commands and program the shell of Linux. 2. To develop various system programs for the functioning of operating system. 3. To implement basic building blocks like processes, threads under the Linux. 4. To develop various system programs for the functioning of OS concepts in user space like concurrency control and file handling in Linux. 5. To design and implement Linux Kernel Source Code. 6. To develop the system program for the functioning of OS concepts in kernel space like embedding the system call in any Linux kernel.
	Software Laboratory-III	1. To understand the nature of software complexity in various application domains, disciplined way of software development and software life cycle process models. 2. To introduce principles of agile software development, the SCRUM process and agile practices. 3. To know methods of capturing, specifying, visualizing and analyzing software requirements. 4. To understand concepts and principles of software design and architecture. 5. To understand user-centric design approach. 6. To apply principles of designing for effective user interfaces	1. To identify the needs of users through requirement gathering. 2. To apply the concepts of Software Engineering process models for project development. 3. To apply the concepts of HCI for user-friendly project development. 4. To deploy website on live webserver and access through URL. 5. To understand, explore and apply various web technologies. 6. To develop team building for efficient project development.
	Audit Course 3		
	Computer Network Technology	1. To understand services offered at different layers of network. 2. To understand protocol used at different layers of network. 3. To fathom wireless network and different wireless standards. 4. To recognize differences in between different wireless networks and to learn different mechanism used at layers of wireless network. 5. To know the applications of network and use the understood concepts for new application development. 6. To explore recent trends in networking.	1. To know Responsibilities, services offered and protocol used at each layer of network. 2. To understand different addressing techniques used in network. 3. To know the difference between different types of network. 4. To know the different wireless technologies and IEEE standards. 5. To use and apply the standards and protocols learned, for application development. 6. To understand and explore recent trends in network domain.
	Systems Programming	1. Computer Organization and architecture. 2. Processor Architecture and Interfacing. 3. Fundamentals of Data Structures, Data Structures and Files. 4. Theory of Computation: DFA, NFA, Regular expressions, Grammars.	1. To learn independently modern software development tools and creates novel solutions for language processing applications. 2. To design and implement assemblers and macro processors. 3. To use tool LEX for generation of Lexical Analyzer. 4. To use YACC tool for generation of syntax analyzer. 5. To generate output for all the phases of compiler. 6. To apply code optimization in the compilation process

Design and Analysis of Algorithms	1. To understand the problem solving and problem classification. 2. To know the basics of computational complexity analysis and various algorithm design strategies. 3. To provide students with solid foundations to deal with a wide variety of computational problems. 4. To provide a thorough knowledge of the most common algorithms and data structures. 5. To analyze a problem and identify the computing requirements appropriate for its solutions. 6. To understand the design of parallel algorithms.	1. To calculate computational complexity using asymptotic notations for various algorithms. 2. To apply Divide & Conquer as well as Greedy approach to design algorithms. 3. To practice principle of optimality. 4. To illustrate different problems using Backtracking. 5. To compare different methods of Branch and Bound strategy. 6. To explore the concept of P, NP, NP-complete, NP-Hard and parallel algorithms.
Cloud Computing	1. To become familiar with Cloud Computing and its ecosystem. 2. To learn basics of virtualization and its importance. 3. To evaluate in-depth analysis of Cloud Computing capabilities. 4. To give technical overview of Cloud Programming and Services. 5. To understand security issues in cloud computing. 6. To be exposed to Ubiquitous Cloud and Internet of Things	1. To understand the need of Cloud based solutions. 2. To understand Security Mechanisms and issues in various Cloud Applications 3. To explore effective techniques to program Cloud Systems. 4. To understand current challenges and trade-offs in Cloud Computing. 5. To find challenges in cloud computing and delve into it to effective solutions. 6. To understand emerging trends in cloud computing.
Data Science & Big Data Analytics	1. To introduce basic need of Big Data and Data science to handle huge amount of data. 2. To understand the basic mathematics behind the Big data. 3. To understand the different Big data processing technologies. 4. To understand and apply the Analytical concept of Big data using R and Python. 5. To visualize the Big Data using different tools. 6. To understand the application and impact of Big Data.	1. To understand Big Data primitives. 2. To learn and apply different mathematical models for Big Data. 3. To demonstrate their Big Data learning skills by developing industry or research applications. 4. To analyze each learning model come from a different algorithmic approach and it will perform differently under different datasets. 5. To understand needs, challenges and techniques for big data visualization. 6. To learn different programming platforms for big data analytics.
Software Laboratory-IV	1. To design and implement small size network and to understand various networking commands 2. To provide the knowledge of various networking tools and their related concepts 3. To understand various application layer protocols for its implementation in client/server environment 4. To understand network layer protocols and its implementations. 5. To explore and understand various simulations tools for network applications. 6. To understand the fundamentals of wireless networks and standards.	1. To implement small size network and its use of various networking commands. 2. To understand and use various networking and simulations tools. 3. To configure various client/server environments to use application layer protocols 4. To understand the protocol design at various layers. 5. To explore use of protocols in various wired and wireless applications. 6. To develop applications on emerging trends.
Software Laboratory-V	1. To design and implement small size network and to understand various networking commands 2. To provide the knowledge of various networking tools and their related concepts 3. To understand various application layer protocols for its implementation in client/server environment 4. To understand network layer protocols and its implementations. 5. To explore and understand various simulations tools for network applications. 6. To understand the fundamentals of wireless networks and standards.	1. To design and implement two pass assembler for hypothetical machine instructions. 2. To design and implement different phases of compiler (Lexical Analyzer, Parser, Intermediate code generation) 3. To use the compile generation tools such as “Lex" and "YACC”. 4. To apply algorithmic strategies for solving various problems. 5. To compare various algorithmic strategies. 6. To analyze the solution using recurrence relation

	Software Laboratory-VI	1. To understand Big data primitives and fundamentals. 2. To understand the different Big data processing techniques. 3. To understand and apply the Analytical concept of Big data using R/Python. 4. To understand different data visualization techniques for Big Data. 5. To understand the application and impact of Big Data 6. To understand emerging trends in Big data analytics	1. To apply Big data primitives and fundamentals for application development. 2. To explore different Big data processing techniques with use cases. 3. To apply the Analytical concept of Big data using R/Python. 4. To visualize the Big Data using Tableau. 5. To design algorithms and techniques for Big data analytics. 6. To design Big data analytic application for emerging trends.
	Project Based Seminar	1. To perform focused study of technical and research literature relevant to a specific topic. 2. To study, interpret and summarize literature scientifically. 3. To build independent thinking on complex problems. 4. To build collaborative work practices. 5. To communicate scientific information to a larger audience in oral and written form. 6. To use presentation standards and guidelines effectively	1. To Gather, organize, summarize and interpret technical literature with the purpose of formulating a project proposal. 2. To write a technical report summarizing state-of-the-art on an identified topic. 3. Present the study using graphics and multimedia presentations. 4. Define intended future work based on the technical review. 5. To explore and enhance the use of various presentation tools and techniques. 6. To understand scientific approach for literature survey and paper writing.

BE Course Outcomes

SEM-I

Course Outcomes

1.Information and Cyber Security (414453)

By the end of the course, students should be able to
1. Be able to use basic cryptographic techniques in software and system design.
2. Apply methods for authentication, access control, intrusion detection and prevention.
3. Able to apply the scientific method to digital forensics and perform forensic investigations.
4. To develop computer forensics awareness.
5. Ability to use computer forensics tools.

2.Machine Learning and Applications (414454)

By the end of the course, students should be able to
1. model the learning primitives.
2. build the learning model.
3. tackle real world problems in the domain of Data Mining and Big Data Analytics, Information Retrieval, Computer vision, Linguistics and Bioinformatics.

3. Software Design and Modeling (414455)

By the end of the course, students should be able to
1. Understand object oriented methodologies, basics of Unified Modeling Language (UML).
2. Understand analysis process, use case modeling, domain/class modeling
3. Understand interaction and behavior modeling.
4. Understand design process and business, access and view layer class design
5. Get started on study of GRASP principles and GoF design patterns.
6. Get started on study of architectural design principles and guidelines in the various type of application development.

4.Elective-I - Business Analytics and Intelligence (414456E)

By the end of the course, students should be able to
1. Comprehend the Information Systems and development approaches of Intelligent Systems
2. Evaluate and rethink business processes using information systems
3. Propose the Framework for business intelligence
4. Get acquainted with the Theories, techniques, and considerations for capturing organizational intelligence
5. Align business intelligence with business strategy
6. Apply the techniques for implementing business intelligence systems

5.Elective-II - Software Testing and Quality Assurance (414457C)

By the end of the course, students should be able to
1. Test the software by applying testing techniques to deliver a product free from bugs.
2. Investigate the scenario and to select the proper testing technique.
3. Explore the test automation concepts and tools and estimation of cost, schedule based onstandard metrics.
4. Understand how to detect, classify, prevent and remove defects.
5. Choose appropriate quality assurance models and develop quality.
6. Ability to conduct formal inspections, record and evaluate results of inspections.

6.Computer Laboratory VII (414458)

By the end of the course, students should be able to
1. The students will be able to implement and port controlled and secured access to software systems and networks.
2. The students will be able to build learning software in various domains.

7.Computer Laboratory VIII (414459)

By the end of the course, students should be able to
1. Draw, discuss different UML 2.0 diagrams, their concepts, notation, advanced notation, forward and reverse engineering aspects.
2. Identify different software artifacts used to develop analysis and design model from requirements.
3. Develop use case model
4. Develop, implement analysis model and design model
5. Develop, implement Interaction and behaviour Model
6. Implement an appropriate design pattern to solve a design problem.

8. Project Phase-I (414460)

By the end of the course, students should be able to
1. To show preparedness to study independently in chosen domain of Information Technology and programming languages and apply their acquired knowledge to variety of real time problem scenarios.
2. To function effectively as a team to accomplish a desired goal.
3. An understanding of professional, ethical, legal, security and social issues and responsibilities related to Information Technology Project.

SEM-II

Course Outcomes

1. Distributed Computing System(414462)

By the end of the course, students should be able to

1. Understand the principles and desired properties of distributed systems based on different application areas.
2. Understand and apply the basic theoretical concepts and algorithms of distributed systems in problem solving.
3. Recognize the inherent difficulties that arise due to distributed-ness of computing resources.
4. Identify the challenges in developing distributed applications

2.Ubiquitous Computing (414463)

By the end of the course, students should be able to

1. Demonstrate the knowledge of design of Ubicomp and its applications.
2. Explain smart devices and services used Ubicomp.
3. Describe the significance of actuators and controllers in real time application design.
4. Use the concept of HCI to understand the design of automation applications.
5. Classify Ubicomp privacy and explain the challenges associated with Ubicomp privacy.
6. Get the knowledge of ubiquitous and service oriented networks along with Ubicomp management.

3.Elective III- Internet and Web Programming (414464D)

By the end of the course, students should be able to

1. Demonstrate static website using basic tools.
2. Develop client side programming skills.
3. Develop server side programming skills.
4. Understand web services and handle content management tools.
5. Develop mobile website using mobile web development tools.
6. Understand aspects of web security and cyber ethics.

4.Elective IV-Social Media Analytics(414464D)

By the end of the course, students should be able to

1. Understand the basics of Social Media Analytics
2. Explain the significance of Data mining in Social media
3. Demonstrate the algorithms used for text mining
4. Apply network measures for social media data
5. Explain Behavior Analytics techniques used for social media data
6. Apply social media analytics for Face book and Twitter kind of applications

5.COMPUTER LABORATORY-IX(414466)

Upon successful completion of this course student will be able to:
1. Demonstrate knowledge of the core concepts and techniques in distributed systems.
2. Learn how to apply principles of state-of-the-Art Distributed systems in practical application.
3. Design, build and test application programs on distributed systems.

6.COMPUTER LABORATORY-X(414467)

Upon successful completion of this course student will be able to:
1. set up the Android environment and explain the Evolution of cellular networks (BT-2)
2. develop the User Interfaces using pre-built Android UI components (BT -6)
3. create applications for performing CURD SQLite database operations using Android(BT-6)
4. create the smart android applications using the data captured through sensors (BT-6)
5. implement the authentication protocols between two mobile devices for providing security (BT-3)
6. analyze the data collected through android sensors using any machine learning algorithm (BT-4).

7.Project Work(414468)

By the end of the course, Students will
1. learn teamwork.
2. be well aware about Implementation phase.
3. get exposure of various types of testing methods and tools.
4. understand the importance of documentation.

Mechanical Engineering

VISION

"Empowerment Through Technological Excellence"

MISSION

"Imparting value base Education. Integrating Engineering and Industry."

Department of Mechanical Engineering

Vision

"The Department of Mechanical Engineering aims at capturing the innovative capabilities of the students through a dynamic learning environment and promotes applied research to cater the professional requirements of core industry and develop entrepreneurship attitude amongst students."

Mission

"Incorporating excellent teaching – learning practices to create a centre of excellence that strives for Research, creativity, product development with project based learning which shall be recognized at National and International level."

2.6.1 List of Course Objectives

SE(2015 Course)

PROGRAM EDUCATIONAL OBJECTIVES

The students of mechanical engineering course after passing out will

1) Graduates shall work in design and analysis of mechanical systems with strong fundamentals and methods of synthesis.
2) Develop successful careers as mechanical engineers and demonstrate professional engineering competence via positions of increasing responsibility and/or assignments.
3) Participate in research and development, and other creative and innovative efforts in science, engineering, and technology, and/or pursue entrepreneurial endeavors.

PROGRAM SPECIFIC OUTCOMES

PSO 1: Apply their knowledge to identify, analyze and solve engineering problems relating to mechanical systems together with allied engineering streams.
PSO 2: Implement their knowledge in the domain of engineering mechanics, thermal and fluid Mechanics to solve engineering problems utilizing advanced technology.
PSO 3: Successfully apply the principles of design, analysis and implementation of mechanical systems/processes which have been studied as a part of curriculum.
PSO 4: Develop and apply new ideas on product design and development with the help of modern CAD/CAM tools, while ensuring best manufacturing practices.
PSO 5: Apply their knowledge to identify, analyze and solve engineering problems relating to mechanical systems together with allied engineering streams.

PROGRAM OUTCOMES

The students in the mechanical engineering course will attain:

1) Apply analytical skills to solve engineering problems.
2) Conduct experiments; analyze data, and present results.
3) Ability to design and develop mechanical components and processes to meet desired needs considering public health, safety, cultural, social, and environmental aspects.
4) Ability to develop sustainable solutions and understand their impact on society and environment.
5) Ability to apply knowledge of engineering and management principles to lead teams and manage projects in multidisciplinary environments.
6. The broad education necessary to assess the impact of mechanical engineering solutions in a legal, health, safety and societal context.
7. An understanding of professional responsibility and accountability and demonstrate the need for sustainability.
8. Ability to ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. An ability to function effectively both as individual or member or a team leader on multidisciplinary teams.
10. An ability to communicate effectively with engineering community and with society at large.
11. An ability to demonstrate the managerial knowledge to manage projects in multidisciplinary environments.
12. Recognition of the need for, and an ability to engage in life-long learning.
13. Capability to assess and solve mechanical and interdisciplinary engineering problems to meet needs of the society.

SE(2015 Course)

Year and Course	Subject	Course Objectives	Course Outcomes

	Fluid Mechanics	1. To understand of various properties of fluids 2. To learn fluid statics and dynamics. 3. To understand of Boundary layer, Drag, and Lift 4. To understand of Bernoulli's equation 5. To Know of various applications of Bernoulli's equation	1. Use of various properties in solving the problems in fluids 2. Use of Bernoulli's equation for solutions in fluids 3. Determination of forces drag and lift on immersed bodies
	Soft Skills	1. To develop students overall personality. 2. To understand and aware about importance, role and contents of soft skills through instructions, knowledge aquisitiion, demonstration and practice.To improve his writing and documentation skills.	1. Improved communication, interaction and presentation of ideas. 2. Right attitudinal and behavioral change 3. Developed right-attitudinal and behavioral change
	Theory of Machines – I	1. To make the student conversant with commonly used mechanism for industrial application. 2. To develop competency in drawing velocity and acceleration diagram for simple and complex mechanism. 3. To develop analytical competency in solving kinematic problems using complex algebra method. 4. To develop competency in graphical and analytical method for solving problems in static and dynamic force analysis. 5. To develop competency in conducting laboratory experiments for finding moment of inertia of rigid bodies,	1. Identify mechanisms in real life applications. 2. Perform kinematic analysis of simple mechanisms. 3. Perform static and dynamic force analysis of slider crank mechanism. 4. Determine moment of inertia of rigid bodies experimentally. 5. Analyze velocity and acceleration of mechanisms by vector and graphical methods.
	Engineering Metallurgy	1. To acquaint students with the basic concepts of Metal Structure 2. To impart a fundamental knowledge of Ferrous & Non Ferrous Metal Processing 3. Selection and application of different Metals & Alloys 4. To Know Fundamentals of Metallography 5. To develop futuristic insight into Metals	1. describe how metals and alloys formed and how the properties change due to microstructure 2. apply core concepts in Engineering Metallurgy to solve engineering problems. 3. conduct experiments, as well as to analyze and interpret data 4. select materials for design and construction. 5. possess the skills and techniques necessary for modern materials engineering practice 6. recognize how metals can be strengthened by alloying, cold-working, and heat treatment

Applied Thermodynamics	1. To get familiar with fundamentals of I. C. Engines, Construction and working Principle of an Engine and Compare Actual, Fuel-Air and Air standard cycle Performance. 2. To study Combustion in SI and CI engines and its controlling factor in order to extract maximum power. 3. To study emission from IC Engines and its controlling method, Various emission norms. 4. Perform Testing of I. C. Engines and methods to estimate Indicated, Brake and Frictional Power and efficiencies 5. To understand theory and performance Calculation of Positive displacement compressor.	1. Classify various types of Engines, Compare Air standard, Fuel Air and Actual cycles and make out various losses in real cycles. 2. Understand Theory of Carburetion, Modern Carburetor, Stages of Combustion in S. I. Engines and Theory of Detonation, Pre-ignition and factors affecting detonation. 3. Understand Fuel Supply system, Types of Injectors and Injection Pumps, Stages of Combustion in CI Engines, Theory of Detonation in CI Engines and Comparison of SI and CI Combustion and Knocking and Factors affecting, Criteria for good combustion chamber and types. 4. Carry out Testing of I. C. Engines and analyze its performance. 5. Describe construction and working of various I. C. Engine systems (Cooling, Lubrication, Ignition, Governing, and Starting) also various harmful gases emitted from exhaust and different devices to control pollution and emission norms for pollution control. 6. Describe construction, working of various types of reciprocating and rotary compressors with performance calculations of positive displacement compressors.
Electrical and Electronics Engineering	1. Principle of operation and speed control of DC machines 2. Induction motor principle and its applications 3. Working principle of special purpose motors 4.Microcontrollers 4. Embedded systems terminologies and sensors 5. Data acquisition system for mechanical applications	.Develop the capability to identify and select suitable DC motor / induction motor / special purpose motor and its speed control method for given industrial application. 2. Program Arduino IDE using conditional statements 3. Interfacing sensors with Arduino IDE
Fluid Mechanics Lab	1. To understand of various properties of fluids 2. To learn fluid statics and dynamics. 3. To understand of Boundary layer, Drag, and Lift 4. To understand of Bernoulli's equation 5. To Know of various applications of Bernoulli's equation	1. Use of various properties in solving the problems in fluids 2. Use of Bernoulli's equation for solutions in fluids 3. Determination of forces drag and lift on immersed bodies

SE(2015 Course)	**Applied Thermodynamics Lab**	1. To get familiar with fundamentals of I. C. Engines, Construction and working Principle of an Engine and Compare Actual, Fuel-Air and Air standard cycle Performance. 2. To study Combustion in SI and CI engines and its controlling factor in order to extract maximum power. 3. To study emission from IC Engines and its controlling method, Various emission norms. 4. Perform Testing of I. C. Engines and methods to estimate Indicated, Brake and Frictional Power and efficiencies 5. To understand theory and performance Calculation of Positive displacement compressor.	1. Classify various types of Engines, Compare Air standard, Fuel Air and Actual cycles and make out various losses in real cycles. 2. Understand Theory of Carburetion, Modern Carburetor, Stages of Combustion in S. I. Engines and Theory of Detonation, Pre-ignition and factors affecting detonation. 3. Understand Fuel Supply system, Types of Injectors and Injection Pumps, Stages of Combustion in CI Engines, Theory of Detonation in CI Engines and Comparison of SI and CI Combustion and Knocking and Factors affecting, Criteria for good combustion chamber and types. 4. Carry out Testing of I. C. Engines and analyze its performance. 5. Describe construction and working of various I. C. Engine systems (Cooling, Lubrication, Ignition, Governing, and Starting) also various harmful gases emitted from exhaust and different devices to control pollution and emission norms for pollution control. 6. Describe construction, working of various types of reciprocating and rotary compressors with performance calculations of positive displacement compressors.
	Machine Shop – I	1. Manufacture of spur gear on milling machine using indexing head. 2. Surface grinding using table grinder. 3. Manufacturing any one sheet metal component involving minimum three different operation (use dies and press). 4. Any two plastic component like bottle, bottle caps, machine handles, etc.	1. Manufacture of spur gear on milling machine using indexing head. 2. Surface grinding using table grinder. 3. Manufacturing any one sheet metal component involving minimum three different operation (use dies and press). 4. Any two plastic component like bottle, bottle caps, machine handles, etc.
	Engineering Mathematics -III	After completing this course, students will have adequate mathematical background, conceptual clarity, computational skills and algorithm design for problem solving related to: 1. Linear differential equations of higher order applicable to Control systems, Computer vision, and Robotics. 2. Transform techniques such as Fourier transform, Z-transform and applications to Image processing. 3. Statistical methods such as correlation, regression analysis and probability theory to analyze data and to make predictions applicable to machine intelligence. 4. Vector calculus necessary to analyze and design complex electrical and electronic devices as appropriate to Computer engineering. 5. Complex functions, conformal mappings and contour integration applicable to Image processing, Digital filters and Computer graphics.	At the end of this course, students will be able to: 1. Solve higher order linear differential equation using appropriate techniques for modeling and analyzing electrical circuits. 2. Solve problems related to Fourier transform, Z-Transform and applications to Signal and Image processing. 3. Apply statistical methods like correlation, regression analysis and probability theory for analysis and prediction of a given data as applied to machine intelligence. 4. Perform vector differentiation and integration to analyze the vector fields and apply to compute line, surface and volume integrals. 5. Analyze conformal mappings, transformations and perform contour integration of complex functions required in Image processing, Digital filters and Computer graphics.

Manufacturing Process-I	1. To make acquaintance of foundry processes pattern making and casting 2. To study metal forming processes such forging, rolling, extrusion and wire drawing. 3. To make study of different plastic molding processes 4. To study metal joining processes 5. To design and development of product with Sheet metal working process • Introduction to center lathe	1. Understand and analyze foundry practices like pattern making, mold making, Core making and Inspection of defects. 2. Understand and analyze Hot and Cold Working, Rolling, Forging, Extrusion and Drawing Processes. 3. Understand different plastic molding processes, Extrusion of Plastic and Thermoforming 4. Understand different Welding and joining processes and its defects 5. Understand, Design and Analyze different sheet metal working processes 6. Understand the constructional details and Working of Centre Lathe
Computer Aided Machine Drawing	1. To understand Parametric Modeling Fundamentals, Procedure, and "Shape before Size" Approach. 2. To develop an ability to Create Parametric 2-D Sketches, and Create and Edit Parametric Dimensions. 3. To develop an ability to Create Solid Models of machine components. The student should be able to apply these skills to the solution of a variety of practical problems and be able to employ their knowledge to solve more complicated problems. 4. To develop an ability to Create assembly models of simple machine (minimum 5 components). The student should be prepared to continue the study of computer aided machine drawing through further subjects/projects in further years of engineering. 5. To develop the ability to apply Limits, Fits, and Dimensional Tolerances, as well as Geometric Tolerances to components and assemblies on Engineering Drawings. 6. To develop an ability to create 2D drawings from 3D models	1. Understand the importance of CAD in the light of allied technologies such as CAM, CAE, FEA, CFD, PLM. 2. Understand the significance of parametric technology and its application in 2D sketching. 3. Understand the significance of parametric feature-based modeling and its application in 3D machine components modeling. 4. Ability to create 3D assemblies that represent static or dynamic Mechanical Systems. 5. Ability to ensure manufacturability and proper assembly of components and assemblies. 6. Ability to communicate between Design and Manufacturing using 2D drawings.

Thermodynamics	1. Identify and use units and notations in Thermodynamics. 2. State and illustrate first and second laws of Thermodynamics. 3. Explain the concepts of entropy, enthalpy, reversibility and irreversibility. 4. Apply the first and second laws of Thermodynamics to various gas processes and cycles. 5. To get conversant with properties of steam, dryness fraction measurement, vapor processes and Thermodynamic vapor cycles, performance estimation. 6. To get conversant with Psychrometric Charts, Psychrometric processes, human comfort conditions.	1. On completion of the course, learner will be able to– 2. Apply various laws of thermodynamics to various processes and real systems. 3. Apply the concept of Entropy, Calculate heat, work and other important thermodynamic properties for various ideal gas processes. 4. Estimate performance of various Thermodynamic gas power cycles and gas refrigeration cycle and availability in each case. 5. Estimate the condition of steam and performance of vapour power cycle and vapour compression cycle. 6. Estimate Stoichiometric air required for combustion, performance of steam generators and natural draught requirements in boiler plants. 7. Use Psychromertic charts and estimate various essential properties related to Psychrometry and processes
Material Science	1. To acquaint students with the basic concepts and properties of Material Science 2. To impart a fundamental knowledge of Materials Processing 3. Selection and application of different Metals & Alloys 4. To understand the structure of Engineering Materials 5. To develop futuristic insight into Materials	1. Understand the basic concepts and properties of Material. 2. Understand about material fundamental and processing. 3. Select proper metal, alloys, nonmetal and powder metallurgical component for specific requirement 4. Detect the defects in crystal and its effect on crystal properties. 5. Evaluate the different properties of material by studying different test 6. Recognize how metals can be strengthened by cold-working and hot working
Strength of Materials	1. Mechanical behavior of the body by determining the stresses, strains and deflections produced by the loads up to the elastic limit. 2. Fundamental concepts related to deformation, strain energy, moment of inertia, load carrying capacity, slope an deflection of beams, shear forces, bending moments, torsional moments, column and struts, principal stresses and strains and theories of failure	1. Apply knowledge of mathematics, science for engineering applications 2. Design and conduct experiments, as well as to analyze and interpret data 3. Design a component to meet desired needs within realistic constraints of health and safety 4. Identify, formulate, and solve engineering problems 5. Practice professional and ethical responsibility 6. Use the techniques, skills, and modern engineering tools necessary for engineering practice

	Computer Aided Machine Drawing lab	1. To understand Parametric Modeling Fundamentals, Procedure, and "Shape before Size" Approach. 2. To develop an ability to Create Parametric 2-D Sketches, and Create and Edit Parametric Dimensions. 3. To develop an ability to Create Solid Models of machine components. The student should be able to apply these skills to the solution of a variety of practical problems and be able to employ their knowledge to solve more complicated problems. 4. To develop an ability to Create assembly models of simple machine (minimum 5 components). The student should be prepared to continue the study of computer aided machine drawing through further subjects/projects in further years of engineering. 5. To develop the ability to apply Limits, Fits, and Dimensional Tolerances, as well as Geometric Tolerances to components and assemblies on Engineering Drawings. 6. To develop an ability to create 2D drawings from 3D models	1. Understand the importance of CAD in the light of allied technologies such as CAM, CAE, FEA, CFD, PLM. 2. Understand the significance of parametric technology and its application in 2D sketching. 3. Understand the significance of parametric feature-based modeling and its application in 3D machine components modeling. 4. Ability to create 3D assemblies that represent static or dynamic Mechanical Systems. 5. Ability to ensure manufacturability and proper assembly of components and assemblies. 6. Ability to communicate between Design and Manufacturing using 2D drawings.
	Audit Course		

TE(2015 Course)

PROGRAM EDUCATIONAL OBJECTIVES

The students of mechanical engineering course after passing out will
1) Graduates shall work in design and analysis of mechanical systems with strong fundamentals and methods of synthesis.
2) Develop successful careers as mechanical engineers and demonstrate professional engineering competence via positions of increasing responsibility and/or assignments.
3) Participate in research and development, and other creative and innovative efforts in science, engineering, and technology, and/or pursue entrepreneurial endeavors.

PROGRAM OUTCOMES

The students in the Information Technology course will attain:
The students in the mechanical engineering course will attain:
1) Apply analytical skills to solve engineering problems.
2) Conduct experiments; analyze data, and present results.
3) Ability to design and develop mechanical components and processes to meet desired needs considering public health, safety, cultural, social, and environmental aspects.
4) Ability to develop sustainable solutions and understand their impact on society and environment.
5) Ability to apply knowledge of engineering and management principles to lead teams and manage projects in multidisciplinary environments.
6. The broad education necessary to assess the impact of mechanical engineering solutions in a legal, health, safety and societal context.
7. An understanding of professional responsibility and accountability and demonstrate the need for sustainability.
8. Ability to ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. An ability to function effectively both as individual or member or a team leader on multidisciplinary teams.
10. An ability to communicate effectively with engineering community and with society at large.
11. An ability to demonstrate the managerial knowledge to manage projects in multidisciplinary environments.
12. Recognition of the need for, and an ability to engage in life-long learning.
13. Capability to assess and solve mechanical and interdisciplinary engineering problems to meet needs of the society.

TE(2015 Course)

Year and Course	Subject	Course Objectives	Course Outcomes

	Design of Machine Elements-I	1. Student shall gain appreciation and understanding of the design function in Mechanical Engineering, different steps involved in designing and the relation of design activity with manufacturing activity. 2. The student shall learn to choose proper materials for different machine elements depending on their physical and mechanical properties. They will learn to apply the knowledge of material science in real life situations. 3. Student shall gain a thorough understanding of the different types of failure modes and criteria. They will be conversant with various failure theories and be able to judge which criterion is to be applied for a particular situation. 4. Student shall gain design knowledge of the different types of elements used in the machine design process, for e.g. fasteners, shafts, couplings etc. and will be able to design these elements for each application.	1. Ability to identify and understand failure modes for mechanical elements and design of machine elements based on strength. 2. Ability to design Shafts, Keys and Coupling for industrial applications. 3. Ability to design machine elements subjected to fluctuating loads. 4. Ability to design Power Screws for various applications. 5. Ability to design fasteners and welded joints subjected to different loading conditions. 6. Ability to design various Springs for strength and stiffness.
	Heat Transfer	1. Identify the important modes of heat transfer and their applications. 2. Formulate and apply the general three dimensional heat conduction equations. 3. Analyze the thermal systems with internal heat generation and lumped heat capacitance. 4. Understand the mechanism of convective heat transfer 5. Determine the radiative heat transfer between surfaces. 6. Describe the various two phase heat transfer phenomenon. Execute the effectiveness and rating of heat exchangers.	CO 1: Analyze the various modes of heat transfer and implement the basic heat conduction equations for steady one dimensional thermal system. CO 2: Implement the general heat conduction equation to thermal systems with and without internal heat generation and transient heat conduction. CO 3: Analyze the heat transfer rate in natural and forced convection and evaluate through experimentation investigation. CO 4: Interpret heat transfer by radiation between objects with simple geometries. CO 5: Analyze the heat transfer equipment and investigate the performance.
	Theory of Machines-II	1. To develop competency in understanding of theory of all types of gears. 2. To understand the analysis of gear train. 3. To develop competency in drawing the cam profile. 4. To make the student conversant with synthesis of the mechanism. 5. To understand step-less regulations. 6. To understand mechanisms for system control – Gyroscope.	1. Student will be able to understand fundamentals of gear theory which will be the prerequisite for gear design. 2. Student will be able to perform force analysis of Spur, Helical, Bevel, Worm and Worm gear. 3. The student to analyze speed and torque in epi-cyclic gear trains which will be the prerequisite for gear box design. 4. Student will be able to design cam profile for given follower motions and understand cam Jump phenomenon, advance cam curves. 5. The student will synthesize a four bar mechanism with analytical and graphical methods. 6. a. The student will analyze the gyroscopic couple or effect for stabilization of Ship Aeroplane and Four wheeler vehicle. b. Student will choose appropriate drive for given application (stepped / step-less).

Turbo Machines	1. To provide the knowledge of basic principles, governing equations and applications of turbo machine. 2. To provide the students with opportunities to apply basic thermo-fluid dynamics flow equations to Turbo machines. 3. To explain construction and working principle and evaluate the performance characteristics of Turbo Machines.	On successful completion of the course, the student will be able to, 1. Apply thermodynamics and kinematics principles to turbo machines. 2. Analyze the performance of turbo machines. 3. Ability to select turbo machine for given application. 4. Predict performance of turbo machine using model analysis.
Metrology and Quality Control	Selection of tool and techniques for determining geometry and dimensions. 2. -Design and calibration of measuring tools and equipments. 3. -Application of Quality Control Techniques. 4. -Application of Quality Management Concept.	1. -An ability to apply knowledge of various tools and techniques used to determine geometry and 2. dimensions of components in engineering applications. 3. -An ability to perform experiments, as well as to analyze and interpret data. 4. -An ability to design gauges to meet desired needs within realistic constraints. 5. -An understanding of Quality Control Techniques and its applications in engineering industries.
Heat Transfer Lab	1. Identify the important modes of heat transfer and their applications. 2. Formulate and apply the general three dimensional heat conduction equations. 3. Analyze the thermal systems with internal heat generation and lumped heat capacitance. 4. Understand the mechanism of convective heat transfer 5. Determine the radiative heat transfer between surfaces. 6. Describe the various two phase heat transfer phenomenon. Execute the effectiveness and rating of heat exchangers.	1: Analyze the various modes of heat transfer and implement the basic heat conduction equations for steady one dimensional thermal system. 2: Implement the general heat conduction equation to thermal systems with and without internal heat generation and transient heat conduction. 3: Analyze the heat transfer rate in natural and forced convection and evaluate through experimentation investigation. 4: Interpret heat transfer by radiation between objects with simple geometries. 5: Analyze the heat transfer equipment and investigate the performance.
Skill Development	1. To develop the skill for required in shop floor working. 2. To have knowledge of the different tools and tackles used in machine assembly shop. 3. Use of theoretical knowledge in practice. 4. Practical aspect of the each component in the assembly of the machine.	1. Tail stock assembly 2. Valve Assembly (PRV, Sluice valve, Steam stop valve) 3. IC engine of Two Wheeler (4 stroke single cylinder) 4. Hermetically sealed compressor 5. Hydraulic actuator 6. Industrial Gear box 7. Sheet drawing (Sheet will be given per group and a group consist of 04 students. The sheet will be drawn manually by every student)
Numerical Methods and Optimization	Recognize the difference between analytical and Numerical Methods. 2 Effectively use Numerical Techniques for solving complex Mechanical engineering Problems. 3 Prepare base for understanding engineering analysis software. 4 Develop logical sequencing for solution procedure and skills in soft computing. 5 Optimize the solution for different real life problems with available constraints. 6 Build the foundation for engineering research.	1. Use appropriate Numerical Methods to solve complex mechanical engineering problems. 2. Formulate algorithms and programming. 3. Use Mathematical Solver. 4. Generate Solutions for real life problem using optimization techniques. 5. Analyze the research problem

TE(2015 Course)	**Design of Machine Elements-II**	1. Enable students to attain the basic knowledge required to understand, analyze, design and select machine elements required in transmission systems. 2. Reinforce the philosophy that real engineering design problems are open-ended and challenging 3. Impart design skills to the students to apply these skills for the problems in real life industrial applications 4. Inculcate an attitude of team work, critical thinking, communication, planning and scheduling through design projects 5. Create awareness amongst students about safety, ethical, legal, and other societal constraints in execution of their design projects 6. Develop an holistic design approach to find out pragmatic solutions to realistic domestic and industrial problems	CO 1: To understand and apply principles of gear design to spur gears and industrial spur gear boxes. CO 2 : To become proficient in Design of Helical and Bevel Gear CO 3: To develop capability to analyse Rolling contact bearing and its selection from manufacturer's Catalogue. CO 4: To learn a skill to design worm gear box for various industrial applications. CO 5: To inculcate an ability to design belt drives and selection of belt, rope and chain drives. CO 6: To achieve an expertise in design of Sliding contact bearing in industrial applications.
	Refrigeration and Air Conditioning	1. Learning the fundamental principles and different methods of refrigeration and air conditioning. 2. Study of various refrigeration cycles and evaluate performance using Mollier charts and/ or refrigerant property tables. 3. Comparative study of different refrigerants with respect to properties, applications and environmental issues. 4. Understand the basic air conditioning processes on psychometric charts, calculate cooling load for its applications in comfort and industrial air conditioning. 5. Study of the various equipment-operating principles, operating and safety controls employed in refrigeration air conditioning systems	1. At the end of this course the students should be able to 2. Illustrate the fundamental principles and applications of refrigeration and air conditioning system 3. Obtain cooling capacity and coefficient of performance by conducting test on vapour compression refrigeration systems 4. Present the properties, applications and environmental issues of different refrigerants
	Mechatronics	1. Understand key elements of Mechatronics system, representation into block diagram 2. Understand concept of transfer function, reduction and analysis 3. Understand principles of sensors, its characteristics, interfacing with DAQ microcontroller 4. Understand the concept of PLC system and its ladder programming, and significance of PLC systems in industrial application 5. Understand the system modeling and analysis in time domain and frequency domain. 6. Understand control actions such as Proportional, derivative and integral and study its significance in industrial applications	1. Identification of key elements of mechatronics system and its representation in terms of block diagram 2. Understanding the concept of signal processing and use of interfacing systems such as ADC, DAC, digital I/O 3. Interfacing of Sensors, Actuators using appropriate DAQ micro-controller 4. Time and Frequency domain analysis of system model (for control application) 5. PID control implementation on real time systems 6. Development of PLC ladder programming and implementation of real life system.

Manufacturing - Process-II	1. To analyze and understand the metal cutting phenomena. 2. To select process parameter and tools for obtaining desired machining characteristic 3. To understand principles of manufacturing processes.	1. Student should be able to apply the knowledge of various manufacturing processes. 2. Student should be able to identify various process parameters and their effect on processes. 3. Student should be able to figure out application of modern machining. 4. Students should get the knowledge of Jigs and Fixtures for variety of operations.
Machine Shop-II	1. To set the manufacturing set–up appropriately and study the corresponding set up parameters. 2. To select appropriate process parameter for obtaining desired characteristic on work piece. 3. To understand the operational problems and suggest remedial solution for adopted manufacturing process.	Ability to develop knowledge about the working and programming techniques for various machines and tools
Seminar	1. Identify and compare technical and practical issues related to the area of course specialization. 2. Outline annotated bibliography of research demonstrating scholarly skills. 3. Prepare a well organized report employing elements of technical writing and critical thinking. 4. Demonstrate the ability to describe, interpret and analyze technical issues and develop competence in presenting.	• Establish motivation for any topic of interest and develop a thought process for technical presentation. • Organize a detailed literature survey and build a document with respect to technical publications. • Analysis and comprehension of proof-of-concept and related data. • Effective presentation and improve soft skills. • Make use of new and recent technology (e.g. Latex) for creating technical reports
Numerical Methods and Optimization Lab	Recognize the difference between analytical and Numerical Methods. 2 Effectively use Numerical Techniques for solving complex Mechanical engineering Problems. 3 Prepare base for understanding engineering analysis software. 4 Develop logical sequencing for solution procedure and skills in soft computing. 5 Optimize the solution for different real life problems with available constraints. 6 Build the foundation for engineering research.	1. Use appropriate Numerical Methods to solve complex mechanical engineering problems. 2. Formulate algorithms and programming. 3. Use Mathematical Solver. 4. Generate Solutions for real life problem using optimization techniques. 5. Analyze the research problem
Audit Course	1. On completion of this Basic Fire Safety Course, participants will be able to:- 2. Describe the chemistry of fire a. Identify fire hazards in the workplace Follow evacuation procedures 3. Select and use appropriate firefighting equipment	1. To create and sustain a community of learning in which students acquire knowledge in fire, safety and hazard management and learn to apply it professionally with due consideration for ethical, human life & property safety issues. 2. To pursue research and development in fire safety engineering, hazard management and disseminate its findings. 3. To meet the challenges of today and tomorrow in the most effective, efficient and contemporary educational manner. 4. To help in building national capabilities in fire safety engineering, disaster management, hazard management, industrial safety education through practical training to ensure a fire safe nation.
BE(2015 Course)		
SEM 1		
	1.To study governing laws used in fluid power	1. Understand working principle of components used in

Hydraulics and Pneumatics	system. 2 To study fluid power applications 3.To study working principles of various components 4. To study selection of different components 5.To study how to design fluid power systems	hydraulic & pneumatic systems 2. Identify various applications of hydraulic & pneumatic systems 3. Selection of appropriate components required for hydraulic and pneumatic systems
CAD CAM and Automation	1. To apply homogeneous transformation matrix for geometrical transformations of 2D/3D CAD entities 2. To model mathematically analytical and synthetic curves, surfaces 3. To predict performance of simple mechanical components viz. beam, shafts, plates, trusses using FEA (Mathematical and Software treatment) 4. To generate CNC program for appropriate manufacturing techniques viz. turning and milling 5. To select and apply suitable Rapid Prototyping techniques for engineering applications 6. To study role and components of different Automation strategies.	1. Apply homogeneous transformation matrix for geometrical transformations of 2D CAD entities for basic geometric transformations. 2. Use analytical and synthetic curves and surfaces in part modeling. 3. Do real times analysis of simple mechanical elements like beams, trusses, etc. and comment on safety of engineering components using analysis software. 4. Generate CNC program for Turning / Milling and generate tool path using CAM software. 5. Demonstrate understanding of various rapid manufacturing techniques and develop competency in designing and developing products using rapid manufacturing technology. 6. Understand the robot systems and their applications in manufacturing industries.
Dynamics of Machinery	1. To conversant with balancing problems of machines. 2. To understand fundamentals of free and forced vibrations. 3. To develop competency in understanding of vibration and noise in Industry. 4. To develop analytical competency in solving vibration problems. 5. To understand the various techniques of measurement and control of vibration and noise..	1. Apply balancing technique for static and dynamic balancing of multi cylinder inline and radial engines. 2. Estimate natural frequency for single DOF undamped & damped free vibratory systems. 3. Determine response to forced vibrations due to harmonic excitation, base excitation and excitation due to unbalance forces. 4. Estimate natural frequencies, mode shapes for 2 DOF undamped free longitudinal and torsional vibratory systems. 5. Describe vibration measuring instruments for industrial / real life applications along with suitable method for vibration control. 6. Explain noise, its measurement & noise reduction techniques for industry and day today life problems.
Finite Element Analysis	1. To understand the philosophy and general procedure of Finite Element Method as applied to solid mechanics and thermal analysis problems. 2. To familiarize students with the displacement-based finite element method for displacement and stress analysis and to introduce related analytical and computer tools. 3. It provides a bridge between hand calculations based on mechanics of materials and machine design and numerical solutions for more complex geometries and loading states. 4. To study approximate nature of the finite element method and convergence of results are examined. 5. It provides some experience with a commercial FEM code and some practical modeling exercises	On completion of the course, students will be able to - 1. Understand the different techniques used to solve mechanical engineering problems. 2. Derive and use 1-D and 2-D element stiffness matrices and load vectors from various methods to solve for displacements and stresses. 3. Apply mechanics of materials and machine design topics to provide preliminary results used for testing the reasonableness of finite element results. 4. Explain the inner workings of a finite element code for linear stress, displacement, temperature and modal analysis. 5. Use commercial finite element analysis software to solve complex problems in solid mechanics and heat transfer. 6. Interpret the results of finite element analyses and make an assessment of the results in terms of modeling (physics assumptions) errors, discretization (mesh density and refinement toward convergence) errors, and numerical (round-off) errors.

Heating, Ventilation, Air Conditioning and Refrigeration Engineering	1. To understand the recent vapour compression cycle 2. To provide the knowledge of analyze thermal design of refrigeration system components 3. To understand practical aspects of vapour compression system 4. To provide the knowledge of basic concepts of ventilation, infiltration and space distribution techniques 5. To inculcate techniques of estimating building envelop load. 5.To understand the working non-conventional air-conditioning systems.	On completion of the course, students will be able to - 1. Determine the performance parameters of trans-critical & ejector refrigeration systems 2. Estimate thermal performance of compressor, evaporator, condenser and cooling tower. 3. Describe refrigerant piping design, capacity & safety controls and balancing of vapour compressor system. 4. Explain importance of indoor and outdoor design conditions, IAQ, ventilation and air distribution system. 5. Estimate heat transmission through building walls using CLTD and decrement factor &time lag methods with energy-efficient and cost-effective measures for building envelope. 6. Explain working of types of desiccant, evaporative, thermal storage, radiant cooling, clean room and heat pump air-conditioning systems.
Automobile Engineering	1. To make the student conversant with fundamentals of automobile systems. 2. To develop competencies in performance analysis of vehicles. 3. To make the student conversant with automobile safety, electrical system and vehicle maintenance. 4. To understand the emerging trends of electric vehicles, hybrid electric vehicles and solar vehicles.	On completion of the course, students will be able to - 1. To compare and select the proper automotive system for the vehicle. 2. To analyse the performance of the vehicle. 3. To diagnose the faults of automobile vehicles. 4. To apply the knowledge of EVs, HEVs and solar vehicles
Operation Research	1. To familiarize the students with the use of practice oriented mathematical applications for optimization functions in an organization.	On completion of the course, students will be able to - 1. Apply LPP and Decision Theory to solve the problems 2. Apply the concept of transportation models to optimize available resources. 3. Decide optimal strategies in conflicting situations. 4. Implement the project management techniques. 5. Minimize the process time 6. Optimize multi stage decision making problems
Energy Audit and Management	Importance of Energy Management. 1. To Carry out Energy Audit. 2. Methods to reduce consumption of energy and save cost. 3. To improve energy efficiency of overall system. 4. Significance of Waste heat recovery and Cogeneration.	On completion of the course, students will be able to - 1. Compare energy scenario of India and World. 2. Carry out Energy Audit of the Residence / Institute/ Organization. 3. Evaluate the project using financial techniques 4. Identify and evaluate energy conservation opportunities in Thermal Utilities. 5. Identify and evaluate energy conservation opportunities in Electrical Utilities. 6. Identify the feasibility of Cogeneration and WHRUse a CFD tool effectively for practical problems and research.
Project – I	To have ideology of the industrial project. 1. Hands on working with tools, tackles and machines 2. To carry out literature survey 3. To do brain storming for mechanical engineering system	On completion of the course, students will be able to - 1. Find out the gap between existing mechanical systems and develop new creative new mechanical system. 2. Learn about the literature review 3. Get the experience to handle various tools, tackles and machines.
SEM 2		
Energy Engineering	1. To study the power generation scenario, the components of thermal power plant, improved Rankin cycle, Cogeneration cycle 2. To understand details of steam condensing plant, analysis of condenser, the an environmental impacts	On completion of the course, students will be able to - 1. Describe the power generation scenario, the layout components of thermal power plant and analyze the improved Rankin cycle, Cogeneration cycle 2. Analyze the steam condensers, recognize the an

	of thermal power plant, method to reduce various	environmental impacts of thermal power plant and
Mechanical System Design	1. To develop competency for system visualization and design. 2. To enable student to design cylinders and pressure vessels and to use IS code. 3. To enable student select materials and to design internal engine components. 4. To introduce student to optimum design and use optimization methods to design mechanical components. 5. To enable student to design machine tool gearbox. 6. To enable student to design material handling systems. 7. Ability to apply the statistical considerations in design and analyze the defects and failure modes in components	On completion of the course, students will be able to - 1. Understand the difference between component level design and system level design. 2. Design various mechanical systems like pressure vessels, machine tool gear boxes, material handling systems, etc. for the specifications stated/formulated. 3. Learn optimum design principles and apply it to mechanical components. 4. Handle system level projects from concept to product.
Industrial Engineering	1. To introduce the concepts, principles and framework of contents of Industrial Engineering. 2. To acquaint the students with various productivity enhancement techniques. 3. To acquaint the students with different aspects of Production Planning and Control and Facility Design. 4. To introduce the concepts of various cost accounting and financial management practices as applied in industries. 5. To acquaint the students with different aspects of Human Resource activities and Industrial Safety rules. 6. To acquaint students with different aspect of simulation modeling for various industrial engineering\applications.	On completion of the course, students will be able to - 1. Apply the Industrial Engineering concept 2. Understand, analyze and implement different concepts involved in method study. 3. Design and Develop different aspects of work system and facilities. 4. Understand and Apply Industrial safety standards, financial management practices. 5. Undertake project work based on modeling & simulation area.
Robotics	1. To get acquainted with basic components of robotic systems. 2. To study various gripper mechanisms and sensors and understand role of suitable control system. 3. To understand statistics & kinematics of robots 4. To develop competency in obtaining desired motion of the robot. 5. To study various programming methods in robotics. 6. To understand need of modern techniques in robotics.	On completion of the course, students will be able to - 1. Identify different type of robot configuration with relevant terminology. 2. Select suitable sensors, actuators and drives for robotic systems. 3.Understand kinematics in robotic systems. 4. Design robot with desired motion with suitable trajectory planning. 5. Select appropriate robot programming for given application. 6. Understand need of IoT, machine learning, simulation in robotics.
Advanced Manufacturing Processes	1. To analyze and identify applications of special forming processes 2. To analyze and identify applications of advanced joining processes 3. To understand and analyze the basic mechanisms of hybrid non-conventional machining techniques 4. To understand various applications and methods of micro and nano fabrication techniques 5. To understand advanced Additive Manufacturing (AM) technology for innovations in product development 6. To understand various material characterization techniques.	On completion of the course, students will be able to - 1. Classify and analyze special forming processes 2. Analyze and identify applicability of advanced joining processes 3. Understand and analyze the basic mechanisms of hybrid non-conventional machining techniques 4. Select appropriate micro and nano fabrication techniques for engineering applications 5. Understand and apply various additive manufacturing technology for product development 6. Understand material characterization techniques to analyze effects of chemical composition, composition variation, crystal structure, etc.

Product Design and Development	1. To explain student's significance of 2. Product design and Product development process 3. Customer needs, satisfaction and commercialization of product 4. Forward & Reverse Engineering and its role in designing a product 5. Design Aspects (DFA, DFMEA, Design for Reliability and Safety) 6.Product Life Cycle Management and Product Data Management	On completion of the course, students will be able to - 1. Understand essential factors for product design 2. Design product as per customer needs and satisfaction 3. Understand Processes and concepts during product development 4. Understand methods and processes of Forward and Reverse engineering 5. Carry various design processes as DFA, DFMEA, design for safety 6. Understand the product life cycle and product data management

PSO 1: Apply their knowledge to identify, analyze and solve engineering problems relating to mechanical systems together with allied engineering

PSO 2: Implement their knowledge in the domain of engineering mechanics, thermal and fluid Mechanics to solve engineering problems utilizing advanced technology.

PSO 3: Successfully apply the principles of design, analysis and implementation of mechanical systems/processes which have been studied as a part of curriculum.

PSO 4: Develop and apply new ideas on product design and development with the help of modern CAD/CAM tools, while ensuring best manufacturing practices.

PSO 5: Apply their knowledge to identify, analyze and solve engineering problems relating to mechanical systems together with allied engineering