Website: www.bitsvizag.com
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Admission code: **BABA**

Estd: 2008

Phone: Off: 0891-2569933
Fax: 0891-2568811
University Code: **NR**

BABA INSTITUTE OF TECHNOLOGY AND SCIENCES
(Approved by AICTE New Delhi, NAAC Accredited, Affiliated to JNTU Kakinada, *ISO 9001-2008 Certified*)
Bakkannapalem Village, Madhurawada Post, Visakhapatnam – 530 048

Program Outcomes – Program Specific Outcomes – Course Outcomes

S.No.	Department	Courses	Availability
1	Civil Engineering	B.Tech & M.Tech	Available
2	Electrical & Electronics Engineering	B.Tech & M.Tech	Available
3	Mechanical Engineering	B.Tech & M.Tech	Available
4	Electronics & Communication Engineering	B.Tech & M.Tech	Available
5	Computer Science & Engineering	B.Tech & M.Tech	Available
6	Management Studies	MBA	Available

BABA INSTITUTE OF TECHNOLOGY AND SCIENCES

PRINCIPAL
Baba Institute of Technology and Sciences
Bakkannapalem (V), Madhurawada (P)
Visakhapatnam

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Department of CIVIL ENGINEERING

B.Tech

Program Specific Outcomes:

1. To apply the knowledge obtained through rigorous analysis of algorithms for advancing the broad area of computer science and engineering.

2. To bring forth the creative zeal and work efficiently in designing the solution to various software and hardware problems by using state of the art tools.

3. To assimilate professional ethics, managerial skills and to officiate effectively as a leader in a team to manage diverse projects.

Program Outcomes:

1. Engineering knowledge: An ability to apply knowledge of Mathematics (including Probability & Statistics and Mathematical Foundation of Computer Science), Science, and Engineering.

2. Problem analysis: An ability to design and conduct experiments, as well as to analyze and interpret data including hardware and software components

3. Design / development of solutions: An ability to design a complex computing system or process to meet desired specifications and needs.

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

5. Modern tool usage: An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice

6. The Engineer and Society: Apply cyber laws and copyright policies to assess societal health, safety, legal and cultural issues.

7. Environment and Sustainability: The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental and demonstrate the knowledge need for sustainable development.

8. Ethics Apply and commit Professional Ethics to satisfy the norms of the engineering practice.

9. Individual and team work: An ability to function on multi-disciplinary teams..

10. Communication: Ability to communicate and present effectively

11. Project Management and Finance: An ability to use the modern engineering tools, techniques, skills and management principles to do work as a member and leader in a team, to manage projects in multidisciplinary environments

SEMESTER I: COURSE OUTCOMES

Course Code:	HS1102
Course Title:	English
Theory / Lab:	Lab
Course Outcomes:	
CO-1	To learn how to pronounce words using the rules of the International Phonetic Alphabet
CO-2	To acquire English speaking skills using rhythm and intonation
CO-3	To learn to overcome stage fear and make presentations with ease
CO-4	To learn to use words and phrases according to the needs and demands of the situation.
CO-5	To learn to face different types of interviews with confidence.
CO-6	To gain confidence to participate in group discussions.

Course Code:	HS1102
Course Title:	English Language and Communication Skills
Theory / Lab:	Lab
Course Outcomes:	
CO-1	To learn how to pronounce words using the rules of the International Phonetic Alphabet
CO-2	To acquire English speaking skills using rhythm and intonation
CO-3	To learn to overcome stage fear and make presentations with ease
CO-4	To learn to use words and phrases according to the needs and demands of the

	situation.
CO-5	To learn to face different types of interviews with confidence.
CO-6	To gain confidence to participate in group discussions.

Course Code:	BSC1101
Course Title:	MATHEMATICS-1
Theory / Lab:	THEORY
Course Outcomes:	
CO-1	Utilize mean value theorems to real life problems.
CO-2	Solve the differential equations related to various engineering fields.
CO-3	Familiarize with functions of several variables which is useful in optimization.
CO-4	Apply double integration techniques in evaluating areas bounded by region.
CO-5	Students will also learn important tools of calculus in higher dimensions . Students will become familiar with 2- dimensional and 3- dimensional coordinate systems.

Course Code:	BSC1108
Course Title:	ENGINEERING PHYSICS
Theory / Lab:	THEORY
Course Outcomes:	
CO-1	The students will be able to Identify forces and moments in mechanical systems using scalar and vector techniques
CO-2	analyze acoustic properties of typically used materials in buildings
CO-3	Understand the elasticity and plasticity concepts
CO-4	An ability to Identify different types of sensors and their working principles
CO-5	An ability to classify the magnetic materials based on susceptibility and their

	temperature dependence.
CO-6	Able to Apply the concept of magnetism to magnetic devices.
Course Code:	BSC1109
Course Title:	ENGINEERING PHYSICS LAB
Theory / Lab:	LAB
Course Outcomes:	
CO-1	Ability to know and understand the Young's modulus by method of single cantilever oscillations.
CO-2	An ability to Determination of spring constant of springs using coupled oscillators.
CO-3	Able to Study the variation of B versus H by magnetizing the magnetic material (B-H curve).
CO-4	Understand the basic concepts of LASER light Sources
CO-5	An ability to Determination of Moment of Inertia of a Fly Wheel.
CO-6	Applying knowledge to estimate the Velocity of sound

COURSE OUTCOMES

SEMESTER-2

Course Code:	BSC1202
Course Title:	ENGINEERING CHEMISTRY
Theory / Lab:	THEORY
Course Outcomes:	
CO-1	Understand the operating principles and the reaction mechanisms of batteries and fuel cells.
CO-2	Able to apply this knowledge to the analysis and design of batteries
CO-3	Hydrogen fuel cell technology is used in automobiles in order to reduce environmental pollution

CO-4	An ability to design and conduct experiments, as well as to organize, analyze, and interpret data.
CO-5	An ability to identify and formulate polymers and have a knowledge of various polymers
CO-6	Ability to know and to understand the various fuels and their occurrences, synthesis and purifications
Course Code:	BSC1203
Course Title:	ENGINEERING CHEMISTRY LAB
Theory / Lab:	LAB
Course Outcomes:	
CO-1	Able to acquire knowledge to prepare solutions and their importance
CO-2	Able to apply this knowledge to the analysis and design of batteries
CO-3	Applying knowledge to estimate the hardness of water in terms of Ca2+ & Mg2+ ions
CO-4	Able to acquire principles of various analytical techniques and their applications.
CO-5	An ability to design and conduct experiments, as well as to organize, analyze, and interpret data.
CO-6	Ability to know and to understand the various fuels and their occurrences, synthesis and purifications.

Course Code:	BSC1201
Course Title:	MATHEMATICS-2
Theory / Lab:	THEORY
Course Outcomes:	
CO-1	Develop the use of matrix algebra techniques that is needed by engineers for practical applications.
CO-2	Solve system of linear algebraic equations using Gauss elimination, Gauss Jordan, Gauss Seidel.
CO-3	Evaluate approximating the roots of polynomial and transcendental equations by different algorithms.

CO-4	Apply Newton's forward & backward interpolation and lagrange's formula for equal and unequal intervals.
CO-5	Apply different algorithms for approximating the solutions of ordinary differential equations to its analytical computations.

ENVIRONMENTAL SCIENCE

Course Code:	MC1201
Course Title:	ENVIRONMENTAL SCIENCE
Theory / Lab:	THEORY
Course Outcomes:	
CO-1	Ability to know and to understand the various fuels and their occurrences, synthesis and purifications
CO-2	Able to apply this knowledge to the analysis and design of batteries
CO-3	An ability to identify and formulate polymers and have a knowledge of various polymers
CO-4	Hydrogen fuel cell technology is used in automobiles in order to reduce environmental pollution

Course Code:	BSC1203
Course Title:	MATHEMATICS-3
Theory / Lab:	THEORY
Course Outcomes:	
CO-1	Interpret the physical meaning of different operations such as gradient, curl and divergence.
CO-2	Estimate the work done against a field, circulation and flux using vector calculus.
CO-3	Apply the laplace transform for solving differential equations.
CO-4	Find the fourier series of periodic signals.

CO-5	Know and be able to apply integral expressions for the forwards and inverse fourier transform to a range of non-periodic waveforms.
CO-6	Identify solution methods for partial differential equations that model physica processes.

SEMESTER III:

Course Code:	R1621011
Course Title:	Probability & Statistics
Theory / Lab:	Theory
Course Outcomes:	
CO-1	Examine, analyze, and compare various Probability distributions for both discrete and continuous random variables.
CO-2	Describe and compute confidence intervals for the mean of a population.
CO-3	Describe and compute confidence intervals for the proportion and the variance of a population and test the hypothesis concerning mean, proportion and variance and perform ANOVA test.
CO-4	Fit a curve to the numerical data.

Course Code:	R1621012
Course Title:	**BASIC ELECTRICAL AND ELECTRONICS ENGINEERING**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	Able to analyse the various electrical networks.
CO-2	Able to understand the operation of DC generators,3-point starter and conduct the Swinburne's Test.
CO-3	Able to analyse the performance of transformer.
CO-4	Able to explain the operation of 3-phase alternator and 3-phase induction motors.

CO-5	Able to analyse the operation of half wave, full wave rectifiers and OP-AMPs.

Course Code:	R1621013
Course Title:	**STRENGTH OF MATERIALS-I**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	The student will be able to understand the basic materials behavior under the influence of different external loading conditions and the support conditions
CO-2	The student will be able to draw the diagrams indicating the variation of the key performance features like bending moment and shear forces
CO-3	The student will have knowledge of bending concepts and calculation of section modulus and for determination of stresses developed in the beams and deflections due to various loading conditions
CO-4	The student will be able to assess stresses across section of the thin and thick cylinders to arrive at optimum sections to withstand the internal pressure using Lame's equation.

Course Code:	R1621014
Course Title:	**BUILDING MATERIALS AND CONSTRUCTION**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	The student should be able to identify different building materials and their importance in building construction.
CO-2	The student is expected to differentiate brick masonry, stone masonry construction and use of lime and cement in various constructions.
CO-3	The student should have learnt the importance of building components and

	finishings.
CO-4	The student is expected to know the classification of aggregates, sieve analysis and moisture content usually required in building construction.

Course Code:	R1621015
Course Title:	**SURVEYING**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	To demonstrate the basic surveying skills
CO-2	To use various surveying instruments.
CO-3	To perform different methods of surveying
CO-4	To compute various data required for various methods of surveying.
CO-5	To integrate the knowledge and produce topographical map.

Course Code:	R1621016
Course Title:	**FLUID MECHANICS**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	Understand the various properties of fluids and their influence on fluid motion and analyse a variety of problems in fluid statics and dynamics.
CO-2	Calculate the forces that act on submerged planes and curves.
CO-3	Identify and analyse various types of fluid flows.
CO-4	Apply the integral forms of the three fundamental laws of fluid mechanics to turbulent and laminar flow through pipes and ducts in order to predict relevant

	pressures, velocities and forces.
CO-5	Draw simple hydraulic and energy gradient lines.
CO-6	Measure the quantities of fluid flowing in pipes, tanks and channels.

SEMESTER IV:

Course Code:	R1622011
Course Title:	**BUILDING PLANNING AND DRAWING**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	Upon successful completion of the course:
CO-2	Student should be able to plan various buildings as per the building by-laws.
CO-3	The student should be able to distinguish the relation between the plan, elevation and cross section and identify the form and functions among the buildings.
CO-4	The student is expected to learn the skills of drawing building elements and plan

Course Code:	R1622012
Course Title:	**STRENGTH OF MATERIALS- II**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	The student will be able to understand the basic concepts of Principal stresses developed in a member when it is subjected to stresses along different axes and design the sections.
CO-2	The student can assess stresses in different engineering applications like

	shafts, springs, columns and struts subjected to different loading conditions
CO-3	The student will be able to assess forces in different types of trusses used in construction.

Course Code:	R1622013
Course Title:	**HYDRAULICS AND HYDRAULIC MACHINERY**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	Solve uniform and non-uniform open channel flow problems.
CO-2	Apply the principals of dimensional analysis and similitude in hydraulic model testing.
CO-3	Understand the working principles of various hydraulic machineries and pumps.

Course Code:	R1622014
Course Title:	**CONCRETE TECHNOLOGY**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	Understand the basic concepts of concrete.
CO-2	Realize the importance of quality of concrete.
CO-3	familiarize the basic ingredients of concrete and their role in the production of concrete and its behaviour in the field
CO-4	Test the fresh concrete properties and the hardened concrete properties.

CO-5	Evaluate the ingredients of concrete through lab test results. design the concrete mix by BIS method.
CO-6	familiarize the basic concepts of special concrete and their production and applications. understand the behaviour of concrete in various environments.

Course Code:	R1622015
Course Title:	**STRUCTURAL ANALYSIS - I**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	Distinguish between the determinate and indeterminate structures.
CO-2	Identify the behavior of structures due to the expected loads, including the moving loads, acting on the structure
CO-3	Estimate the bending moment and shear forces in beams for different fixity conditions.
CO-4	Analyze the continuous beams using various methods -, three moment method, slope deflection method, energy theorems.
CO-5	Draw the influence line diagrams for various types of moving loads on beams/bridges.
CO-6	Analyze the loads in Pratt and Warren trusses when loads of different types and spans are passing over the truss.

Course Code:	R1622016
Course Title:	**TRANSPORTATION ENGINEERING – I**
Theory / Lab:	Theory
Course Outcomes:	Course Outcomes:
CO-1	Plan highway network for a given area.
CO-2	Determine Highway alignment and design highway geometrics

CO-3	Design Intersections and prepare traffic management plans
CO-4	Judge suitability of pavement materials and design flexible and rigid pavements
CO-5	Construct and maintain highways

SEMESTER V:

Course Code:	
Course Title:	**MANAGEMENT SCIENCE**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	After completion of the Course the student will acquire the knowledge on management functions, global leadership and organizational behavior.
CO-2	Will familiarize with the concepts of functional management project management and strategic management.

Course Code:	
Course Title:	**ENGINEERING GEOLOGY**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	Identify and classify the geological minerals
CO-2	Measure the rock strengths of various rocks
CO-3	Classify and measure the earthquake prone areas to practice the hazard zonation
CO-4	Classify, monitor and measure the Landslides and subsidence

CO-5	Prepares, analyses and interpret the Engineering Geologic maps
CO-6	Analyses the ground conditions through geophysical surveys.
CO-7	Test the geological material and ground to check the suitability of civil engineering project construction.
CO-8	Investigate the project site for mega/mini civil engineering projects.Site selection for mega engineering projects like Dams, Tunnels, disposal sites etc…

Course Code:	
Course Title:	**STRUCTURAL ANALYSIS – II**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	Differentiate Determinate and Indeterminate Structures
CO-2	Carryout lateral Load analysis of structures
CO-3	Analyze Cable and Suspension Bridge structures
CO-4	Analyze structures using Moment Distribution, Kani's Method and Matrix methods

Course Code:	
Course Title:	**DESIGN AND DRAWING OF REINFORCED CONCRETE STRUCTURES**
Theory / Lab:	Theory
Course Outcomes:	

CO-1	Work on different types of design philosophies
CO-2	Carryout analysis and design of flexural members and detailing
CO-3	Design structures subjected to shear, bond and torsion
CO-4	Design different type of compression members and footings

Course Code:	
Course Title:	**TRANSPORTATION ENGINEERING – II**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	Design geometrics in a railway track.
CO-2	Design airport geometrics and airfield pavements.
CO-3	Plan, construct and maintain Docks and Harbours.

Course Code:	
Course Title:	**CONCRETE TECHNOLOGY LAB**
Theory / Lab:	Lab
Course Outcomes:	
CO-1	Determine the consistency and fineness of cement.

CO-2	Determine the setting times of cement.
CO-3	Determine the specific gravity and soundness of cement.
CO-4	Determine the compressive strength of cement.
CO-5	Determine the workability of cement concrete by compaction factor, slump and Vee– Bee tests
CO-6	Determine the specific gravity of coarse aggregate and fine aggregate by Sieve analysis.
CO-7	Determine the flakiness and elongation index of aggregates.
CO-8	Determine the bulking of sand.
CO-9	Understand the non-destructive testing procedures on concrete.

Course Code:	
Course Title:	**ENGINEERING GEOLOGY LAB**
Theory / Lab:	Lab
Course Outcomes:	
CO-1	Identify Mega-scopic minerals & their properties.
CO-2	Identify Mega-scopic rocks & their properties.
CO-3	Identify the site parameters such as contour, slope & aspect for topography.
CO-4	Know the occurrence of materials using the strike & dip problems.

Course Code:	
Course Title:	**TRANSPORTATION ENGINEERING LAB**
Theory / Lab:	Lab

Course Outcomes:	
CO-1	Ability to test aggregates and judge the suitability of materials for the road construction
CO-2	Ability to test the given bitumen samples and judge their suitability for the road construction
CO-3	Ability to obtain the optimum bitumen content for the mix design
CO-4	Ability to determine the traffic volume, speed and parking characteristics.

SEMESTER VI:

Course Code:	
Course Title:	**DESIGN AND DRAWING OF STEEL STRUCTURES**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	Work with relevant IS codes
CO-2	Carryout analysis and design of flexural members and detailing
CO-3	Design compression members of different types with connection detailing
CO-4	Design Plate Girder and Gantry Girder with connection detailing
CO-5	Produce the drawings pertaining to different components of steel structures

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Course Title:	**GEOTECHNICAL ENGINEERING – I**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	The student must know the definition of the various parameters related to soil mechanics and establish their inter-relationships.
CO-2	The student should be able to know the methods of determination of the various index properties of the soils and classify the soils.
CO-3	The student should be able to know the importance of the different engineering properties of the soil such as compaction, permeability, consolidation and shear strength and determine them in the laboratory.
CO-4	The student should be able to apply the above concepts in day-to-day civil engineering practice.

Course Code:	
Course Title:	**ENVIRONMENTAL ENGINEERING – I**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	Plan and design the water and distribution networks and sewerage systems
CO-2	Identify the water source and select proper intake structure
CO-3	Characterisation of water
CO-4	Select the appropriate appurtenances in the water supply

Course Code:	
Course Title:	**WATER RESOURCES ENGINEERING–I**
Theory / Lab:	Theory

Course Outcomes:	
CO-1	Have a thorough understanding of the theories and principles governing the hydrologic processes
CO-2	Be able to quantify major hydrologic components and apply key concepts to several practical areas of engineering hydrology and related design aspects
CO-3	Develop Intensity-Duration-Frequency and Depth-Area Duration curves to design hydraulic structures.
CO-4	Be able to develop design storms and carry out frequency analysis
CO-5	Be able to determine storage capacity and life of reservoirs.
CO-6	Develop unit hydrograph and synthetic hydrograph
CO-7	Be able to estimate flood magnitude and carry out flood routing.
CO-8	Be able to determine aquifer parameters and yield of wells.
CO-9	Be able to model hydrologic processes

Course Code:	
Course Title:	**DATA BASE MANAGEMENT SYSTEMS**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	Describe a relational database and object-oriented database.
CO-2	Create, maintain and manipulate a relational database using SQL
CO-3	Describe ER model and normalization for database design.
CO-4	Examine issues in data storage and query processing and can formulate appropriate solutions.
CO-5	Understand the role and issues in management of data such as efficiency, privacy, security, ethical responsibility, and strategic advantage.
CO-6	Design and build database system for a given real world problem

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Course Code:	
Course Title:	**GEOTECHNICAL ENGINEERING LAB**
Theory / Lab:	Lab
Course Outcomes:	
CO-1	Determine index properties of soil and classify them.
CO-2	Determine permeability of soils.
CO-3	Determine Compaction, Consolidation and shear strength characteristics.

Course Code:	
Course Title:	**ENVIRONMENTAL ENGINEERING LAB**
Theory / Lab:	Lab
Course Outcomes:	
CO-1	Estimation some important characteristics of water and wastewater in the laboratory
CO-2	Draw some conclusion and decide whether the water is potable or not.
CO-3	Decide whether the water body is polluted or not with reference to the state parameters in the list of experiments
CO-4	Estimation of the strength of the sewage in terms of BOD and COD

Course Code:	
Course Title:	**COMPUTER AIDED ENGINEERING LABORATORY**

Theory / Lab:	Lab
Course Outcomes:	
CO-1	Plan and design the sewerage systems
CO-2	Select the appropriate appurtenances in the sewerage systems
CO-3	Analyze sewage and suggest and design suitable treatment system for sewage treatment
CO-4	Identify the critical point of pollution in a river for a specific amount of pollutant disposal into the river
CO-5	Suggest a suitable disposal method with respect to effluent standards.

SEMESTER VII:

Course Code:	
Course Title:	**ENVIRONMENTAL ENGINEERING -II**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	Plan and design the sewerage systems
CO-2	Select the appropriate appurtenances in the sewerage systems
CO-3	Analyze sewage and suggest and design suitable treatment system for sewage treatment
CO-4	Identify the critical point of pollution in a river for a specific amount of pollutant disposal into the river
CO-5	Suggest a suitable disposal method with respect to effluent standards.

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Course Code:	
Course Title:	**WATER RESOURCES ENGINEERING–II**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	Estimate irrigation water requirements
CO-2	Design irrigation canals and canal network
CO-3	Plan an irrigation system
CO-4	Design irrigation canal structures
CO-5	Plan and design diversion head works
CO-6	Analyse stability of gravity and earth dams
CO-7	Design ogee spillways and energy dissipation works

Course Code:	
Course Title:	**GEOTECHNICAL ENGINEERING – II**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	The student must be able to understand the various types of shallow foundations and decide on their location based on soil characteristics
CO-2	The student must be able to compute the magnitude of foundation settlement to decide the size of the foundation.
CO-3	The student must be able to use the field test data and arrive at the bearing capacity.
CO-4	The student must be able to design Piles based on the principles of bearing capacity.

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Course Code:	
Course Title:	**REMOTE SENSING AND GIS APPLICATIONS**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	Be familiar with ground, air and satellite based sensor platforms.
CO-2	Interpret the aerial photographs and satellite imageries
CO-3	Create and input spatial data for GIS application
CO-4	Apply RS and GIS concepts in water resources engineering
CO-5	Applications of various satellite data

Course Code:	
Course Title:	**GROUND IMPROVEMENT TECHNIQUES**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	By the end of the course, the student should be able to possess the knowledge of various methods of ground improvement and their suitability to different field situations.
CO-2	The student should be in a position to design a reinforced earth embankment and check its stability.
CO-3	The student should know the various functions of Geo synthetics and their applications in Civil Engineering practice.
CO-4	The student should be able to understand the concepts and applications of grouting.

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Course Title:	**ENVIRONMENTAL IMPACT ASSESSMENT AND MANAGEMENT**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	Prepare EMP, EIS, and EIA report
CO-2	Identify the risks and impacts of a project
CO-3	Selection of an appropriate EIA methodology
CO-4	Evaluation the EIA report
CO-5	Estimate the cost benefit ratio of a project
CO-6	Know the role of stakeholder and public hearing in the preparation of EIA

Course Code:	
Course Title:	**GIS & CAD LAB**
Theory / Lab:	Lab
Course Outcomes:	
CO-1	Work comfortably on GIS software
CO-2	Digitize and create thematic map and extract important features
CO-3	Develop digital elevation model
CO-4	Use structural analysis software to analyze and design 2D and 3D frames
CO-5	Design and analyze retaining wall and simple towers using CADD software.

SEMESTER VIII:

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Course Code:	
Course Title:	**ESTIMATION SPECIFICATION & CONTRACTS**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	The student should be able to determine the quantities of different components of buildings.
CO-2	The student should be in a position to find the cost of various building components.
CO-3	The student should be capable of finalizing the value of structures.

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Course Code:	
Course Title:	**CONSTRUCTION TECHNOLOGY AND MANAGEMENT**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	Appreciate the importance of construction planning
CO-2	Understand the functioning of various earth moving equipment
CO-3	Know the methods of production of aggregate products and concreting and usage of machinery required for the works.
CO-4	Apply the gained knowledge to project management and construction techniques

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Course Code:	
Course Title:	**PRESTRESSED CONCRETE**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	Understand the different methods of prestressing
CO-2	Estimate effective prestress including the short and long term losses
CO-3	Analyze and design prestressed concrete beams under flexure and shear
CO-4	Understand the relevant IS Codal provisions for prestressed concrete

Course Code:	
Course Title:	**SOLID AND HAZARDOUS WASTE MANAGEMENT**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	Design the collection systems of solid waste of a town
CO-2	Design treatment of municipal solid waste and landfill
CO-3	Know the criteria for selection of landfill
CO-4	Characterize the solid waste and design a composting facility
CO-5	Know the Method of treatment and disposal of Hazardous wastes.

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Course Title:	**PROJECT WORK**
Theory / Lab:	
Course Outcomes:	
CO-1	Apply all levels of Engineering knowledge in solving the Engineering problems.
CO-2	Work together with team spirit.
CO-3	Use Civil Engineering software at least one.
CO-4	Document the projects
CO-5	
CO-6	

M.Tech

PO 1

PSOs:

1. Ability to recognize the importance of Civil Engineering Professional development by pursuing post graduate studies
2. An ability to face competitive exams that offer challenging and rewarding careers
3. An ability to apply develop and execution of projects in the construction of variousCivilengineeringdiscipline.Abilitytobecomeanentrepreneurandto improve the management skills

POs:

1. Able to solve mathematical/numerical problem
2. Able to analyze trusses, beams, frames
3. Estimation of forces, analysis of multi degree of freedom systems using
4. Mathematical approaches such as static quasi static and dynamic methods.

5. Design of Structures to contribute in the development of the society
6. Application of experimental techniques on structural evaluation
7. Able to analyze and design of structure under different types of loads
8. Optimization of structures and presentation of the project done with ethics

COURSE OUTCOMES

SEMESTER I:

Course Code:	
Course Title:	**THEORY OF ELASTICITY**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	Know the definition of stress and deformation and how to determine the components of the stress and strain tensors.
CO-2	Apply the conditions of compatibility and equations of equilibrium.
CO-3	Understand how to express the mechanical characteristics of materials, constitutive equations and generalized Hook law.
CO-4	Use the equilibrium equations stated by the displacements and compatibility conditions stated by stresses
CO-5	Understand index notation of equations, tensor and matrix notation and define state of plane stress, state of plane strain
CO-6	Be able to analyze real problem and to formulate the conditions of theory of elasticity Applications

CO-7	Determine the boundary restrictions in calculations. Solve the basic problems of the theory of elasticity by using Airy function expressed as bi- harmonic function.

Course Code:	
Course Title:	**STRUCTURAL DYNAMICS**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	Understand the response of structural systems to dynamic loads
CO-2	Realize the behavior and response of linear and nonlinear SDOF and MDOF structures with various dynamic loading
CO-3	Understand the behavior and response of MDOF structures with various dynamic loading.
CO-4	Understand the behavior of structures subjected to dynamic loads under free vibration
CO-5	Possess the ability to find out suitable solution for continuous system
CO-6	Understand the behavior of structures subjected to dynamic loads Harmonic excitation and earthquake load

Course Code:	
Course Title:	**MATRIX ANALYSIS OF STRUCTURES**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	Perform the structural analysis of determinate and indeterminate structures using classical compatibility methods, such as method of consistent displacements, force and equilibrium Methods
CO-2	Perform structural analysis using the stiffness method.
CO-3	Solve multiple degree of freedom two and three dimensional problems involving trusses, beams, frames and plane stress
CO-4	Understand basic finite element analysis

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Course Code:	
Course Title:	**REPAIR AND REHABILITATION OF STRUCTURES**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	Recognize the mechanisms of degradation of concrete structures and to design durable concrete structures.
CO-2	Conduct field monitoring and non- destructive evaluation of concrete structures.
CO-3	Design and suggest repair strategies for deteriorated concrete structures including repairing with composites.
CO-4	Understand the methods of strengthening methods for concrete structures
CO-5	Assessment of the serviceability and residual life span of concrete structures by Visual inspection and in situ tests
CO-6	Evaluation of causes and mechanism of damage
CO-7	Evaluation of actual capacity of the concrete structure Maintenance strategies

Course Code:	
Course Title:	**ADVANCED CONCRETE TECHNOLOGY**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	The learner will be able to design concrete mixes of different grades and also use the special concretes.

Course Code:	
Course Title:	**ADVANCED CONCRETE TECHNOLOGY LABORATORY**
Theory / Lab:	Lab

Course Outcomes:	
CO-1	Conduct various laboratory tests on Cement, Aggregates
CO-2	Know strain measurement
CO-3	Non- destructive testing
CO-4	Chemical analysis on concrete and Aggregate and Sand

Course Code:	
Course Title:	**ADVANCED STRUCTURAL ENGINEERING LABORATORY**
Theory / Lab:	Lab
Course Outcomes:	
CO-1	Conduct various laboratory tests on Cement, Aggregates
CO-2	Know strain measurement
CO-3	Non- destructive testing
CO-4	Chemical analysis on concrete and Aggregate and Sand

SEMESTER II:

Course Code:	
Course Title:	**FINITE ELEMENT METHODS IN STRUCTURAL ENGINEERING**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	Develop finite element formulations of 1 degree of freedom problems and solve them
CO-2	Understand any Finite Element software to perform stress, thermal and modal analysis
CO-3	Compute the stiffness matrices of different elements and system
CO-4	Interpret displacements, strains and stress resultants

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Course Code:	
Course Title:	**THEORY OF PLATES AND SHELLS**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	Have a knowledge about various plate theories due to bending
CO-2	Gain the knowledge of Navier‟s solution, Levy‟s solution and solve for the rectangular and square plates
CO-3	Analyze circular plates with various boundary conditions.
CO-4	Focus on the finite difference method of solving plate problems.
CO-5	Ability to realize the potential energy principle and find the solution of rectangular plates
CO-6	Understand the behaviour of folded plates and shells.

Course Code:	
Course Title:	**STABILITY OF STRUCTURES**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	Analyze different types of structural instabilities
CO-2	Execute and work out the inelastic buckling using various methodologies.
CO-3	Examine the behaviour of beam columns and frames with and without side sway using classical and stiffness methods
CO-4	To be well versed in the lateral buckling, torsional buckling, Flexural torsional buckling of various beams and non- circular sections.

Course Code:	
Course Title:	**EARTH RETAINING STRUCTURES**

Theory / Lab:	Theory
Course Outcomes:	
CO-1	Quantify the lateral earth pressures associated with different earth systems
CO-2	Evaluate the mechanical properties of geosynthetics used for soil reinforcement
CO-3	Identify the merits and demerits of different earth retaining systems.
CO-4	Select the most technically appropriate type of retaining wall for the application from a thorough knowledge of available systems
CO-5	Design of retaining structures using appropriate design methods, factors of safety, earth pressure diagrams and field verification methods
CO-6	Aware of current guidelines regarding the design of earth retaining structures.
CO-7	Design retaining structures considering both external and internal stability aspects

Course Code:	
Course Title:	**COMPUTER AIDED DESIGN LABORATORY**
Theory / Lab:	Lab
Course Outcomes:	
CO-1	Develop Computer Programs for Analysis and Design of various Structural Elements
CO-2	Use different Structural Engineering software‟s to solve various civil Engineering programs

Course Code:	
Course Title:	**STRUCTURAL DESIGN LABORATORY**
Theory / Lab:	Lab
Course Outcomes:	
CO-1	Develop Computer Programs for Analysis and Design of various Structural Elements
CO-2	Use different Structural Engineering software‟s to solve various civil Engineering

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Course Code:	
Course Title:	Mini Project With **SEMINAR**
Theory / Lab:	
Course Outcomes:	
CO-1	Collect research material on some topic and to summaries it report and give to present the same

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Department of ELECTRICAL & ELECTRONICS ENGINEERING

B.Tech

Program Specific Outcomes:

1. The ability to implement Electrical and Electronics Engineering concepts in the field of Industrial Automation, Renewable Energy and Smart Cities.

2. To develop the ability to solve large complex evolving projects using cutting edge technologies and modern tools.

3. To instill lifelong learning approach towards constantly evolving technologies with innovative and ethical mindset.

Program Outcomes:

1. **ENGINEERING KNOWLEDGE:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization for the solution of complex engineering problems.

2. **PROBLEM ANALYSIS:** Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

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

4. **MODERN TOOL USAGE:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modeling to complex engineering activities, with an understanding of the limitations.

5. **ENGINEER AND SOCIETY:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

6. **ENVIRONMENT AND SUSTAINABILITY:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

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

8. **INDIVIDUAL AND TEAM WORK:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

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

10. **PROJECT MANAGEMENT AND FINANCE:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

11. **CONDUCT INVESTIGATIONS OF COMPLEX PROBLEMS:**
The problems:

- That cannot be solved by straightforward application of knowledge, theories and techniques applicable to the engineering discipline.
- That may not have a unique solution.
- That requires consideration of appropriate constraints/requirements not explicitly given in the problem statement.
- Which need to be defined (modeled) within appropriate mathematical framework.
- That often requires use of modern computational concepts and tools.

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

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COURSE OUTCOMES

SEMESTER I:

Course Code:	HS1101
Course Title:	English
Theory / Lab:	Theory
Course Outcomes:	
CO-1	To improve listening skills so as to understand English spoken by native speakers
CO-2	To focus on appropriate reading strategies for comprehension of various academic texts and authentic materials
CO-3	To demonstrate speaking skills through participation in activities such as role plays, discussions and structured talks/oral presentations.
CO-4	To communicate confidently in various contexts and different cultures
CO-5	To comprehend grammatical structures and vocabulary and encourage their use in speech and writing.
CO-6	To analyze unfamiliar phrases/sentences and to understand the structure/syntax of the English Language.

Course Code:	HS1102
Course Title:	English Language and Communication Skills
Theory / Lab:	Lab
Course Outcomes:	
CO-1	To learn how to pronounce words using the rules they have been taught.
CO-2	To acquire English speaking skills using rhythm and intonation.
CO-3	To learn to overcome stage fear and make presentations with ease.
CO-4	To learn how to use right words and phrases according to the situation.
CO-5	To learn to face different types of interviews with confidence.
CO-6	To gain confidence to participate in group discussions.

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Course Code:	BS1101
Course Title:	MATHEMATICS-1
Theory / Lab:	THEORY
Course Outcomes:	
CO-1	Utilize mean value theorems to real life problems
CO-2	Solve the differential equations related to various engineering fields
CO-3	Familiarize with functions of several variables which is useful in optimization
CO-4	Apply double integration techniques in evaluating areas bounded by region
CO-5	Students will also learn important tools of calculus in height dimensions .
CO-6	Students will become familiar with 2-dimensional and 3-dimensional coordinate systems.

Course Code:	BS1106
Course Title:	APPLIED CHEMISTRY
Theory / Lab:	THEORY
Course Outcomes:	
CO-1	Understand the operating principles and the reaction mechanisms of batteries and fuel cells.
CO-2	Able to apply this knowledge to the analysis and design of batteries
CO-3	Hydrogen fuel cell technology is used in automobiles in order to reduce environmental pollution
CO-4	An ability to design and conduct experiments, as well as to organize, analyze, and interpret data.
CO-5	An ability to identify and formulate polymers and have a knowledge of various polymers
CO-6	Ability to know and to understand the various fuels and their occurrences, synthesis and purifications

Course Code:	BS1107
Course Title:	APPLIED CHEMISTRY LAB
Theory / Lab:	LAB
Course Outcomes:	
CO-1	Able to acquire knowledge to prepare solutions and their importance
CO-2	Able to apply this knowledge to the analysis and design of batteries.
CO-3	Applying knowledge to estimate the hardness of water in terms of Ca2+ & Mg2+ ions
CO-4	Able to acquire principles of various analytical techniques and their applications
CO-5	An ability to design and conduct experiments, as well as to organize, analyze, and interpret data.
CO-6	Ability to know and to understand the various fuels and their occurrences, synthesis and purifications.

SEMESTER-2

Course Code:	BS1202
Course Title:	MATHEMATICS-2
Theory / Lab:	THEORY
Course Outcomes:	
CO-1	Develop the use of matrix algebra techniques that is needed by engineers for practical applications.
CO-2	Solve system of linear algebraic equations using Gauss elimination, Gauss Jordan, Gauss seidel.
CO-3	Evaluate approximating the roots of polynomial and transcendental equations by different algorithms.
CO-4	Apply Newton's forward & backward interpolation and Langrange's formulae for equal and unequal intervals
CO-5	Apply different algorithms for approximating the solutions of ordinary differential equations to its analytical computations.

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Course Code:	BS1203
Course Title:	MATHEMATICS-3
Theory / Lab:	THEORY
Course Outcomes:	
CO-1	Interpret the physical meaning of different operators such as gradient, curl and divergence.
CO-2	Estimate the work done against a field, circulation and flux using vector calculus.
CO-3	Apply the Laplace transform for solving differential equations.
CO-4	Find the fourier series of periodic signals.
CO-5	Know and be able to apply integral expressions for the forwards and inverse Fourier transform to a range of non-periodic waveforms.
CO-6	Identify solution methods for partial differential equations that model physical processes.

Course Code:	HS1203
Course Title:	English Language and Communication Skills
Theory / Lab:	Lab
Course Outcomes:	
CO-1	To learn how to pronounce words using the rules of the International Phonetic Alphabet
CO-2	To acquire English speaking skills using rhythm and intonation
CO-3	To learn to overcome stage fear and make presentations with ease
CO-4	To learn to use words and phrases according to the needs and demands of the situation.
CO-5	To learn to face different types of interviews with confidence.
CO-6	To gain confidence to participate in group discussions.

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Course Code:	BS1204
Course Title:	APPLIED PHYSICS
Theory / Lab:	THEORY
Course Outcomes:	
CO-1	Able to explain the need of coherent sources and the conditions for sustained interference.
CO-2	Able to analyze the physical significance of wave function.
CO-3	An ability to calculate the Fermi energy.
CO-4	An ability to identify the type of semiconductor using Hall effect.
CO-5	Able to summarize various types of polarization of dielectrics
CO-6	An ability to classify the magnetic materials based on susceptibility and their temperature dependence.

Course Code:	BS1205
Course Title:	APPLIED PHYSICS LAB
Theory / Lab:	LAB
Course Outcomes:	
CO-1	An ability to find thickness of a spacer using wedge film and parallel interference fringes.
CO-2	Able to acquire principles of various analytical techniques and their applications
CO-3	Ability to know and understand the Characteristics of Thermistor
CO-4	An ability to find Measurement of magnetic susceptibility by Gouy's method
CO-5	Able to Resolving Power of telescope
CO-6	An ability to find Hall voltage and Hall coefficients of a given semiconductor using Hall effect.

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SEMESTER III:

Course Code:	R1621021
Course Title:	**ELECTRICAL CIRCUIT ANALYSIS-II**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	Students are able to solve three- phase circuits under balanced and unbalanced condition
CO-2	Students are able find the transient response of electrical networks for different types of excitations.
CO-3	Students are able to find parameters for different types of network.
CO-4	Students are able to realize electrical equivalent network for a given network transfer function.
CO-5	Students are able to extract different harmonics components from the response of a electrical network.
CO-6	Students are able to solve three- phase circuits under balanced and unbalanced condition

Course Code:	R1621022
Course Title:	**ELECTRICAL MACHINES – I**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	Able to assimilate the concepts of electromechanical energy conversion.
CO-2	Able to mitigate the ill-effects of armature reaction and improve commutation in dc machines.
CO-3	Able to understand the torque production mechanism and control the speed of dc motors.
CO-4	Able to analyze the performance of single phase transformers.
CO-5	Able to predetermine regulation, losses and efficiency of single phase transformers.
CO-6	Able to parallel transformers, control voltages with tap changing methods and achieve three phase to two-phase transformation.

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Course Code:	R1621023
Course Title:	**BASIC ELECTRONICS AND DEVICES**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	Students are able to understand the basic concepts of semiconductor physics, which are usefulto understand the operation of diodes and transistors.
CO-2	Students are able to explain the operation and characteristics of PN junction diode and special diodes.
CO-3	Ability to understand operation and design aspects of rectifiers and regulators.
CO-4	Students are able to understand the characteristics of various transistor configurations. They become familiar with different biasing, stabilization and compensation techniques used in transistor circuits.
CO-5	Students are able to understand the operation and characteristics of FET, Thyristors, PowerIGBTs and Power MOSFETs.
CO-6	Students are able to understand the merits and demerits of positive and negative feedback and the role of feedback in oscillators and amplifiers.

Course Code:	R1621024
Course Title:	**ELECTROMAGNETIC FIELDS**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	To determine electric fields and potentials using guass's law or solving Laplace's or Possion's equations, for various electric charge distributions.
CO-2	To Calculate and design capacitance, energy stored in dielectrics.
CO-3	To Calculate the magnetic field intensity due to current, the application of ampere'slaw and the Maxwell's second and third equations.
CO-4	To determine the magnetic forces and torque produced by currents in magnetic field
CO-5	To determine self and mutual inductances and the energy stored in the magnetic field.
CO-6	To calculate induced e.m.f., understand the concepts of displacement current and Pointing vector.

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Course Code:	R1621025
Course Title:	**THERMAL AND HYDRO PRIME MOVERS**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	To make the student learn about the constructional features, operational details of various types of internal combustion engines through the details of several engine systems and the basic air standard cycles, that govern the engines. Further, thestudent shall be able to calculate the performance of different types of internal combustion engines.
CO-2	To train the student in the aspects of steam formation and its utilities through the standard steam data tables and charts. To make the student correlate between the air standard cycles and the actual cycles that govern the steam turbines. To train the student to calculate the performance of steam turbines using velocity diagrams
CO-3	To impart the knowledge of gas turbine fundamentals, the governing cycles and the methods to improve the efficiency of gas turbines
CO-4	To teach the student about the fundamental of fluid dynamic equations and its applications fluid jets. To impart the knowledge of various types of pumps, their constructional features, working and performance
CO-5	To make the student learn about the constructional features, operational details of various types of hydraulic turbines. Further, the student shall be able to calculate the performance of hydraulic turbines
CO-6	To train the student in the areas of types of hydro electric power plants, estimation and calculation of different loads by considering various factors

Course Code:	R1621026
Course Title:	**MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	The Learner is equipped with the knowledge of estimating the Demand and demand elasticities for a product and the knowledge of understanding of the Input-Output-Cost relationships and estimation of the least cost combination of inputs.
CO-2	One is also ready to understand the nature of different markets and Price Output determination under various market conditions and also to have the knowledge of different Business Units.
CO-3	The Learner is able to prepare Financial Statements and the usage of various Accounting tools for Analysis and to evaluate various investment project proposals with the help of capital budgeting techniques for decision making.

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Course Code:	R1621027
Course Title:	**THERMAL AND HYDRO LAB**
Theory / Lab:	Lab
Course Outcomes:	
CO-1	To impart practical knowledge on the performance evaluation methods of various internal combustion engines, flow measuring equipment and hydraulic turbines and pumps.

Course Code:	R1621028
Course Title:	**ELECTRICAL CIRCUITS LAB**
Theory / Lab:	Lab
Course Outcomes:	
CO-1	Able to apply various thermos, determination of self and mutual inductances, two port parameters of a given electric circuits.
CO-2	Able to draw locus diagrams. Waveforms and phasor diagram for lagging and leading networks.

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SEMESTER IV:

Course Code:	R1622021
Course Title:	**ELECTRICAL MEASUREMENTS**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	Able to choose right type of instrument for measurement of voltage and current for ac and dc.
CO-2	Able to choose right type of instrument for measurement of power and energy – able to calibrate energy meter by suitable method
CO-3	Able to calibrate ammeter and potentiometer.
CO-4	Able to select suitable bridge for measurement of electrical parameters
CO-5	Able to use the ballistic galvanometer and flux meter for magnetic measuring instruments
CO-6	Able to measure frequency and phase difference between signals using CRO. Able to use digital Instruments in electrical measurements.

Course Code:	R1622022
Course Title:	**ELECTRICAL MACHINES – II**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	Able to explain the operation and performance of three phase induction motor.
CO-2	Able to analyze the torque-speed relation, performance of induction motor and induction generator.
CO-3	Able to explain design procedure for transformers and three phase induction motors.
CO-4	Implement the starting of single phase induction motors.
CO-5	To perform winding design and predetermine the regulation of synchronous generators.
CO-6	Avoid hunting phenomenon, implement methods of staring and correction of power factor with synchronous motor.

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Course Code:	R1622023
Course Title:	**SWITCHING THEORY AND LOGIC DESIGN**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	to review of number systems & codes
CO-2	Able to learn minimization techniques
CO-3	Able to learn combinational logic circuits design
CO-4	Able to learn pal, pla basic structures and programming tables of pld's
CO-5	Able to learn basic flip flops, RS flip flops, JK flip flops, D flip flops
CO-6	Able to learn sequential circuits, state diagrams and state tables

Course Code:	R1622024
Course Title:	**CONTROL SYSTEMS**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	Ability to derive the transfer function of physical systems and determination of overall transfer function using block diagram algebra and signal flow graphs.
CO-2	Capability to determine time response specifications of second order systems and to determine error constants.
CO-3	Acquires the skill to analyze absolute and relative stability of LTI systems using Routh's stability criterion and the root locus method.
CO-4	Capable to analyze the stability of LTI systems using frequency response methods.
CO-5	Able to design Lag, Lead, Lag-Lead compensators to improve system performance from Bode diagrams.
CO-6	Ability to represent physical systems as state models and determine the response. Understanding the concepts of controllability and observability

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Course Code:	R1622025
Course Title:	**POWER SYSTEMS-I**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	Students are able to identify the different components of thermal power plants.
CO-2	Students are able to identify the different components of nuclear Power plants.
CO-3	Students are able to distinguish between AC/DC distribution systems and also estimate voltage drops of distribution systems.
CO-4	Students are able to identify The different components of air and gas insulated substations.
CO-5	Students are able to identify single core and multi core cables with different insulating materials.
CO-6	Students are able to analyze the different economic factors of power generation and tariffs.

Course Code:	R1622026
Course Title:	**MANAGEMENT SCIENCE**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	After completion of the Course the student will acquire the knowledge on management functions, global leadership and organizational behavior.
CO-2	Will familiarize with the concepts of functional management project management and

Course Code:	R1622027
Course Title:	**ELECTRICAL MACHINES – I LABORATORY**
Theory / Lab:	Lab
Course Outcomes:	
CO-1	To determine and predetermine the performance of DC machines and Transformers.

CO-2	To control the speed of DC motor.
CO-3	To achieve three phase to two phase transformation

Course Code:	R1622028
Course Title:	**ELECTRONIC DEVICES AND CIRCUITS LAB**
Theory / Lab:	Lab
Course Outcomes:	
CO-1	To Identification, Specifications, Testing of R, L, C Components (Colour Codes),
CO-2	To operate Potentiometers, Coils, Gang Condensers, Relays, Bread Boards.
CO-3	To Identification, Specifications and Testing of active devices, Diodes, BJTs, JFETs, LEDs, LCDs, SCR, UJT
CO-4	To get Soldering Practice- Simple circuits using active and passive components.
CO-5	To Study and operation of Ammeters, Voltmeters, Transformers, Analog and

SEMESTER V:

Course Code:	R1631021
Course Title:	**POWER SYSTEMS–II**
Theory / Lab:	**Theory**
Course Outcomes:	
CO-1	Able to understand parameters of various types of transmission lines during different operating conditions.
CO-2	Able to understand the performance of short and medium transmission lines.
CO-3	Student will be able to understand travelling waves on transmission lines.
CO-4	Will be able to understand various factors related to charged transmission lines.
CO-5	Will be able to understand sag/tension of transmission lines and performance of line insulators.

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Course Code:	R1631022
Course Title:	**RENEWABLE ENERGY SOURCES**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	Analyze solar radiation data, extraterrestrial radiation, and radiation on earth's surface.
CO-2	Design solar thermal collectors, solar thermal plants.
CO-3	Design solar photo voltaic systems.
CO-4	Develop maximum power point techniques in solar PV and wind energy systems.
CO-5	Explain wind energy conversion systems, wind generators, power generation.
CO-6	Explain basic principle and working of hydro, tidal, biomass, fuel cell and geothermal systems.

Course Code:	R1631023
Course Title:	**SIGNALS & SYSTEMS**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	Characterize the signals and systems and principles of vector spaces, Concept of orthgonality.
CO-2	Analyze the continuous-time signals and continuous-time systems using Fourier series, Fourier transform and Laplace transform.
CO-3	Apply sampling theorem to convert continuous-time signals to discrete-time signal and reconstruct back.
CO-4	Understand the relationships among the various representations of LTI systems
CO-5	Understand the Concepts of convolution, correlation, Energy and Power density spectrum and their relationships.
CO-6	Apply z-transform to analyze discrete-time signals and systems.

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Course Code:	R1631024
Course Title:	**PULSE AND DIGITAL CIRCUITS**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	After going through this course the student will be able to Design linear and non-linear wave shaping circuits.
CO-2	Apply the fundamental concepts of wave shaping for various switching and signal generating circuits.
CO-3	Design different multi vibrators and time base generators.
CO-4	Utilize the non sinusoidal signals in many experimental research areas.
CO-5	After going through this course the student will be able to Design linear and non-linear wave shaping circuits.
CO-6	Apply the fundamental concepts of wave shaping for various switching and signal generating circuits.

Course Code:	R1631025
Course Title:	**POWER ELECTRONICS**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	Explain the characteristics of various power semiconductor devices and analyze the static and dynamic characteristics of SCR's.
CO-2	Design firing circuits for SCR.
CO-3	Explain the operation of single phase full–wave converters and analyze harmonics in the input current.
CO-4	Explain the operation of three phase full–wave converters.
CO-5	Analyze the operation of different types of DC-DC converters.
CO-6	Explain the operation of inverters and application of PWM techniques for voltage control and harmonic mitigation

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Course Code:	R1631029
Course Title:	**INTELLECTUAL PROPERTY RIGHTS AND PATENTS**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	IPR Laws and patents pave the way for innovative ideas which are instrumental for Inventions to seek Patents
CO-2	Student get an insight on Copyrights, Patents and Software patents which are instrumental for further advancements

Course Code:	R1631026
Course Title:	**ELECTRICAL MACHINES – II LABORATORY**
Theory / Lab:	Lab
Course Outcomes:	
CO-1	Able to assess the performance ofsingle phase and three phase induction motors.
CO-2	Able to control the speed of three phase induction motor.
CO-3	Able to predetermine the regulation of three–phase alternator by various methods.
CO-4	Able to find the X_d/ $X_q$ratio of alternator and asses the performance of three–phase

Course Code:	R1631027
Course Title:	**CONTROL SYSTEMS LAB**
Theory / Lab:	Lab
Course Outcomes:	
CO-1	Able to analyze the performance and working Magnetic amplifier, D.C and A.C.
CO-2	servo motors and synchronous motors.
CO-3	Able to design P,PI,PD and PID controllers

CO-4	Able to design lag, lead and lag–lead compensators
CO-5	Able to control the temperature using PID controller
CO-6	Able to determine the transfer function of D.C.motor

Course Code:	R1631028
Course Title:	**ELECTRICAL MEASUREMENTS LABORATORY**
Theory / Lab:	Lab
Course Outcomes:	
CO-1	To be able to measure the electrical parameters voltage, current, power, energy and electrical characteristics of resistance, inductance and capacitance
CO-2	To be able to test transformer oil for its effectiveness.
CO-3	To be able to measure the parameters of inductive coil.

SEMESTER VI:

Course Code:	R1632021
Course Title:	**POWER ELECTRONIC CONTROLLERS& DRIVES**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	Explain the fundamentals of electric drive and different electric braking methods.
CO-2	Analyze the operation of three phase converter fed dc motors and four quadrant operations of dc motors using dual converters.
CO-3	Describe the converter control of dc motors in various quadrants of operation
CO-4	Know the concept of speed control of induction motor by using AC voltage controllers and voltage source inverters.
CO-5	Differentiate the stator side control and rotor side control of three phase induction motor..
CO-6	Explain the speed control mechanism of synchronous motors

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Course Code:	R1632022
Course Title:	**POWER SYSTEM ANALYSIS**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	Able to draw impedance diagram for a power system network and to understand per unit quantities.
CO-2	Able to form a Y_{bus} and Z_{bus} for a power system networks.
CO-3	Able to understand the load flow solution of a power system using different methods.
CO-4	Able to find the fault currents for all types faults to provide data for the design of protective devices.
CO-5	Able to find the sequence components of currents for unbalanced power system network.
CO-6	Able to analyze the steady state, transient and dynamic stability concepts of a power system.

Course Code:	R1632023
Course Title:	**MICROPROCESSORS AND MICROCONTROLLERS**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	To be able to understand the microprocessor capability in general and explore the evaluation of microprocessors.
CO-2	To be able to understand the addressing modes of microprocessors
CO-3	To be able to understand the micro controller capability
CO-4	To be able to program mp and mc
CO-5	To be able to interface mp and mc with other electronic devices
CO-6	To be able to develop cyber physical systems

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Course Code:	R1632024
Course Title:	**DATA STRUCTURES**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	Distinguish between procedures and object oriented programming.
CO-2	Apply advanced data structure strategies for exploring complex data structures.
CO-3	Compare and contrast various data structures and design techniques in the area of Performance.
CO-4	Implement data structure algorithms through C++. • Incorporate data structures into the applications such as binary search trees, AVL and B Trees
CO-5	Implement all data structures like stacks, queues, trees, lists and graphs and compare their Performance and trade offs
CO-6	Distinguish between procedures and object oriented programming.

Course Code:	R163202A
Course Title:	**UNIX AND SHELL PROGRAMMING**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	Documentation will demonstrate good organization and readability.
CO-2	File processing projects will require data organization, problem solving and research.
CO-3	Scripts and programs will demonstrate simple effective user interfaces.
CO-4	Scripts and programs will demonstrate effective use of structured programming.
CO-5	Scripts and programs will be accompanied by printed output demonstrating completion of a test plan.
CO-6	Testing will demonstrate both black and glass box testing strategies.

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Course Code:	R1632029
Course Title:	**PROFESSIONAL ETHICSAND HUMAN VALUES**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	It gives a comprehensive understanding of a variety issues that are encountered by every professional in discharging professional duties.
CO-2	It provides the student the sensitivity and global outlook in the contemporary world to fulfill the professional obligations effectively.

Course Code:	R1632026
Course Title:	**POWER ELECTRONICS LAB**
Theory / Lab:	Lab
Course Outcomes:	
CO-1	Able to study the characteristics of various power electronic devices and analyze gate drive circuits of IGBT.
CO-2	Able to analyze the performance of single–phase and three–phase full–wave bridge converters with both resistive and inductive loads
CO-3	Able to understand the operation of single phase AC voltage regulator with resistive and inductive loads
CO-4	Able to understand the working of Buck converter, Boost converter, single–phase square wave inverter and PWM inverter

Course Code:	R1632027
Course Title:	**MICRO MPROCESSORS AND MICRO CONTROLLERS LAB**
Theory / Lab:	Lab
Course Outcomes:	
CO-1	Will be able to write assembly language program using 8086 micro based on arithmetic, logical, and shift operations.
CO-2	Will be able to interface 8086 with I/O and other devices.
CO-3	Will be able to do parallel and serial communication using 8051 & PIC 18 micro controllers.

Course Code:	R1632028
Course Title:	**DATASTRUCTURES THROUGH C LAB**
Theory / Lab:	Lab
Course Outcomes:	
CO-1	Be able to design and analyze the time and space efficiency of the data structure
CO-2	Be capable to identity the appropriate data structure for given problem
CO-3	Have practical knowledge on the application of data structures

SEMESTER VII:

Course Code:	R1641021
Course Title:	**UTILIZATION OF ELECTRICAL ENERGY**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	Able to identify a suitable motor for electric drives and industrial applications
CO-2	Able to identify most appropriate heating or welding techniques for suitable applications.
CO-3	Able to understand various level of luminosity produced by different illuminating sources.
CO-4	Able to estimate the illumination levels produced by various sources and recommend the most efficient illuminating sources and should be able to design different lighting systems by taking inputs and constraints in view.
CO-5	Able to determine the speed/time characteristics of different types of traction motors.
CO-6	Able to estimate energy consumption levels at various modes of operation.

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Course Code:	R1641022
Course Title:	**LINEAR IC APPLICATIONS**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	Design circuits using operational amplifiers for various applications.
CO-2	Analyze and design amplifiers and active filters using Op-amp.
CO-3	Diagnose and trouble-shoot linear electronic circuits.
CO-4	Understand the gain-bandwidth concept and frequency response of the amplifier configurations.
CO-5	Understand thoroughly the operational amplifiers with linear integrated circuits.
CO-6	

Course Code:	R1641023
Course Title:	**POWER SYSTEM OPERATION AND CONTROL**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	Able to compute optimal scheduling of Generators.
CO-2	Able to understand hydrothermal scheduling.
CO-3	Understand the unit commitment problem.
CO-4	Able to understand importance of the frequency.
CO-5	Understand importance of PID controllers in single area and two area systems.
CO-6	Will understand reactive power control and compensation for transmission line.

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Course Code:	R1641024
Course Title:	**SWITCHGEAR AND PROTECTION**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	Able to understand the principles of arc interruption for application to high voltage circuit breakers of air, oil, vacuum, SF_6 gas type.
CO-2	Ability to understand the working principle and operation of different types of electromagnetic protective relays.
CO-3	Students acquire knowledge of faults and protective schemes for high power generator and transformers.
CO-4	Improves the ability to understand various types of protective schemes used for feeders and bus bar protection.
CO-5	Able to understand different types of static relays and their applications.
CO-6	Able to understand different types of over voltages and protective schemes required for insulation co–ordination.

Course Code:	R164102D
Course Title:	**INSTRUMENTATION**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	Able to represent various types of signal .
CO-2	Acquire proper knowledge to use various types of Transducers.
CO-3	Able to monitor and measure various parameters such as strain, velocity, temperature, pressure etc.
CO-4	Acquire proper knowledge and working principle of various types of digital voltmeters.
CO-5	Able to measure various parameter like phase and frequency of a signal with the help of CRO.
CO-6	Acquire proper knowledge and able to handle various types of signal analyzers.

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Course Code:	R164102G
Course Title:	**SPECIAL ELECTRICAL MACHINES**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	Distinguish between brush dc motor and brush less dc motor**.**
CO-2	Explain the performance and control of stepper motors, and their applications.
CO-3	Explain theory of operation and control of switched reluctance motor.
CO-4	Explain the theory of travelling magnetic field and applications of linear motors.
CO-5	Understand the significance of electrical motors for traction drives.

Course Code:	R1641027
Course Title:	**ELECTRICAL SIMULATION LAB**
Theory / Lab:	Lab
Course Outcomes:	
CO-1	Able to simulate integrator circuit, differentiator circuit, Boost converter, Buck converter, full convertor and PWM inverter.
CO-2	Able to simulate transmission line by incorporating line, load and transformer models.
CO-3	Able to perform transient analysis of RLC circuit and single machine connected to infinite bus(SMIB).

Course Code:	R1641028
Course Title:	**POWER SYSTEMS & SIMULATION LAB**
Theory / Lab:	Lab
Course Outcomes:	
CO-1	The student is able to determine the parameters of various power system components which are frequently occur in power system studies and he can execute energy management systems functions at load dispatch center.

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SEMESTER VIII:

Course Code:	R1642021
Course Title:	**DIGITAL CONTROL SYSTEMS**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	The students learn the advantages of discrete time control systems and the "know how" of various associated accessories.
CO-2	• The learner understand z–transformations and their role in the mathematical analysis of different systems(like Laplace transforms in analog systems).
CO-3	The stability criterion for digital systems and methods adopted for testing the same are explained.
CO-4	Finally, the conventional and state space methods of design are also introduced

Course Code:	R1642022
Course Title:	**H.V.D.C. TRANSMISSION**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	Learn different types of HVDC levels and basic concepts
CO-2	Know the operation of converters
CO-3	Acquire control concept of reactive power control and AC/DC load flow.
CO-4	Understand converter faults, protection and harmonic effects
CO-5	Design low pass and high pass filters

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Course Code:	R1642023
Course Title:	**ELECTRICAL DISTRIBUTION SYSTEMS**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	Able to understand various factors of distribution system.
CO-2	Able to design the substation and feeders.
CO-3	Able to determine the voltage drop and power loss
CO-4	Able to understand the protection and its coordination.
CO-5	Able to understand the effect of compensation forp. improvement.
CO-6	Able to understand the effect of voltage control.

Course Code:	R164202B
Course Title:	**FLEXIBLE ALTERNATING CURRENT TRANSMISSION SYSTEMS**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	Understand power flow control in transmission lines using FACTS controllers.
CO-2	Explain operation and control of voltage source converter.
CO-3	Analyze compensation methods to improve stability and reduce power oscillations in the transmission lines.
CO-4	Explain the method of shunt compensation using static VAR compensators.
CO-5	Understand the methods of compensations using series compensators.
CO-6	Explain operation of Unified Power Flow Controller (UPFC).

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M.Tech (POWER ELECTRONICS & ELECTRICAL DRIVES)

PSOs:

1. Will be able to apply the knowledge of science and and designing in analyzing the power converters and drives for various applications that meet specific needs in providing good quality power to consumers.

2. To enable students to develop, construct, operate and test power electronic converters and machine in the laboratory. It will build the technical skills, communication skills and ethical skills.

3. Students will understand current and emerging issues to analyze and evaluate the merits and demerits of power electronic systems. It will develop their research skill and helps in overall development of nation worldwide.

POs:

1. Independently carry out research /investigation and development work to solve practical problems

2. Write and present a substantial technical report/document

3. Demonstrate a degree of mastery over the area as per the specialization of the program. The mastery should be at a level higher than the requirements in the appropriate bachelor program.

4. Analyze electrical power systems to identify performance parameters to be improved by designing suitable control system.

5. Use modern scientific and engineering tools to assess the performance of power systems.

6. Evaluate financial aspects in power system infrastructure development considering environmental issues for sustainable growth.

7. To study design, analysis and control of power electronic circuits for variable frequency drives application

8. To facilitate graduates in research activities leading to innovative solutions in interfacing of power electronic controllers with renewable energy sources.

9. To impart education and train graduate engineers in the field of power electronics & Drives to meet the emerging needs of society

10. To understand and design power electronic and drive systems for different application.

11. To analyze and design switch mode regulators/Power Converters for various industry applications.

12. Detailed understanding of the operation, function and interaction between various components and sub-systems used in power electronic converters, electric machines and adjustable-speed drives. It will also make up the mind of student to run their own small industry and develop their entrepreneurship skills.

COURSE OUTCOMES

SEMESTER I:

Course Code:	M4301
Course Title:	**Electrical Machines Modeling and Analysis**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	Analyze the characteristics of different types of DC motors to design suitable controllers for different applications.
CO-2	Apply the knowledge of reference frame theory for AC machines to model the induction and Synchronous machines
CO-3	Evaluate the steady state and transient behavior of induction and synchronous machines to propose the suitability of drives for different industrial applications
CO-4	Analyze the behavior of induction machines using voltage and torque equations

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Course Code:	M4302
Course Title:	**Analysis of Power Electronic Converters**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	Describe and analyze the operation of AC-DC converters.
CO-2	Analyze the operation of power factor correction converters.
CO-3	Analyze the operation of three phase inverters with PWM control.
CO-4	Study the principles of operation of multi- level inverters and their applications.

Course Code:	M4304
Course Title:	**Power Quality and Custom Power Devices**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	Identify the issues related to power quality in power systems.
CO-2	Address the problems of transient and long duration voltage variations in power systems.
CO-3	Analyze the effects of harmonics and study of different mitigation techniques.
CO-4	Identify the importance of custom power devices and their applications.
CO-5	Acquire knowledge on different compensation techniques to minimize power quality

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Course Code:	M4307
Course Title:	**HVDC Transmission and Flexible AC Transmission Systems**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	Compare HVDC and EHVAC transmission systems
CO-2	Analyze converter configurations used in HVDC and evaluate the performance metrics.
CO-3	Understand controllers for controlling the power flow through a dc link and compute filter Parameters.
CO-4	Apply impedance, phase angle and voltage control for real and reactive power flow in ac transmission systems with FACTS controller
CO-5	Analyze and select a suitable FACTS controller for a given power flow condition.

Course Code:	M0109
Course Title:	**Research Methodology and IPR**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	Able to learn Meaning of research problem, Sources of research problem
CO-2	Effective literature studies approaches, analysis Plagiarism, Research ethics
CO-3	Nature of Intellectual Property: Patents, Designs, Trade and Copyright
CO-4	Patent Rights: Scope of Patent Rights. Licensing and transfer of technology
CO-5	New Developments in IPR: Administration of Patent System.

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Course Code:	M4308
Course Title:	**POWER ELECTRONICS SIMULATION LABORATORY**
Theory / Lab:	Lab
Course Outcomes:	
CO-1	To understand the operation of DC-DC converters, AC-DC converters, AC voltage regulators and DC-AC converters by simulation.

Course Code:	M4309
Course Title:	**POWER CONVERTERS LABORATORY**
Theory / Lab:	Lab
Course Outcomes:	
CO-1	Students are able to implement the converter and inverters in real time applications.

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SEMESTER II:

Course Code:	N4301
Course Title:	**Switched Mode Power Conversion**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	Analyze operation and control of non-isolated and isolated switch mode converters.
CO-2	Design of non-isolated and isolated switch mode converters.
CO-3	Analyze operation and control of resonant converters.
CO-4	Feedback design of switch mode converters based on linearized models.

Course Code:	N4302
Course Title:	**Power Electronic Control of Electrical Drives**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	Understand the concepts of scalar and vector control methods for drive systems.
CO-2	Analyze and design controllers and converters for induction motor, PMSM and BLDC drives.
CO-3	Select and implement proper control techniques for induction motor and PMSM for specific applications
CO-4	Analyze and design control techniques and converters for SRM drives.

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Course Code:	N4305
Course Title:	**DIGITAL CONTROL SYSTEMS**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	Analyze digital control systems using Z-transforms and Inverse Z-Transforms.
CO-2	Evaluate the state transition matrix and solve state equation for discrete model for continuous time systems, investigate the controllability and observability
CO-3	Determine the stability; design state feedback controller.
CO-4	Design an observer.
CO-5	Solve a given optimal control problem

Course Code:	N4306
Course Title:	**Applications of Power Converters**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	Analyze power electronic application requirements.
CO-2	Identify suitable power converter from the available configurations.
CO-3	Develop improved power converters for any stringent application requirements.
CO-4	Improvise the existing control techniques to suit the application. Design of Bi-directional

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Course Code:	N4308
Course Title:	**Electric Drives Simulation Laboratory**
Theory / Lab:	Lab
Course Outcomes:	
CO-1	The student should analyze the performance of different electrical machines and drives

Course Code:	N4309
Course Title:	**Electric Drives Laboratory**
Theory / Lab:	Lab
Course Outcomes:	
CO-1	The student should Understand the performance of DC & AC drives.

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Department of MECHANICAL ENGINEERING

B.Tech

Program Specific Outcomes:

1. To enable the students to apply practical skills, knowledge in major streams such as Thermal, design, manufacturing and industrial engineering.
2. To empower the students to take-up career in industries or to pursue higher studies in mechanical and interdisciplinary programs.

Program Outcomes:

1. **Engineering Knowledge**
2. **Problem Analysis**
3. **Design/development of Solutions**
4. **Conduct Investigations of Complex Problems**
5. **Modern Tool Usage**
6. **The Engineer and Society**
7. **Environment and Sustainability**
8. **Ethics**
9. **Individual and Team Work**
10. **Communication**
11. **Project Management and Finance**
12. **Life-Long Learning**

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COURSE OUTCOMES

SEMESTER I:

Course Code:	HS1102
Course Title:	English
Theory / Lab:	Lab
Course Outcomes:	
CO-1	To learn how to pronounce words using the rules of the International Phonetic Alphabet
CO-2	To acquire English speaking skills using rhythm and intonation
CO-3	To learn to overcome stage fear and make presentations with ease
CO-4	To learn to use words and phrases according to the needs and demands of the situation.
CO-5	To learn to face different types of interviews with confidence.
CO-6	To gain confidence to participate in group discussions.

Course Code:	HS1102
Course Title:	English Language and Communication Skills
Theory / Lab:	Lab
Course Outcomes:	
CO-1	To learn how to pronounce words using the rules of the International Phonetic Alphabet
CO-2	To acquire English speaking skills using rhythm and intonation
CO-3	To learn to overcome stage fear and make presentations with ease
CO-4	To learn to use words and phrases according to the needs and demands of the situation.
CO-5	To learn to face different types of interviews with confidence.
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Course Code:	BS1101
Course Title:	MATHEMATICS-1
Theory / Lab:	THEORY
Course Outcomes:	
CO-1	Utilize mean value theorems to real life problems.
CO-2	Solve the differential equations related to various engineering fields.
CO-3	Familiarize with functions of several variables which is useful in optimization.
CO-4	Apply double integration techniques in evaluating areas bounded by region.
CO-5	Students will also learn important tools of calculus in higher dimensions . Students will become familiar with 2-dimensions and 3-dimensions coordinate systems.
CO-6	

Course Code:	BS1102
Course Title:	MATHEMATICS-2
Theory / Lab:	THEORY
Course Outcomes:	
CO-1	Develop the use of matrix algebra techniques that is needed by engineers for practical applications.
CO-2	Solve system of linear algebraic equations using Gauss elimination, Gauss Jordan, Gauss Seidel.
CO-3	Evaluate approximating the roots of polynomial and transcendental equations by different algorithms.
CO-4	Apply Newton's forward & backward interpolation and lagrange's formulae for equal and unequal intervals.
CO-5	Apply different algorithms for approximating the solutions of ordinary differential equations to its analytical computations.

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Course Code:	BS1108
Course Title:	ENGINEERING PHYSICS
Theory / Lab:	THEORY
Course Outcomes:	
CO-1	The students will be able to Identify forces and moments in mechanical systems using scalar and vector techniques
CO-2	analyze acoustic properties of typically used materials in buildings
CO-3	Understand the elasticity and plasticity concepts
CO-4	An ability to Identify different types of sensors and their working principles
CO-5	An ability to classify the magnetic materials based on susceptibility and their temperature dependence.
CO-6	Able to Apply the concept of magnetism to magnetic devices.

Course Code:	BS1109
Course Title:	ENGINEERING PHYSICS LAB
Theory / Lab:	LAB
Course Outcomes:	
CO-1	Ability to know and understand the Young‘s modulus by method of single cantilever oscillations.
CO-2	An ability to Determination of spring constant of springs using coupled oscillators.
CO-3	Able to Study the variation of B versus H by magnetizing the magnetic material (B-H curve).
CO-4	Understand the basic concepts of LASER light Sources
CO-5	An ability to Determination of Moment of Inertia of a Fly Wheel.
CO-6	Applying knowledge to estimate the Velocity of sound

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SEMESTER-2

Course Code:	BS1210
Course Title:	ENGINEERING CHEMISTRY
Theory / Lab:	THEORY
Course Outcomes:	
CO-1	Understand the operating principles and the reaction mechanisms of batteries and fuel cells.
CO-2	Able to apply this knowledge to the analysis and design of batteries
CO-3	Hydrogen fuel cell technology is used in automobiles in order to reduce environmental pollution
CO-4	An ability to design and conduct experiments, as well as to organize, analyze, and interpret data.
CO-5	An ability to identify and formulate polymers and have a knowledge of various polymers
CO-6	Ability to know and to understand the various fuels and their occurrences, synthesis and purifications

Course Code:	BS1211
Course Title:	ENGINEERING CHEMISTRY LAB
Theory / Lab:	LAB
Course Outcomes:	
CO-1	Able to acquire knowledge to prepare solutions and their importance
CO-2	Able to apply this knowledge to the analysis and design of batteries.
CO-3	Applying knowledge to estimate the hardness of water in terms of Ca2+ & Mg2+ ions
CO-4	Able to acquire principles of various analytical techniques and their applications.
CO-5	An ability to design and conduct experiments, as well as to organize, analyze, and interpret data.
CO-6	Ability to know and to understand the various fuels and their occurrences, synthesis and purifications

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Course Code:	HS1201
Course Title:	English
Theory / Lab:	Theory
Course Outcomes:	
CO-1	To improve listening skills so as to understand English spoken by native speakers
CO-2	To focus on appropriate reading strategies for comprehension of various academic texts and authentic materials
CO-3	To demonstrate speaking skills through participation in activities such as role plays, discussions and structured talks/oral presentations.
CO-4	To communicate confidently in various contexts and different cultures
CO-5	To comprehend grammatical structures and vocabulary and encourage their use in speech and writing.
CO-6	To analyze unfamiliar phrases/sentences and to understand the structure/syntax of the English Language.

Course Code:	HS1203
Course Title:	English Language and Communication Skills
Theory / Lab:	Lab
Course Outcomes:	
CO-1	To learn how to pronounce words using the rules of the International Phonetic Alphabet
CO-2	To acquire English speaking skills using rhythm and intonation
CO-3	To learn to overcome stage fear and make presentations with ease
CO-4	To learn to use words and phrases according to the needs and demands of the situation.
CO-5	To learn to face different types of interviews with confidence.
CO-6	To gain confidence to participate in group discussions.

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SEMESTER III:

Course Code:	R1621032
Course Title:	MECHANICS OF SOLIDS
Theory / Lab:	theory
Course Outcomes:	
CO-1	Model & Analyze the behavior of basic structural members subjected to various loading and support conditions based on principles of equilibrium.
CO-2	Understand the apply the concept of stress and strain to analyze and design structural members and machine parts under axial, shear and bending loads, moment and torsional moment.
CO-3	Students will learn all the methods to analyze beams, columns, frames for normal, shear, and torsion stresses and to solve deflection problems in preparation for the design of such structural components. Students are able to analyse beams and draw correct and complete shear and bending moment diagrams for beams.
CO-4	Students attain a deeper understanding of the loads, stresses, and strains acting on a structure and their relations in the elastic behavior
CO-5	Design and analysis of Industrial components like pressure vessels

Course Code:	R1621031
Course Title:	METALLURGY&MATERIAL SCIENCE
Theory / Lab:	THEORY
Course Outcomes:	
CO-1	To explain basic concepts of bonds in metals and alloys, and To know the basic requirements for the formation of solid solutions and other compounds.
CO-2	Analyze the regions of stability of the phases that can occur in an alloy system
CO-3	Explain the differences between cast irons and steels, their properties and practical applications.
CO-4	Describe the concept of heat treatment of steels & strengthening mechanisms

CO-5	To know the properties and applications of widely used non-ferrous metals and their alloys
CO-6	To explain the properties and applications of ceramic, composite materials and other materials, and describe the various methods of component manufacture of composite.

Course Code:	R1621033
Course Title:	THERMODYNAMICS
Theory / Lab:	theory
Course Outcomes:	
CO-1	Students are able to understand thermodynamic systems and apply knowledge to solve problems related to heat & work.
CO-2	Students are able to apply first law of thermodynamics for different thermodynamic systems and for different processes
CO-3	Students are able to apply second law of thermodynamics for engines and can solve performance parameters of heat engines.
CO-4	Students are able to understand the concept of steam formation and able to calculate the quality of steam after its expansion in turbines with the help of steam tables.
CO-5	Students are able to use psychrometric chart for finding properties of air
CO-6	Students are able to calculate efficiency & performance parameters of IC Engines using the concept of power cycles

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Course Code:	R1621034
Course Title:	FLUID MECHANICS&HYDRAULIC MACHINES
Theory / Lab:	theory
Course Outcomes:	
CO-1	Students are able to learn about the concept of fluid and its properties, manometry, hydrostatic forces acting on different surfaces and also problem solving techniques.
CO-2	Students are able to study the basic laws of fluids, flow patterns, viscous flow through ducts and their corresponding problems
CO-3	Students are able to learn about the concepts related to boundary layer theory, flow separation, basic concepts of velocity profiles, dimensionless numbers and dimensional analysis.
CO-4	Students are able to study the use of aware of the importance, function and performance of hydro machinery.
CO-5	Students are able to evaluate the performance characteristics of hydraulic turbines. Also a little knowledge on hydraulic systems and fluidics is imparted to the student.

Course Code:	R1621035
Course Title:	COMPUTER AIDED ENGINEERING DRAWING PRACTICE
Theory / Lab:	LAB
Course Outcomes:	
CO-1	Describe the projections of solids will be able to acquire knowledge on how to draw the projections and corresponding sections.
CO-2	Describe the intersection of solids can understand its importance in the field of design and manufacturing.
CO-3	Analyze the Isometric projections can easily understand iso and perspective views for the given drawings.
CO-4	Learning basic commands in AutoCAD and can easily understand how to draw 2D and 3D models.
CO-5	Evaluate the basic geometric model techniques and can easily understand how to draw solids in Isometric, Orthographic and Perspective Projections.
CO-6	Explain the concept and how to draw solids on complex shapes.

Course Code:	R1621037
Course Title:	MECHANICS OF SOLIDS & METALLURGY LAB
Theory / Lab:	LAB
Course Outcomes:	
CO-1	Students can describe the practical exposure on the microstructures of various ferrous and non ferrous materials
CO-2	Students can explain heat treatment procedures and the change of properties by heat treatment processes
CO-3	To know the practical knowledge on the evaluation of material properties through various destructive testing procedures.
CO-4	Student can do the hardness test on different materials
CO-5	Student can do the impact test on different materials
CO-6	student can calculate the swelling coefficient of the materials

SEMESTER IV:

Course Code:	R1622031
Course Title:	KINEMATICS OF MACHINERY
Theory / Lab:	theory
Course Outcomes:	
CO-1	Contrive a mechanism for a given plane motion with single degree of freedom.
CO-2	Suggest and analyze a mechanism for a given straight line motion and automobile steering motion.
CO-3	Analyze the motion (velocity and acceleration) of a plane mechanism.
CO-4	Suggest and analyze mechanisms for a prescribed intermittent motion like opening and closing of IC engine valves etc.
CO-5	Select a power transmission system for a given application and analyze motion of different transmission systems

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Course Code:	R1622032
Course Title:	THERMAL ENGINEERING-I
Theory / Lab:	theory
Course Outcomes:	
CO-1	The reasons and affects of various losses that occur in the actual engine operation can be analysed and solved .
CO-2	The various engine systems along with their function and necessity can be familiarized.
CO-3	Normal combustion phenomenon and knocking in S.I. and C.I. Engines can be explained and can find the several engine operating parameters that affect the smooth engine operation.
CO-4	Testing on S.I and C.I Engines for the calculations of performance and emission parameters can be performed.
CO-5	Different types of compressors can be classified and also can calculate power and efficiency of reciprocating compressors.
CO-6	Mechanical details, power and efficiency of rotary compressors can be studied.

Course Code:	R1622033
Course Title:	PRODUCTION TECHNOLOGY
Theory / Lab:	theory
Course Outcomes:	
CO-1	Students are able to design the patterns and the gating system for different metal casting processes.
CO-2	Students are able to understand the concept of special casting processes and to study about different types of furnaces.
CO-3	Students are able to learn about the classification of welding and apply knowledge to understand the applications of fusion welding.
CO-4	Students are able to understand the concept of forging, extrusion and rolling processes and able to calculate the forces and power requirements in rolling.
CO-5	Students are able to understand about the sheet metal forming processing methods of plastics.

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Course Code:	R1622034
Course Title:	DESIGN OF MACHINE MEMBERS -I
Theory / Lab:	theory
Course Outcomes:	
CO-1	Understanding the design procedure to engineering problems, including the consideration of technical and manufacturing constraints and also Select suitable materials and significance of tolerances and fits in critical design applications
CO-2	By Utilizing the design data hand book and can design the elements for strength, stiffness and fatigue and also Identifying the loads, the machine members subjected and calculate static and dynamic stresses to ensure safe design.
CO-3	Learning and understanding of the different types of failure modes and criteria of riveted , bolted and welded joints and also can design the boiler shells and ship hulls etc.
CO-4	Imparting the procedure for designing different machine elements such as shafts, cotter joints, keys and axial loaded joints and understand the failures if these elements in real life application.
CO-5	Can explain the Procedure for designing different types shaft couplings also should able to understand the failures if these elements in real life application.
CO-6	Analyze the Procedure for designing different types Mechanical springs also to understand the failures if these elements in real life application.

Course Code:	R1622035
Course Title:	MACHINE DRAWING
Theory / Lab:	theory
Course Outcomes:	
CO-1	The student will acquire a knowledge of fastening arrangements such as welding, riveting the different styles of attachment for shaft.
CO-2	The student also is enabled to prepare the assembly of various machine or engine components and miscellaneous machine components.

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Course Code:	R1622036
Course Title:	INDUSTRIAL ENGINEERING AND MANAGEMENT
Theory / Lab:	theory
Course Outcomes:	
CO-1	Develop a fundamental knowledge and skill sets required in the Industrial Management and Engineering profession
CO-2	Design a system, component, or process, and synthesize solutions to achieve desired needs.
CO-3	Use the techniques, skills, and modern engineering tools necessary for engineering practice with appropriate considerations for public health and safety, cultural, societal and environmental constraints.
CO-4	Function effectively within multi-disciplinary teams and understand the fundamental precepts of effective project management.
CO-5	Understand their role as engineers and their impact to society at the national and global context.HR
CO-6	Understand value engineering, implementation procedure, enterprise resource planning and supply chain management

Course Code:	R1622037
Course Title:	FLUID MECHANICS & HYDRAULIC MACHINERY LAB
Theory / Lab:	LAB
Course Outcomes:	
CO-1	Understand the physical characteristics and basic properties of a fluid.
CO-2	Familiarization with the various fluid measurement systems, including their advantages and disadvantages.
CO-3	Understanding of various fluid flows and in different cross sections through experimental setup in laboratory
CO-4	Learn the proper procedures for experimental set-up, operation, measurement, adjustment, data gathering, and data reduction for hydraulic pumps
CO-5	Learn the proper procedures for experimental set-up, operation, measurement, adjustment, data gathering, and data reduction for hydraulic turbines
CO-6	Ability to present experimental results using explanatory text, data tables, and graphs.

Course Code:	R1622038
Course Title:	PRODUCTION TECHNOLOGY LAB
Theory / Lab:	LAB
Course Outcomes:	
CO-1	Understood how To made different patterns, Mould preparation, Melting and Casting
CO-2	Understood usage, operations and applications of welding like ARC, GAS and TIG
CO-3	Analyzed Brazing and Soldering operations and their applications
CO-4	Described how to do Blanking & Piercing operations with simple, compound and progressive dies on Mechanical press
CO-5	Explained about bulk forming processes and sheet metal operations like Deep drawing and sheet bending operations on Hydraulic Press.
CO-6	Understood how to make different hallow and solid plastic products using Injection Molding & Blow Molding machines

SEMESTER V:

Course Code:	R1631031
Course Title:	Dynamics of Machinery
Theory / Lab:	theory
Course Outcomes:	
CO-1	Analyze stabilization of sea vehicles, aircrafts and automobile vehicles.
CO-2	Compute frictional losses, torque transmission of mechanical systems.
CO-3	Analyze dynamic force analysis of slider crank mechanism and design of flywheel.
CO-4	Understand how to determine the natural frequencies of continuous systems starting from the general equation of displacement.
CO-5	Understand balancing of reciprocating and rotary masses.

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Course Code:	R1631032
Course Title:	Metal Cutting & Machine Tools
Theory / Lab:	theory
Course Outcomes:	
CO-1	Apply cutting mechanics to metal machining based on cutting force and power consumption.
CO-2	Operate lathe, milling machines, drill press, grinding machines, etc.
CO-3	Select cutting tool materials and tool geometries for different metals.
CO-4	Select appropriate machining processes and conditions for different metals.
CO-5	Learn machining economics.
CO-6	Design jigs and Fixtures for simple parts.
CO-7	Learn principles of CNC Machines

Course Code:	R1631033
Course Title:	Design of Machine Members-II
Theory / Lab:	theory
Course Outcomes:	
CO-1	Impart the selection of suitable bearing depending upon the application and can calculate life of the bearing.
CO-2	Analyze the design procedure of different I.C Engine parts Cylinder, Piston, Crankshaft and Connecting rod.
CO-3	To analyze the design procedure of curved beams having different cross sections like rectangular, circular, trapezoidal , T-section of crane hooks and C-clamps
CO-4	Design the power transmission elements like belts, ropes, chains and power screws.
CO-5	Design the power transmission elements like gears.
CO-6	Design different power transmission elements &Alignment on machine tool elements

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Course Code:	R1631035
Course Title:	Thermal Engineering -II
Theory / Lab:	theory
Course Outcomes:	
CO-1	By learning the basic concepts of vapour cycles a student can attain good knowledge useful in steam power plants and apply the knowledge to improve the efficiency of plant
CO-2	By understanding the working principle and classification of boilers a student will be able to solve various problems related to efficiency and power output.
CO-3	By understanding working principle of nozzle ,a student can able to understand the conversion of heat energy of steam into kinetic energy.
CO-4	By studying classification of types of turbines a student will be able to draw the velocity diagram and can find turbine work output.
CO-5	By understanding gas turbines properly a student can easily enumerate the methods of improving performance of a power plant.
CO-6	By understanding the concept of jet propulsion and rockets a student can draw various schematic diagrams and also can find thrust power and propulsion efficiency.

Course Code:	R1631036
Course Title:	Theory of Machines Lab
Theory / Lab:	LAB
Course Outcomes:	
CO-1	Ability to apply the principles of gyroscopic effects.
CO-2	Ability to determine moment of inertia of mechanical systems.
CO-3	Ability to apply stabilization on various transport vehicles and applications of various governors.
CO-4	Ability to apply various types of gears for different purposes

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Course Code:	R1631037
Course Title:	Machine Tools Lab
Theory / Lab:	LAB
Course Outcomes:	
CO-1	Understanding about lathe working principle and can perform various operations to prepare different shapes of products.
CO-2	Can operate drilling machine and can perform various operations to prepare different shapes of products.
CO-3	Can operate shaper, slotting and planning machine and can perform various operations to prepare different shapes of products.
CO-4	Understanding the surface grinding machine and can perform various operations to prepare different shapes of products.
CO-5	Can operate milling machine, with understanding working principle and can perform various operations to prepare different shapes of products.
CO-6	Understanding tool and cutter grinding machine and can perform various operations to prepare different shapes of products.

Course Code:	R1631038
Course Title:	Thermal Engineering Lab
Theory / Lab:	LAB
Course Outcomes:	
CO-1	Understand different mechanisms that work during operation in spark ignition engines.
CO-2	Understand different mechanisms that work during operation in Compression ignition engines.
CO-3	Calculate the various efficiencies, various horse powers and energy balance for several types of Compression ignition engines.
CO-4	Calculate the various efficiencies, various horse powers and energy balance for several types of Internal Combustions Engines
CO-5	Calculate the various efficiencies, various horse powers for Reciprocating air compressor..
CO-6	Understand the construction and working of different type of boilers.

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SEMESTER VI:

Course Code:	R1632031
Course Title:	Metrology
Theory / Lab:	THEORY
Course Outcomes:	
CO-1	Students are able to learn about the Inspection of engineering parts with various precision instruments.
CO-2	Students are able to study the Design of part, tolerances and fits
CO-3	Students are able to learn about the Principles of measuring instruments and gauges and their uses.
CO-4	Students are able to study the use of Inspection of spur gear and thread elements.
CO-5	Students are able to impart basic knowledge and understanding about the machine tool testing to evaluate machine tool quality

Course Code:	R1632032
Course Title:	Instrumentation & Control Systems
Theory / Lab:	THEORY
Course Outcomes:	
CO-1	Students will be conversant with measurement techniques and the use of measuring instruments,
CO-2	Students will be able to design a measuring equipments for the measurement of temperature and pressure
CO-3	Students will be able to design a sensors and transducers used for stress and strain measurement
CO-4	Students will be able to design a measuring equipments for the measurement of temperature and flow
CO-5	Students Will have working knowledge for dealing with problems involving control system fundamentals
CO-6	student can able to control the mechanical measurement devices through mechanical and electrical controllers

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Course Code:	R1632033
Course Title:	Refrigeration & Air-conditioning
Theory / Lab:	THEORY
Course Outcomes:	
CO-1	Analyze various refrigerating cycles and evaluate their performance.
CO-2	Knowledge on vapour compression refrigeration system and can analyze the performance of the system.
CO-3	Can understand the difference between CFC, HCFC and HFC refrigerants and their effect on environment.
CO-4	Having knowledge on vapour absorption and steam jet refrigeration system and can analyze the performance of the system.
CO-5	Can perform cooling load calculations and select the appropriate process and equipment for the required comfort and industrial Air-conditioning. Student is having knowledge on the difference between refrigeration and air conditioning systems & sensible and latent heat.
CO-6	Describe about various components of the air conditioning system and their working.

Course Code:	R1632034
Course Title:	Heat Transfer
Theory / Lab:	THEORY
Course Outcomes:	
CO-1	Students are able to apply principles of heat transfer to basic engineering systems and can solve problems on conduction ,convection and radiation
CO-2	Students are able to apply the non dimensional numbers for solving heat transfer problems
CO-3	Students are able to develop the concept of boundary layer formation over heated surfaces during forced and free convection, formulation of momentum and energy equations of the laminar boundary layers and their solution by approximate method
CO-4	Students are able to understand film wise and drop wise condensation in condensers, Pool, forced, sub-cooled and saturated boiling in boilers and

	evaporators, bubble formation and critical heat flux. Model laminar film condensation and its application in the design of condensers. Evaluation of Reynolds and Nusselt numbers for boiling and condensation
CO-5	Students are able to calculate fluid temperatures, mass flow rates, pressure drops, heat exchange and effectiveness during parallel, counter and cross flow in simple and baffled–shell and tube type heat exchangers, condensers, evaporators, etc.
CO-6	Students are able to develop concept of monochromatic and total radiations, intensity of radiation, shape factor, radiation shields, solar radiation and estimation of radiative heat exchange between two or more surfaces of different geometries.

Course Code:	R163203D
Course Title:	Green Engineering Systems
Theory / Lab:	theory
Course Outcomes:	
CO-1	To study the solar radiation data, extraterrestrial radiation, radiation on earth's surface.
CO-2	To study solar thermal collections.
CO-3	To study solar photo voltaic systems.
CO-4	To study maximum power point techniques in solar pv and wind.
CO-5	To study wind energy conversion systems, Betz coefficient, tip speed ratio.
CO-6	To study basic principle and working of hydro, tidal, biomass, fuel cell and geothermal systems.

Course Code:	R1632036
Course Title:	Heat Transfer Lab
Theory / Lab:	LAB
Course Outcomes:	
CO-1	Ability to evaluate the amount of heat exchange for plane, cylindrical & spherical geometries in various modes of heat transfer.

CO-2	Explains the importance of extended surfaces for heat transfer process and to calculate the effectiveness of fins.
CO-3	Ability to understand and solve conduction, problems using, Fourier's law, Newton's law of cooling , non dimensional numbers.
CO-4	Ability to understand and solve radiation problems using Stefan Boltzmann constant.
CO-5	Ability to design and analyze the performance of heat exchangers.
CO-6	Ability to design and analyze the performance of boilers and condensers.

Course Code:	R1632037
Course Title:	Metrology & Instrumentation Lab
Theory / Lab:	LAB
Course Outcomes:	
CO-1	Measurement of various linear, angular dimensions of the products and flatness of the surface by using precision measuring instruments.
CO-2	Learn how to check various parameters of the threads and gears.
CO-3	Selection of the appropriate measuring instruments
CO-4	Knowledge of the requirement of calibration and errors in measurement and perform accurate measurements
CO-5	Alignment various machines used in manufacturing
CO-6	Understand the construction and working of various instruments

Course Code:	R1632038
Course Title:	Computational Fluid Dynamics Lab
Theory / Lab:	LAB
Course Outcomes:	
CO-1	Understand and be able to numerically solve the governing equations for fluid flow in C-language and MATLAB.

CO-2	Understand and apply turbulence models to engineering fluid flow problems in C-language and MATLAB
CO-3	Understand and apply finite difference, finite volume and finite element methods to fluid flow problems
CO-4	Be able to numerically solve a heat transfer problem
CO-5	Understand the issues surrounding two-phase flow modeling
CO-6	Be able to use ANSYS FLUENT to an acceptable standard for a graduate engineer.

SEMESTER VII:

Course Code:	R1641031
Course Title:	Mechatronics
Theory / Lab:	theory
Course Outcomes:	
CO-1	To learn the fundamentals of Mechatronics systems, various elements of Mechatronics and various microprocessors base application.
CO-2	To Learn the Fundamentals of solid state electronic devices and working mechanism of different diodes with their application.
CO-3	To learn the working mechanism of various hydraulic and pneumatic control system and correlation between actuator and servo mechanism
CO-4	To learn the fundamental concept of Digital and Analog electronic system. To describe different PLCs with their application.
CO-5	To understand the basic concept of Data Acquisition system with various conversion phenomenon between analog and Digital signals
CO-6	To learn the concept of system analogies, design and future trends of Mechatronics system.

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Course Code:	R1641032
Course Title:	CAD/CAM
Theory / Lab:	theory
Course Outcomes:	
CO-1	Improves the basic idea on the history of CAD/CAM hardware, and importance of CAD/CAM in industries.
CO-2	Learn the mathematical techniques for representation of geometric entities including points, lines, and parametric curves, surfaces and solid, and the technique of transformation of geometric entities using transformation matrix.
CO-3	To get the knowledge on procedure to write manuscript for a part to be manufactured. Having basic idea on APT language in computer aided part programming for the product development.
CO-4	Classification of different parts into part families, which are manufacturing in any industry with the knowledge on group technology and learning different techniques which are widely applying in industries.
CO-5	Having basic knowledge in Process Planning help in understanding the importance in manufacturing industries. And the learning of computer aided quality control enhances their knowledge in applying or using these techniques in the industries.
CO-6	Can identify various elements and their activities in the Computer Integrated Manufacturing Systems.

Course Code:	R1641033
Course Title:	Finite Element Methods
Theory / Lab:	theory
Course Outcomes:	
CO-1	Understand the concepts behind variational methods and weighted residual methods in FEM
CO-2	Identify the application and characteristics of FEA elements such as bars, beams, plane and isoparametric elements, and 3-D element.
CO-3	Develop element characteristic equation procedure and generation of global stiffness equation will be applied.

CO-4	Able to apply Suitable boundary conditions to a global structural equation, and reduce it to a solvable form.
CO-5	Able to identify how the finite element method expands beyond the structural domain, for problems involving dynamics, heat transfer, and fluid flow.

Course Code:	R1641034
Course Title:	Power Plant Engineering
Theory / Lab:	theory
Course Outcomes:	
CO-1	The student will able to know various energy resources and energy conversion methods available for the production of electric power in India.
CO-2	The student will able to determine the efficiency and output of a modern Rankine cycle steam power plant from given data, including superheat, reheat &regeneration
CO-3	The student will able to calculate the performance of gas turbines with reheat and regeneration, and discuss the performance of combined cycle power plants
CO-4	The student will able to understand major types of hydro-power and wind-power turbines and estimate power generation potential
CO-5	The student will able to know the basic principles of thermal-fission and fast-breeder nuclear power plants, such as pressurized-water, boiling-water, and heavy-water reactors.
CO-6	Perform the preliminary design of the major components or systems of a conventional or alternate power plant

Course Code:	R164103B
Course Title:	Condition Monitoring
Theory / Lab:	theory
Course Outcomes:	
CO-1	Understand the maintenance scheme, their scope and limitations –apply the maintenance strategies to various problems in the industrial sectors.
CO-2	Analyze for machinery condition monitoring and explain how this compliments monitoring the condition

CO-3	Develop an appreciation for the need of modern technological approach for plant maintenance to reduce the maintenance expenditure
CO-4	Emphasizes on case studies that require gathering information using the modern testing equipment and processing it to identify the malfunction in that system.
CO-5	Identify vibration measurement, lubrication oil analysis

Course Code:	R164103E
Course Title:	Design for Manufacture
Theory / Lab:	theory
Course Outcomes:	
CO-1	Design components for machining
CO-2	General design rules for machining dimensional tolerance and surface roughness
CO-3	Simulate the casting design and choose the best casting process for a specific product.
CO-4	Evaluate the effect of thermal stresses in weld joints
CO-5	Design components for sheet metal work by understanding in depth the sheet metal processes and their formation mechanisms
CO-6	Design plastic components for machining and joining and selecting a proper processes for different joining cases

Course Code:	R1641037
Course Title:	CAD/CAM Lab
Theory / Lab:	LAB
Course Outcomes:	
CO-1	Modeling of simple machine parts and assemblies from the part drawings using standard CAD packages

CO-2	Generate CNC Turning and Milling codes for different operations using standard CAM packages. Write manual part programming using ISO codes for turning and milling operations

Course Code:	R1641038
Course Title:	Mechatronics Lab
Theory / Lab:	LAB
Course Outcomes:	
CO-1	Study of sensors, Hydraulic and Pneumatic actuators and experiment ion of its characterization for industrial applications
CO-2	Study of data acquisition system and its industrial applications
CO-3	Understand the architecture of microprocessor and microcontroller
CO-4	Develop pneumatic circuit /hydraulic circuit for industrial applications and measure its performance
CO-5	Develop an understanding of plc ladder diagram related to industrial automation systems and measure its performance

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SEMESTER VIII:

Course Code:	R1642031
Course Title:	Production Planning and Control
Theory / Lab:	theory
Course Outcomes:	
CO-1	Recognize the objectives, functions, applications of PPC and forecasting techniques
CO-2	Explain different Inventory control techniques.
CO-3	Solve routing and scheduling problems.
CO-4	Summarize various aggregate production planning techniques.
CO-5	Describe way of integrating different departments to execute PPC functions.

Course Code:	R1642032
Course Title:	Unconventional Machining Processes
Theory / Lab:	theory
Course Outcomes:	
CO-1	Distinguish the mechanics of material removal process parameters and their applications of Ultrasonic machining process
CO-2	Identify and utilize fundamentals of metal cutting as applied to the Electro chemical machining.
CO-3	Develop the skills of effective utilization of the cutting fluids and applications for better productivity
CO-4	Identify and utilize fundamentals of metal cutting as applied to the Electron Beam Machining, Laser Beam Machining
CO-5	Basic fundamentals of the metal removal mechanism in Plasma Machining process
CO-6	Can enumerate the fundamentals of mechanics of material removal in Abrasive jet machining, Water jet machining and abrasive water jet machining.

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Course Code:	R1642033
Course Title:	Automobile Engineering
Theory / Lab:	theory
Course Outcomes:	
CO-1	Basic introduction to automobiles can be easily analyzed, so as for better understanding of concepts further.
CO-2	Design of various types of transmission systems can be classified along with their working principle, advantages and disadvantages.
CO-3	The topic describes basic terminology of how a steering system works and also explains various types of steering gear mechanisms that are in use.
CO-4	Design of major necessities in an automobile such as electrical system, braking system and suspension system can be easily understood from this unit , along with their limitations.
CO-5	Analyzes the importance of safety system in an automobile and also it evaluates the latest updates in the field of automobile industry. Classifies various types of automobile engines that are in use along with their detailed specifications.
CO-6	Explains how the emissions/pollutants from automobiles are harmful for humans and also for environment. what are all the necessary steps to be taken to overcome them. national and international pollution standards.

Course Code:	R164203C
Course Title:	Quality and Reliability Engineering
Theory / Lab:	THEORY
Course Outcomes:	
CO-1	Attain the basic techniques of quality improvement, fundamental knowledge of statistics and probability.
CO-2	Use control charts to analyze for improving the process quality
CO-3	Describe different sampling plans
CO-4	Acquire basic knowledge of total quality management
CO-5	Understand the concepts of reliability and maintainability.
CO-6	Ability to use the techniques, skills, and modern engineering tools necessary for engineering practice

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M.Tech (CAD/CAM)

PSOs:

1. Analyse, design and develop mechanical systems to solve complex engineering problems by integrating modern mechanical engineering tools, software and equipment's.

2: Adopt a multidisciplinary approach to solve real-world industrial problems.

3: Independently carry out research / investigation to solve practical problems and write / present a substantial technical report/document.

POs:

1: Having an ability to apply mathematics and science in engineering applications.

2: Not Applicable

3: Having ability to design a component or a product applying all the relevant standards and with realistic constraints, including public health, safety, culture, society and environment.

4: Having an ability to design and conduct experiments, as well as to analyze and interpret data, and synthesis of information

5: Having an ability to use techniques, skills, resources and modern engineering and IT tools necessary for engineering practice

6: Having problem solving ability-to assess social issues (societal, health, safety, legal and cultural) and engineering problems

7: Having adaptive thinking and adaptability in relation to environmental context and sustainable development

8: Having a clear understanding of professional and ethical responsibility

9: Not Applicable

10: Not Applicable

11: Having a good cognitive load management skills related to project management and finance

12: Not Applicable

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COURSE OUTCOMES

SEMESTER I:

Course Code:	I0401
Course Title:	Industrial Robotics
Theory / Lab:	Theory
Course Outcomes:	
CO-1	Analyze the manipulator design including actuator and sensor issues
CO-2	Calculate the problems based on manipulator kinematics for serial and parallel robots
CO-3	Identify different types of end effectors and sensors required for specific applications
CO-4	Develop programming principles and languages for a robot control system
CO-5	Discuss various applications for industrial and non-industrial robot systems

Course Code:	I0402
Course Title:	Computer Aided Manufacturing
Theory / Lab:	Theory
Course Outcomes:	
CO-1	Explain NC, CNC and DNC machines
CO-2	Discuss the different features of NC machine tools
CO-3	Develop NC part program for various machining operations
CO-4	Develop APT part program for various machining operations
CO-5	Describe the application of adaptive control in CNC machine and quality control

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Course Code:	I0403
Course Title:	Special Manufacturing Processes
Theory / Lab:	Theory
Course Outcomes:	
CO-1	To explain about the crystallinity of the metallic structure and phase diagrams
CO-2	To understand the heat treatment of ferrous and non-ferrous alloys
CO-3	To apply various techniques to process polymeric materials
CO-4	To understand the techniques involved in processing ceramic materials
CO-5	To evaluate the advance different techniques on processing advance application

Course Code:	I1506
Course Title:	Geometric Modeling
Theory / Lab:	Theory
Course Outcomes:	
CO-1	To provides an overview of how computers are being used in mechanical component design.
CO-2	To impart knowledge on computer graphics which are used routinely in diverse areas as Science, engineering, medicine, etc.
CO-3	Acquire fundamental understanding of the principles of CAD, including engineering drawing, geometric and surface modeling, and feature-based design.
CO-4	Apply computer aided manufacturing principles to perform manual and computer aided numerical control programming.

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Course Code:	I1809
Course Title:	Nano Technology
Theory / Lab:	Theory
Course Outcomes:	
CO-1	Courses in electronics, materials science, biotechnology and characterization techniques
CO-2	Provides theoretical basis, knowledge of experimental methods and technological applications
CO-3	Social implications of nanotechnology pertaining to ethical and environmental issues
CO-4	Nurture individuals as nanotechnologists in industry and research institutes
CO-5	Develops passion for higher studies in the emerging areas of nanotechnology

Course Code:	I0406
Course Title:	Computer Aided Process Planning
Theory / Lab:	Theory
Course Outcomes:	
CO-1	Generate the structure of automated process planning system and uses the principle of generative and retrieval CAPP systems for automation
CO-2	Select the manufacturing sequence and explains the reduction of total set up cost for a particular sequence
CO-3	Predict the effect of machining parameters on production rate, cost and surface quality and determines the manufacturing tolerances
CO-4	Explain the generation of tool path and solve optimization models of machining processes
CO-5	Create awareness about the implementation techniques for CAPP

Course Code:	I0407
Course Title:	Advanced CAD Lab
Theory / Lab:	Lab
Course Outcomes:	
CO-1	Modeling of simple machine parts and assemblies from the part drawings using standard CAD packages
CO-2	Generate CNC Turning and Milling codes for different operations using standard CAM packages. Write manual part programming using ISO codes for turning and milling operations

SEMESTER II:

Course Code:	J0401
Course Title:	Modeling & Simulation of Manufacturing Systems
Theory / Lab:	Theory
Course Outcomes:	
CO-1	To introduce modeling, optimization and simulation, as it applies to the study and analysis of manufacturing systems for decision support.
CO-2	The introduction of optimization models and algorithms provide a framework to think about a wide range of issues that arise in manufacturing systems.
CO-3	To expose students to a wide range of applications for these methods and models, and to integrate this material with their introduction to operations management.
CO-4	Probabilistic simulation methods are also a powerful tool for the study, analysis and design of manufacturing systems.
CO-5	To 'refresh' the student's analytic thinking and background in anticipation of the rest of the Leaders for Manufacturing curriculum.

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Course Code:	J1501
Course Title:	Optimization and Reliability
Theory / Lab:	Theory
Course Outcomes:	
CO-1	To illustrate the importance of advanced optimization techniques in theory and practice.
CO-2	To formulate and solve engineering design problems in the industry for optimal results
CO-3	To test the analytical skills in solving realistic engineering problems by applying appropriate optimization technique.
CO-4	To demonstrate various advanced and unconventional optimization techniques being developed in recent times.
CO-5	To develop and promote research interest in problems of Engineering and Technology

Course Code:	J0402
Course Title:	Computer Graphics
Theory / Lab:	Theory
Course Outcomes:	
CO-1	Devise transformations such as translation, rotation and reflection etc. of objects
CO-2	Generate Bezier curves, Bezier surfaces and B-spline curves
CO-3	Generate and construct meshes
CO-4	Differentiate CSG and B-rep solid modellers
CO-5	Develop algorithms to remove hidden surfaces, render and shade objects

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Course Code:	J20103
Course Title:	Finite Element Methods
Theory / Lab:	Theory
Course Outcomes:	
CO-1	apply direct stiffness, Rayleigh-Ritz, Galerkin method to solve engineering problems and outline the requirements for convergence
CO-2	analyze linear 1D problems like bars and trusses; 2D structural problems using CST element and analyse the axi-symmetric problems with triangular elements
CO-3	write shape functions for 4 and 8 node quadrilateral, 6 node triangle elements and apply numerical integration to solve; 1D and 2D; stiffness integrations
CO-4	solve linear 2D structural beams and frames problems; 1Dheat conduction and convection heat transfer problems
CO-5	evaluate the Eigen values and Eigenvectors for stepped bar and beam, explain nonlinear geometric and material non linearity

Course Code:	J0405
Course Title:	Concurrent Engineering
Theory / Lab:	Theory
Course Outcomes:	
CO-1	Explain the importance utilization of resources simultaneously.
CO-2	Expose to different applications and fields where CE is applicable.
CO-3	Explain various strategies in implementing the CE in an Industry.
CO-4	Analyze various issues that industry faces and solutions offered by CE
CO-5	Expose to case studies, working models, products design and Assembly layouts etc.

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Course Code:	J0407
Course Title:	Intelligent Manufacturing Systems
Theory / Lab:	Theory
Course Outcomes:	
CO-1	Summarize the concepts of computer integrated manufacturing systems and manufacturing communication systems
CO-2	Identify various components of knowledge based systems
CO-3	Demonstrate the concepts of artificial intelligence and automated process planning
CO-4	Select the manufacturing equipment using knowledge based system for equipment selection
CO-5	Apply various methods to solve group technology problems and demonstrate the structure for knowledge based system for group technology

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Department of ELECTRONICS & COMMUNICATIONS ENGINEERING

B.Tech (R16)

Program Specific Outcomes:

1. Proficient in design, develop and implement the electronics and communication engineering systems and products.

2. Capable of qualifying in multi level public and private sector competitive examinations for successful employment and higher studies.

Program Outcomes:

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

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

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

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

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

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

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

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

9. **Individual and Team Work**: Function effectively as an individual, and as a member or leader in diverse teams and in multi-disciplinary settings.

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

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

12. **Life-long Learning:** Recognize the need for and have the preparation and ability to Engage in independent and life- long learning in the broadest context of technological Change.

COURSE OUTCOMES

SEMESTER I

Course Code:	HS1101
Course Title:	English
Theory / Lab:	Theory
Course Outcomes:	
CO-1	To improve listening skills so as to understand English spoken by native speakers
CO-2	To focus on appropriate reading strategies for comprehension of various academic texts and authentic materials
CO-3	To demonstrate speaking skills through participation in activities such as role plays, discussions and structured talks/oral presentations.
CO-4	To communicate confidently in various contexts and different cultures
CO-5	To comprehend grammatical structures and vocabulary and encourage their use in speech and writing.
CO-6	To analyze unfamiliar phrases/sentences and to understand the structure/syntax of the English Language.

Course Code:	HS1102
Course Title:	English Language and Communication Skills
Theory / Lab:	Lab
Course Outcomes:	
CO-1	To learn how to pronounce words using the rules they have been taught.
CO-2	To acquire English speaking skills using rhythm and intonation.
CO-3	To learn to overcome stage fear and make presentations with ease.
CO-4	To learn how to use right words and phrases according to the situation.
CO-5	To learn to face different types of interviews with confidence.
CO-6	To gain confidence to participate in group discussions.

COURSE OUTCOMES

SEMESTER 1

Course Code:	BS1101
Course Title:	MATHEMATICS-1
Theory / Lab:	THEORY
Course Outcomes:	
CO-1	Utilize mean value theorems to real life problems.
CO-2	Solve the differential equations related to various engineering fields.
CO-3	Familiarize with functions of several variables which is useful in optimization.
CO-4	Apply double integration techniques in evaluating areas bounded by region.
CO-5	Students will also learn important tools of calculus in higher dimensions . Students become familiar with 2- dimensional and 3- dimensional coordinate systems.

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Course Code:	BS1106
Course Title:	APPLIED CHEMISTRY
Theory / Lab:	THEORY
Course Outcomes:	
CO-1	Understand the operating principles and the reaction mechanisms of batteries and fuel cells.
CO-2	Able to apply this knowledge to the analysis and design of batteries
CO-3	Hydrogen fuel cell technology is used in automobiles in order to reduce environmental pollution
CO-4	An ability to design and conduct experiments, as well as to organize, analyze, and interpret data.
CO-5	An ability to identify and formulate polymers and have a knowledge of various polymers
CO-6	Ability to know and to understand the various fuels and their occurrences, synthesis and purifications

Course Code:	BS1107
Course Title:	APPLIED CHEMISTRY LAB
Theory / Lab:	LAB
Course Outcomes:	
CO-1	Able to acquire knowledge to prepare solutions and their importance
CO-2	Able to apply this knowledge to the analysis and design of batteries.
CO-3	Applying knowledge to estimate the hardness of water in terms of Ca2+ & Mg2+ ions
CO-4	Able to acquire principles of various analytical techniques and their applications.
CO-5	An ability to design and conduct experiments, as well as to organize, analyze, and interpret data.
CO-6	Ability to know and to understand the various fuels and their occurrences, synthesis and purifications.

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SEMESTER-2

Course Code:	BS1202
Course Title:	MATHEMATICS-2
Theory / Lab:	THEORY
Course Outcomes:	
CO-1	Develop the use of matrix algebra techniques that is needed by engineers for practical applications.
CO-2	Solve system of linear algebraic equations using Gauss elimination, Gauss Jordan, Gauss Seidel.
CO-3	Evaluate approximating the roots of polynomial and transcendental equations by different algorithms.
CO-4	Apply Newton's forward & backward interpolation and lagrange's formulae for equal and unequal intervals.
CO-5	Apply different algorithms for approximating the solutions of ordinary different equations to its analytical computations.

Course Code:	BS1203
Course Title:	MATHEMATICS-3
Theory / Lab:	THEORY
Course Outcomes:	
CO-1	Interpret the physical meaning of different operators such as gradient, cur and divergence.
CO-2	Estimate the work done against a field, circulation and flux using vector calculus.
CO-3	Apply the laplace transform for solving differential equations.
CO-4	Find the fourier series of periodic signals.
CO-5	Know and be able to apply integral expressions for the forwards and inverse fourier transform to a range of non-periodic waveforms.
CO-6	Identify solution methods for partial differential equations that model physical processes.

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Course Code:	HS1203
Course Title:	English Language and Communication Skills
Theory / Lab:	Lab
Course Outcomes:	
CO-1	To learn how to pronounce words using the rules of the International Phonetic Alphabet
CO-2	To acquire English speaking skills using rhythm and intonation
CO-3	To learn to overcome stage fear and make presentations with ease
CO-4	To learn to use words and phrases according to the needs and demands of the situation.
CO-5	To learn to face different types of interviews with confidence.
CO-6	To gain confidence to participate in group discussions.

Course Code:	BS1204
Course Title:	APPLIED PHYSICS
Theory / Lab:	THEORY
Course Outcomes:	
CO-1	Able to explain the need of coherent sources and the conditions for sustained interference.
CO-2	Able to analyze the physical significance of wave function.
CO-3	An ability to calculate the Fermi energy.
CO-4	An ability to identify the type of semiconductor using Hall effect.
CO-5	Able to summarize various types of polarization of dielectrics
CO-6	An ability to classify the magnetic materials based on susceptibility and their temperature dependence.

Course Code:	BS1205
Course Title:	APPLIED PHYSICS-LAB
Theory / Lab:	LAB
Course Outcomes:	
CO-1	An ability to find thickness of a spacer using wedge film and parallel interference fringes.
CO-2	Able to acquire principles of various analytical techniques and their applications
CO-3	Ability to know and understand the Characteristics of Thermistor
CO-4	An ability to find Measurement of magnetic susceptibility by Gouy's method
CO-5	Able to Resolving Power of telescope
CO-6	An ability to find Hall voltage and Hall coefficients of a given semiconductor using Hall effect.

SEMESTER III:

Course Code:	R1621026
Course Title:	**MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS**
Theory / Lab:	THEORY
Course Outcomes:	
CO-1	The Learner is equipped with the knowledge of estimating the Demand and demand elasticities for a product and the knowledge of understanding of the Input-Output-Cost relationships and estimation of the least cost combination of inputs
CO-2	One is also ready to understand the nature of different markets and Price Output determination under various market conditions and also to have the knowledge of different Business Units
CO-3	The Learner is able to prepare Financial Statements and the usage of various Accounting tools for Analysis and to evaluate various investment project proposals with the help of capital budgeting techniques for decision making.

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Course Code:	R1621041
Course Title:	**ELECTRONIC DEVICES AND CIRCUITS**
Theory / Lab:	THEORY
Course Outcomes:	
CO-1	Understand the basic concepts of semiconductor physics.
CO-2	Understand the formation of p-n junction and how it can be used as a p-n junction as diode in different modes of operation.
CO-3	Know the construction, working principle of rectifiers with and without filters with relevant expressions and necessary comparisons.
CO-4	Understand the construction, principle of operation of transistors, BJT and FET with their V-I characteristics in different configurations
CO-5	Know the need of transistor biasing, various biasing techniques for BJT and FET and stabilization concepts with necessary expressions.
CO-6	Perform the analysis of small signal low frequency transistor amplifier circuits using BJT and FET in different configurations.

Course Code:	R1621042
Course Title:	**SWITCHING THEORY AND LOGIC DESIGN**
Theory / Lab:	THEORY
Course Outcomes:	
CO-1	Classify different number systems and apply to generate various codes.
CO-2	Use the concept of Boolean algebra in minimization of switching functions
CO-3	Design different types of combinational logic circuits.
CO-4	Apply knowledge of flip-flops in designing of Registers and counter
CO-5	The operation and design methodology for synchronous sequential circuits and algorithmic statements.
CO-6	Produce innovative designs by modifying the traditional design techniques.

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Course Code:	R1621044
Course Title:	**NETWORK ANALYSIS**
Theory / Lab:	THEORY
Course Outcomes:	
CO-1	gain the knowledge on basic network elements.
CO-2	will analyze the RLC circuits behavior in detailed
CO-3	analyze the performance of periodic waveforms
CO-4	gain the knowledge in characteristics of two port network parameters (Z, Y, ABCD, h & g).
CO-5	analyze the filter design concepts in real world applications.

Course Code:	R1621045
Course Title:	**RANDOM VARIABLES & STOCHASTIC PROCESSES**
Theory / Lab:	THEORY
Course Outcomes:	
CO-1	Mathematically model the random phenomena and solve simple probabilistic problems.
CO-2	Identify different types of random variables and compute statistical averages of these random variables.
CO-3	Characterize the random processes in the time and frequency domains.
CO-4	Analyze the LTI systems with random inputs
CO-5	Apply these techniques to analyze the systems in the presence of different types of noise

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Course Code:	R1621043
Course Title:	**SIGNALS & SYSTEMS**
Theory / Lab:	THEORY
Course Outcomes:	
CO-1	Characterize the signals and systems and principles of vector spaces, Concept of orthgonality.
CO-2	Analyze the continuous-time signals and continuous-time systems using Fourier series, Fourier transform and Laplace transform
CO-3	Apply sampling theorem to convert continuous-time signals to discrete-time signal and reconstruct back
CO-4	Understand the relationships among the various representations of LTI systems
CO-5	Understand the Concepts of convolution, correlation, Energy and Power density spectrum and their relationships
CO-6	Apply z-transform to analyze discrete-time signals and systems

Course Code:	R1621046
Course Title:	**ELECTRONIC DEVICES AND CIRCUITS LAB**
Theory / Lab:	Lab
Course Outcomes:	
CO-1	Understand the formation of p-n junction and how it can be used as a p-n junction as diode in different modes of operation.
CO-2	Know the construction, working principle of rectifiers with and without filters with relevant expressions and necessary comparisons
CO-3	Understand the construction, principle of operation of transistors, BJT and FET with their V-I characteristics in different configurations
CO-4	Perform the analysis of small signal low frequency transistor amplifier

	circuits using BJT and FET in different configurations.

Course Code:	R1621047
Course Title:	NETWORKS AND ELECTRICAL TECHNOLOGY LAB
Theory / Lab:	Lab
Course Outcomes:	
CO-1	gain the knowledge on basic network elements.
CO-2	will analyze the RLC circuits behavior in detailed
CO-3	analyze the performance of periodic waveforms
CO-4	gain the knowledge in characteristics of two port network parameters (Z, Y, ABCD, h & g).

SEMESTER IV:

Course Code:	R1622041
Course Title:	**ELECTRONIC CIRCUIT ANALYSIS**
Theory / Lab:	THEORY
Course Outcomes:	
CO-1	Design and analysis of small signal high frequency transistor amplifier using BJT and FET
CO-2	Design and analysis of multi stage amplifiers using BJT and FET and Differential amplifier using BJT
CO-3	Derive the expressions for frequency of oscillation and condition for oscillation of RC and LC oscillators and their amplitude and frequency stability concept
CO-4	Know the classification of the power and tuned amplifiers and their analysis with performance comparison

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Course Code:	R1622042
Course Title:	**CONTROL SYSTEMS**
Theory / Lab:	THEORY
Course Outcomes:	
CO-1	Represent the mathematical model of a system
CO-2	Determine the response of different order systems for various step inputs
CO-3	Analyse the stability of the system
CO-4	Demonstrate the concepts of state variable analysis, design and also the concepts of controllability and observability
CO-5	Identify and plot different Root locus techniques for system analysis.

Course Code:	R1622043
Course Title:	**EM WAVES AND TRANSMISSION LINES**
Theory / Lab:	THEORY
Course Outcomes:	
CO-1	Determine E and H using various laws and applications of electric & magnetic fields
CO-2	Apply the Maxwell equations to analyze the time varying behavior of EM waves
CO-3	Gain the knowledge in uniform plane wave concept and characteristics of uniform plane wave in various media
CO-4	Calculate Brewster angle, critical angle and total internal reflection
CO-5	Derive the expressions for input impedance of transmission lines
CO-6	Calculate reflection coefficient, VSWR etc. using smith chart

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Course Code:	R1622044
Course Title:	**ANALOG COMMUNICATIONS**
Theory / Lab:	THEORY
Course Outcomes:	
CO-1	Differentiate various Analog modulation and demodulation schemes and their spectral characteristics
CO-2	Analyze noise characteristics of various analog modulation methods
CO-3	Analyze various functional blocks of radio transmitters and receivers
CO-4	Design simple analog systems for various modulation techniques

Course Code:	R1622045
Course Title:	**PULSE AND DIGITAL CIRCUITS**
Theory / Lab:	THEORY
Course Outcomes:	
CO-1	Design linear and non-linear wave shaping circuits
CO-2	Apply the fundamental concepts of wave shaping for various switching and signal generating circuits
CO-3	Design different multi vibrators and time base generators
CO-4	Utilize the non sinusoidal signals in many experimental research areas.

Course Code:	R1622026
Course Title:	**MANAGEMENT SCIENCE**
Theory / Lab:	THEORY
Course Outcomes:	
CO-1	After completion of the Course the student will acquire the knowledge on management functions, global leadership and organizational behavior

CO-2	Will familiarize with the concepts of functional management project management and strategic management

Course Code:	R1622046
Course Title:	**ELECTRONIC CIRCUIT ANALYSIS LAB**
Theory / Lab:	Lab
Course Outcomes:	
CO-1	Design and analysis of small signal high frequency transistor amplifier using BJT and FET
CO-2	Design and analysis of multi stage amplifiers using BJT and FET and Differential amplifier using BJT
CO-3	Derive the expressions for frequency of oscillation and condition for oscillation of RC and LC oscillators and their amplitude and frequency stability concept
CO-4	Know the classification of the power and tuned amplifiers and their analysis with performance comparison

Course Code:	R1622047
Course Title:	**ANALOG COMMUNICATIONS LAB**
Theory / Lab:	Lab
Course Outcomes:	
CO-1	Differentiate various Analog modulation and demodulation schemes and their spectral characteristics
CO-2	Analyze noise characteristics of various analog modulation methods
CO-3	Analyze various functional blocks of radio transmitters and receivers
CO-4	Analyze various functional blocks of radio transmitters and receivers
CO-5	Design simple analog systems for various modulation techniques

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SEMESTER V:

Course Code:	R1631041
Course Title:	**COMPUTER ARCHITECTURE AND ORGANIZATION**
Theory / Lab:	THEORY
Course Outcomes:	
CO-1	Students can understand the architecture of modern computer
CO-2	They can analyze the Performance of a computer using performance equation
CO-3	Understanding of different instruction types
CO-4	Students can calculate the effective address of an operand by addressing modes
CO-5	They can understand how computer stores positive and negative numbers
CO-6	Understanding of how a computer performs arithmetic operation of positive and negative numbers

Course Code:	R1631042
Course Title:	**LINEAR IC APPLICATIONS**
Theory / Lab:	THEORY
Course Outcomes:	
CO-1	Design circuits using operational amplifiers for various applications
CO-2	Analyze and design amplifiers and active filters using Op-amp
CO-3	Diagnose and trouble-shoot linear electronic circuits
CO-4	Understand the gain-bandwidth concept and frequency response of the amplifier configurations

CO-5	Understand thoroughly the operational amplifiers with linear integrated circuits

Course Code:	R1631043
Course Title:	**DIGITAL IC APPLICATIONS**
Theory / Lab:	THEORY
Course Outcomes:	
CO-1	Understand the concepts of different logics and implementations using Integrated circuits
CO-2	Design and analyze any Digital design in real time applications
CO-3	Extend the digital operations to any width by connecting the ICs and can also design, simulate their results using hardware description language
CO-4	Understand the concepts of MSI Registers and Modes of Operation of Shift Registers, Universal Shift Registers

Course Code:	R1631044
Course Title:	**DIGITAL COMMUNICATIONS**
Theory / Lab:	THEORY
Course Outcomes:	
CO-1	Determine the performance of different waveform coding techniques for the generation and digital representation of the signals.
CO-2	Determine the probability of error for various digital modulation schemes
CO-3	Analyze different source coding techniques
CO-4	Compute and analyze different error control coding schemes for the reliable transmission of digital information over the channel.
CO-5	Demonstrate the applications of block codes, cyclic codes and convolution coding techniques.

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Course Code:	R1631045
Course Title:	**ANTENNAS AND WAVE PROPAGATION**
Theory / Lab:	THEORY
Course Outcomes:	
CO-1	Identify basic antenna parameters
CO-2	Design and analyze wire antennas, loop antennas, reflector antennas, lens antennas, horn antennas and microstrip antennas
CO-3	Design and analyze antenna arrays
CO-4	Analyze antenna measurements to assess antenna's performance
CO-5	Identify the characteristics of radio wave propagation
CO-6	Identify the characteristics of radio wave propagation

Course Code:	R1631049
Course Title:	**PROFESSIONAL ETHICSAND HUMAN VALUES**
Theory / Lab:	THEORY
Course Outcomes:	
CO-1	It gives a comprehensive understanding of a variety issues that are encountered by every professional in discharging professional duties
CO-2	It provides the student the sensitivity and global outlook in the contemporary world to fulfill the professional obligations effectively

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Bakkannapalem Village, Madhurawada Post, Visakhapatnam – 530 048

Course Code:	R1631046
Course Title:	**PULSE AND DIGITAL CIRCUITS LAB**
Theory / Lab:	Lab
Course Outcomes:	
CO-1	Design linear and non-linear wave shaping circuits
CO-2	Apply the fundamental concepts of wave shaping for various switching and signal generating circuits
CO-3	Design different multi vibrators and time base generators

Course Code:	R1631047
Course Title:	**LINEAR IC APPLICATIONS LAB**
Theory / Lab:	Lab
Course Outcomes:	
CO-1	Design circuits using operational amplifiers for various applications
CO-2	Analyze and design amplifiers and active filters using Op-amp
CO-3	Diagnose and trouble-shoot linear electronic circuits
CO-4	Understand the gain-bandwidth concept and frequency response of the amplifier configurations
CO-5	Understand thoroughly the operational amplifiers with linear integrated circuits

Course Code:	R1631048
Course Title:	**DIGITAL IC APPLICATIONS LAB**
Theory / Lab:	Lab
Course Outcomes:	
CO-1	Understand the concepts of different logics and implementations using Integrated circuits
CO-2	Extend the digital operations to any width by connecting the ICs and can also design, simulate their results using hardware description language
CO-3	Understand the concepts of MSI Registers and Modes of Operation of Shift Registers, Universal Shift Registers

SEMESTER VI:

Course Code:	R1632041
Course Title:	**MICRO PROCESSORS AND MICRO CONTROLLERS**
Theory / Lab:	THEORY
Course Outcomes:	
CO-1	Develop programs for different addressing modes
CO-2	perform 8086 interfacing with different peripherals and implement programs
CO-3	describe the key features of serial and parallel communication and able to Design a microcontroller for simple applications

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Course Code:	R1632042
Course Title:	**MICROWAVE ENGINEERING**
Theory / Lab:	THEORY
Course Outcomes:	
CO-1	Gain knowledge of transmission lines and waveguide structures and how they are used as elements in impedance matching and filter circuits
CO-2	Apply analysis methods to determine circuit properties of passive or active microwave devices
CO-3	Gain knowledge and understanding of microwave analysis methods
CO-4	Distinguish between M-type and O-type tubes
CO-5	Analyze and measure various microwave parameters using a Microwave test bench

Course Code:	R1632043
Course Title:	**VLSI DESIGN**
Theory / Lab:	THEORY
Course Outcomes:	
CO-1	Apply the Concept of design rules during the layout of a circuit
CO-2	Model and simulate digital VLSI systems using hardware design language
CO-3	Synthesize digital VLSI systems from register-transfer or higher level descriptions
CO-4	Understand current trends in semiconductor technology, and how it impacts

	scaling and performance

Course Code:	R1632044
Course Title:	**DIGITAL SIGNAL PROCESSING**
Theory / Lab:	THEORY
Course Outcomes:	
CO-1	Apply the difference equations concept in the anayziation of Discrete time systems
CO-2	Use the FFT algorithm for solving the DFT of a given signal
CO-3	Design a Digital filter (FIR&IIR) from the given specifications
CO-4	Realize the FIR and IIR structures from the designed digital filter
CO-5	Use the Multirate Processing concepts in various applications(eg: Design of phase shifters, Interfacing of digital systems…)
CO-6	Apply the signal processing concepts on DSP Processor

Course Code:	R163204A
Course Title:	**OOPS THROUGH JAVA**
Theory / Lab:	THEORY
Course Outcomes:	
CO-1	Understand Java programming concepts and utilize Java Graphical User Interface in Program writing
CO-2	Write, compile, execute and troubleshoot Java programming for networking concepts

CO-3	Build Java Application for distributed environment
CO-4	Design and Develop multi-tier applications
CO-5	Identify and Analyze Enterprise applications

Course Code:	R163204D
Course Title:	**BIO-MEDICAL ENGINEERING**
Theory / Lab:	THEORY
Course Outcomes:	
CO-1	experience in applying principles of engineering, biology, human physiology, chemistry, calculus-based physics, mathematics (through differential equations) and statistics
CO-2	experience in solving bio/biomedical engineering problems, including those associated with the interaction between living and non-living systems
CO-3	experience in analyzing, modeling, designing, and realizing bio/biomedical engineering devices, systems, components, or processes
CO-4	experience in making measurements on and interpreting data from living systems

Course Code:	R1632048
Course Title:	**DIGITAL COMMUNICATIONS LAB**
Theory / Lab:	Lab
Course Outcomes:	
CO-1	analyze the performance of a Digital Communication System for probability of error and are able to design a digital communication system
CO-2	analyze various source coding techniques

CO-3	Compute and analyze Block codes, cyclic codes and convolution codes
CO-4	Design a coded communication system

Course Code:	R1632047
Course Title:	**VLSI DESIGN LAB**
Theory / Lab:	Lab
Course Outcomes:	
CO-1	Apply the Concept of design rules during the layout of a circuit
CO-2	Model and simulate digital VLSI systems using hardware design language
CO-3	Synthesize digital VLSI systems from register-transfer or higher level descriptions
CO-4	Understand current trends in semiconductor technology, and how it impacts scaling and performance

Course Code:	R1632046
Course Title:	**MICRO PROCESSORS AND MICRO CONTROLLERS LAB**
Theory / Lab:	Lab
Course Outcomes:	
CO-1	Develop programs for different addressing modes
CO-2	perform 8086 interfacing with different peripherals and implement programs
CO-3	describe the key features of serial and parallel communication and able to Design a microcontroller for simple applications

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SEMESTER VII:

Course Code:	R1641041
Course Title:	**RADAR SYSTEMS**
Theory / Lab:	THEORY
Course Outcomes:	
CO-1	Derive the radar range equation and to solve some analytical problems.
CO-2	Understand the different types of radars and its applications.
CO-3	Understand the concept of tracking and different tracking techniques.
CO-4	Understand the various components of radar receiver and its performance.

Course Code:	R1641042
Course Title:	**DIGITAL IMAGE PROCESSING**
Theory / Lab:	THEORY
Course Outcomes:	
CO-1	Perform image manipulations and different digital image processing techniques
CO-2	Perform basic operations like – Enhancement, segmentation, compression, Image transforms and restoration techniques on image
CO-3	Analyze pseudo and full color image processing techniques

CO-4	Apply various morphological operators on images

Course Code:	R1641043
Course Title:	**COMPUTER NETWORKS**
Theory / Lab:	THEORY
Course Outcomes:	
CO-1	Understand OSI and TCP/IP models
CO-2	Analyze MAC layer protocols and LAN technologies
CO-3	Design applications using internet protocols
CO-4	Understand routing and congestion control algorithms
CO-5	Understand how internet works

Course Code:	R1641044
Course Title:	**OPTICAL COMMUNICATIONS**
Theory / Lab:	THEORY
Course Outcomes:	
CO-1	Choose necessary components required in modern optical communications systems
CO-2	Design and build optical fiber experiments in the laboratory, and learn how to calculate electromagnetic modes in waveguides, the amount of light lost going through an optical system, dispersion of optical fibers
CO-3	Use different types of photo detectors and optical test equipment to analyze optical fiber and light wave systems

CO-4	Choose the optical cables for better communication with minimum losses
CO-5	Design, build, and demonstrate optical fiber experiments in the laboratory.

Course Code:	R164104B
Course Title:	**ELECTRONIC SWITCHING SYSTEMS**
Theory / Lab:	THEORY
Course Outcomes:	
CO-1	Evaluate the time and space parameters of a switched signal
CO-2	Establish the digital signal path in time and space, between two terminals
CO-3	Evaluate the inherent facilities within the system to test some of the SLIC, CODEC and digital switch functions
CO-4	Investigate the traffic capacity of the system
CO-5	Evaluate methods of collecting traffic data
CO-6	Evaluate the method of interconnecting two separate digital switches

Course Code:	R164104D
Course Title:	**EMBEDDED SYSTEMS**
Theory / Lab:	THEORY
Course Outcomes:	
CO-1	Understand the basic concepts of an embedded system and able to know an embedded system design approach to perform a specific function
CO-2	The hardware components required for an embedded system and the design approach of an embedded hardware

CO-3	The various embedded firmware design approaches on embedded environment
CO-4	Understand how to integrate hardware and firmware of an embedded system using real time operating system

Course Code:	R1641048
Course Title:	**DIGITAL SIGNAL PROCESSING LAB**
Theory / Lab:	Lab
Course Outcomes:	
CO-1	Apply the difference equations concept in the analysis of Discrete time systems
CO-2	Design a Digital filter (FIR&IIR) from the given specifications
CO-3	Use the FFT algorithm for solving the DFT of a given signal

Course Code:	R1641047
Course Title:	**MICROWAVE ENGINEERING & OPTICAL LAB**
Theory / Lab:	Lab
Course Outcomes:	
CO-1	Gain knowledge of transmission lines and waveguide structures and how they are used as elements in impedance matching and filter circuits
CO-2	Apply analysis methods to determine circuit properties of passive or active microwave devices
CO-3	Analyze and measure various microwave parameters using a Microwave test bench
CO-4	Distinguish between M-type and O-type tubes

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SEMESTER VIII:

Course Code:	R1642041
Course Title:	**CELLULAR AND MOBILE COMMUNICATIONS**
Theory / Lab:	THEORY
Course Outcomes:	
CO-1	Identify the limitations of conventional mobile telephone systems; understand the concepts of cellular systems
CO-2	Understand the frequency management, channel assignment strategies and antennas in cellular systems
CO-3	Understand the concepts of handoff and architectures of various cellular systems

Course Code:	R1642042
Course Title:	**ELECTRONIC MEASUREMENTS AND INSTRUMENTATION**
Theory / Lab:	THEORY
Course Outcomes:	
CO-1	Select the instrument to be used based on the requirements
CO-2	Understand and analyze different signal generators and analyzers
CO-3	Understand the design of oscilloscopes for different applications

CO-4	Design different transducers for measurement of different parameters

Course Code:	R1642043
Course Title:	**SATELLITE COMMUNICATIONS**
Theory / Lab:	THEORY
Course Outcomes:	
CO-1	Understand the concepts, applications and subsystems of Satellite communications
CO-2	Derive the expression for G/T ratio and to solve some analytical problems on satellite link design
CO-3	Understand the various types of multiple access techniques and architecture of earth station design
CO-4	Understand the concepts of GPS and its architecture

Course Code:	R164204A
Course Title:	**WIRELESS SENSORS AND NETWORKS**
Theory / Lab:	THEORY
Course Outcomes:	
CO-1	Understand different types of sensors/transducers, working principles, selection procedure, applications of sensing systems
CO-2	Understand Challenges and applications of sensors and sensor networks

CO-3	Select a sensor/sensing system for are requirement
CO-4	Test, install and collect the data from a group of sensors
CO-5	Derive sensor-based solution for different applications

Course Code:	R1642045
Course Title:	Seminar
Theory / Lab:	Seminar
Course Outcomes:	
CO-1	Knowledge of self-development and presentation skills
CO-2	Learn the importance of discussion skills
CO-3	Developing the overall personality with Argumentative Skills and Critical Thinking
CO-4	Knowledge of self-development through Questioning.

Course Code:	R1642046
Course Title:	Project
Theory / Lab:	Project work
Course Outcomes:	
CO-1	Understand of contemporary / emerging technology for various processes and systems.
CO-2	Share knowledge effectively in oral and written form and formulate documents
CO-3	Demonstrate a sound technical knowledge of their selected project topic.

CO-4	Undertake problem identification, formulation and solution.
CO-5	Design engineering solutions to complex problems utilising a systems approach.

M.Tech (VLSI Design)

PSOs:

1. To acquire competency in areas of VLSI Design, Testing, verification IC Fabrication and prototype development with focus on applications.

2. To integrate multiple sub-systems to develop System on Chip, optimize its performance and excel in industry sectors related to VLSI domain and to develop a start-up system.

POs:

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

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

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

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

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

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

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

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

9. **Individual and Team Work**: Function effectively as an individual, and as a member or leader in diverse teams and in multi-disciplinary settings.

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

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

12. **Life-long Learning:** Recognize the need for and have the preparation and ability to Engage in independent and life- long learning in the broadest context of technological Change.

COURSE OUTCOMES

SEMESTER I (R19)

Course Code:	M5701
Course Title:	CMOS Analog IC Design
Theory / Lab:	Theory
Course Outcomes:	
CO-1	Design MOSFET based analog integrated circuits.
CO-2	Analyze analog circuits at least to the first order.

CO-3	Appreciate the trade-offs involved in analog integrated circuit design.
CO-4	Understand and appreciate the importance of noise and distortion in analog circuits.
CO-5	Analyze complex engineering problems critically in the domain of analog IC design for conducting research.
CO-6	Solve engineering problems for feasible and optimal solutions in the core area of analog ICs.

Course Code:	M5702
Course Title:	CMOS Digital IC design
Theory / Lab:	Theory
Course Outcomes:	
CO-1	Demonstrate advanced knowledge in Static and dynamic characteristics of CMOS, Alternative CMOS Logics, Estimation of Delay and Power, Adders Design.
CO-2	Classify different semiconductor memories.
CO-3	Analyze, design and implement combinational and sequential MOS logic circuits.
CO-4	Analyze complex engineering problems critically in the domain of digital IC design for conducting research.
CO-5	Solve engineering problems for feasible and optimal solutions in the core area of digital ICs.

Course Code:	M5703
Course Title:	VLSI Technology
Theory / Lab:	Theory

Course Outcomes:	
CO-1	Understand the basics of MOS transistors and also the characteristics of MOS transistors.
CO-2	Learn about the MOS fabrication process and short channel effects.
CO-3	Learn about the basic rules in layout designing.
CO-4	Analyse various combinational logic networks and sequential systems.

Course Code:	M5707
Course Title:	Nano-electronics
Theory / Lab:	Theory
Course Outcomes:	
CO-1	To understand and challenges due to scaling on CMOS devices
CO-2	To analyze and explain working of novel MOS based silicon devices and various multi gate devices.
CO-3	To understand working of spin electronic devices
CO-4	To understand nanoelectronic systems and building blocks such as: low dimensional semiconductors, heterostructures, carbon nanotubes, quantum dots, nano wires etc.

Course Code:	M0109
Course Title:	Research methodology and IPR
Theory / Lab:	Theory

Course Outcomes:	
CO-1	Understand research problem formulation.
CO-2	Analyze research related information
CO-3	Follow research ethics
CO-4	Understand that today‟s world is controlled by Computer, Information Technology, but tomorrow world will be ruled by ideas, concept, and creativity.
CO-5	Understanding that when IPR would take such important place in growth of individuals & nation, it is needless to emphasis the need of information about Intellectual Property Right to be promoted among students in general & engineering in particular.
CO-6	Understand that IPR protection provides an incentive to inventors for further research work and investment in R & D, which leads to creation of new and better products, and in turn brings about, economic growth and social benefits.

Course Code:	M5709
Course Title:	CMOS Analog IC Design Lab
Theory / Lab:	Lab
Course Outcomes:	
CO-1	Have the ability to explain the VLSI Design Methodologies using Mentor Graphics Tools
CO-2	Grasp the significance of various cmos analog circuits in full-custom IC Design flow
CO-3	Have the ability to explain the Physical Verification in Layout Design
CO-4	Fully Appreciate the design and analyze of analog and mixed signal simulation
CO-5	Grasp the Significance of Pre-Layout Simulation and Post-Layout Simulation

Course Code:	M5710
Course Title:	CMOS Digital IC Design Lab
Theory / Lab:	Lab

Course Outcomes:	
CO-1	Have the ability to explain the VLSI Design Methodologies using Mentor Graphics Tools
CO-2	Grasp the significance of various design logic Circuits in full-custom IC Design.
CO-3	Have the ability to explain the Physical Verification in Layout Extraction
CO-4	Fully Appreciate the design and analyze of CMOS Digital Circuits
CO-5	Grasp the Significance of Pre-Layout Simulation and Post-Layout Simulation

SEMESTER II: (R19)

Course Code:	N5701
Course Title:	Mixed Signal & RF IC Design
Theory / Lab:	Theory
Course Outcomes:	
CO-1	Design basic cells like Op-Amp, against process and temperature variations meeting the mixed signal specifications
CO-2	Design comparators that can meet the high speed requirements of digital circuitry.
CO-3	Design a complete mixed signal system that includes efficient data conversion and RF circuits with minimizing switching.
CO-4	Understand the design bottlenecks specific to RF IC design, linearity related issues and ISI
CO-5	Comprehend different multiple access techniques, wireless standards and various transceiver architectures

Course Code:	N5508
Course Title:	Physical Design Automation

Theory / Lab:	Theory
Course Outcomes:	
CO-1	Understand the relationship between design automation algorithms and Various constraints posed by VLSI fabrication and design technology.
CO-2	Adapt the design algorithms to meet the critical design parameters.
CO-3	Identify layout optimization techniques and map them to the algorithms
CO-4	Develop proto-type EDA tool and test its efficacy

Course Code:	N5702
Course Title:	Elective-III: Design For Testability
Theory / Lab:	Theory
Course Outcomes:	
CO-1	Demonstrate advanced knowledge in The basic faults that occur in digital systems, Testing of stuck at faults for digital circuits, Design for testability.
CO-2	Analyze testing issues in the field of digital system design critically for conducting research.
CO-3	Solve engineering problems by modeling different faults for fault free simulation in digital circuits.
CO-4	Apply appropriate research methodologies and techniques to develop new testing strategies for digital and mixed signal circuits and systems.

Course Code:	N5705
Course Title:	Elective IV: Low Power VLSI Design
Theory / Lab:	Theory
Course Outcomes:	

CO-1	Identify the sources of power dissipation in digital IC systems & understand the impact of power on system performance and reliability.
CO-2	Characterize and model power consumption & understand the basic analysis methods.
CO-3	Understand leakage sources and reduction techniques.

Course Code:	N5706
Course Title:	Mixed Signal IC Design Lab
Theory / Lab:	Lab
Course Outcomes:	
CO-1	Design High speed comparator, Data converters and Flip-flops.
CO-2	Design of PLL,VCO and Bandgap reference circuits
CO-3	Design of switched capacitor circuits, Parasitic sensitive and insensitive integrators
CO-4	Demonstrate the layouts of all the circuits designed and simulated

Course Code:	N5707
Course Title:	Physical Design Automation Lab
Theory / Lab:	Lab
Course Outcomes:	
CO-1	Design and identify different automation algorithms.
CO-2	Demonstrate different Graph algorithms
CO-3	Design and verify different computational geometry algorithms with sweep methods
CO-4	Design and demonstrate different Partitioning algorithms.
CO-5	Verify various Floor planning and Routing algorithms

Course Code:	N57MP
Course Title:	Mini Project
Theory / Lab:	Project Work
Course Outcomes:	
CO-1	Understand of contemporary / emerging technology for various processes and systems.
CO-2	Share knowledge effectively in oral and written form and formulate documents

SEMESTER III: (R16)

Course Code:	
Course Title:	Comprehensive Viva-Voce
Theory / Lab:	Viva-Voce
Course Outcomes:	
CO-1	Demonstrate knowledge in the VLSI domain.
CO-2	Present his/her views cogently and precisely
CO-3	Exhibit professional etiquette suitable for career progression

Course Code:	
Course Title:	Seminar – I
Theory / Lab:	Seminar

Course Outcomes:	
CO-1	Knowledge of self-development and presentation skills
CO-2	Learn the importance of discussion skills
CO-3	Developing the overall personality with Argumentative Skills and Critical Thinking
CO-4	Knowledge of self-development through Questioning.

Course Code:	
Course Title:	Project Work Part – I
Theory / Lab:	Project work
Course Outcomes:	
CO-1	Understand of contemporary / emerging technology for various processes and systems.
CO-2	Share knowledge effectively in oral and written form and formulate documents
CO-3	Demonstrate a sound technical knowledge of their selected project topic.
CO-4	Undertake problem identification, formulation and solution.
CO-5	Design engineering solutions to complex problems utilising a systems approach.
CO-6	Conduct an engineering project.

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SEMESTER IV: (R16)

Course Code:	
Course Title:	Seminar – II
Theory / Lab:	Seminar
Course Outcomes:	
CO-1	Knowledge of self-development and presentation skills
CO-2	Learn the importance of discussion skills
CO-3	Developing the overall personality with Argumentative Skills and Critical Thinking
CO-4	Knowledge of self-development through Questioning.

Course Code:	
Course Title:	Project Work Part - II
Theory / Lab:	Project work
Course Outcomes:	
CO-1	Understand of contemporary / emerging technology for various processes and systems.
CO-2	Share knowledge effectively in oral and written form and formulate documents
CO-3	Demonstrate a sound technical knowledge of their selected project topic.
CO-4	Undertake problem identification, formulation and solution.
CO-5	Design engineering solutions to complex problems utilising a systems approach.
CO-6	Conduct an engineering project.

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Department of COMPUTER SCIENCE ENGINEERING

B.Tech

Program Specific Outcomes:

1. **To apply the knowledge knowledge** obtained obtained through through rigorous analysis of algorithms for advancing the broad area of computer science and engineering.

2. **To bring forth the creative zeal** and work efficiently in designing the solution to various software and hardware problems by using state of the art tools.

3. **To assimilate professional ethics**, managerial skills and to officiate effectively as a leader in a team to manage diverse projects.

Program Outcomes:

1. **Engineering knowledge:** An ability to apply knowledge of Mathematics (including Probability & Statistics and Mathematical Foundation of Computer Science), Science, and Engineering.

2. **Problem analysis**: An ability to design and conduct experiments, as well as to analyze and interpret data including hardware and software components

3. **Design / development of solutions**: An ability to design a complex computing system or process to meet desired specifications and needs.

4. **Conduct investigations of complex problems**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

5. **Modern tool usage:** An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice

6. **The Engineer and Society**: Apply cyber laws and copyright policies to assess societal health, safety, legal and cultural issues.

7**. Environment and Sustainability**: The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental and demonstrate the knowledge need for sustainable development.

8. **Ethics** Apply and commit Professional Ethics to satisfy the norms of the engineering practice.

9. **Individual and team work** An ability to function on multi-disciplinary teams..

10. **Communication** An ability to communicate and present effectively

11. **Project Management and Finance** An ability to use the modern engineering tools, techniques, skills and management principles to do work as a member and leader in a team, to manage projects in multidisciplinary environments.

12. **Life-long Learning** A recognition of the need for, and an ability to engage in, to resolve contemporary issues and acquire lifelong learning.

COURSE OUTCOMES

SEMESTER I:

Course Code:	HS1101
Course Title:	English
Theory / Lab:	Theory
Course Outcomes:	
CO-1	To improve listening skills so as to understand English spoken by native speakers
CO-2	To focus on appropriate reading strategies for comprehension of various academic texts and authentic materials
CO-3	To demonstrate speaking skills through participation in activities such as role plays, discussions and structured talks/oral presentations.
CO-4	To communicate confidently in various contexts and different cultures
CO-5	To comprehend grammatical structures and vocabulary and encourage their use in speech and writing.
CO-6	To analyze unfamiliar phrases/sentences and to understand the structure/syntax of the English Language.

Course Code:	HS1102
Course Title:	English Language and Communication Skills
Theory / Lab:	Lab
Course Outcomes:	
CO-1	To learn how to pronounce words using the rules they have been taught.
CO-2	To acquire English speaking skills using rhythm and intonation.
CO-3	To learn to overcome stage fear and make presentations with ease.
CO-4	To learn how to use right words and phrases according to the situation.

CO-5	To learn to face different types of interviews with confidence.
CO-6	To gain confidence to participate in group discussions.

Course Code:	BS1101
Course Title:	MATHEMATICS-1
Theory / Lab:	THEORY
Course Outcomes:	
CO-1	Utilize mean value theorems to real life problems.
CO-2	Solve the differential equations related to various engineering fields.
CO-3	Familiarize with functions of several variables which is useful in optimization.
CO-4	Apply double integration techniques in evaluating areas bounded by region.
CO-5	Students will also learn important tools of calculus in higher dimensions. Students will become familiar with 2- dimensional and 3- dimensional coordinate systems.

Course Code:	BS1106
Course Title:	APPLIED CHEMISTRY
Theory / Lab:	THEORY
Course Outcomes:	
CO-1	Understand the operating principles and the reaction mechanisms of batteries and fuel cells.
CO-2	Able to apply this knowledge to the analysis and design of batteries
CO-3	Hydrogen fuel cell technology is used in automobiles in order to reduce environmental pollution
CO-4	An ability to design and conduct experiments, as well as to organize, analyze, and interpret data.
CO-5	An ability to identify and formulate polymers and have a knowledge of various polymers
CO-6	Ability to know and to understand the various fuels and their occurrences,

	synthesis and purifications

Course Code:	BS1107
Course Title:	APPLIED CHEMISTRY LAB
Theory / Lab:	LAB
Course Outcomes:	
CO-1	Able to acquire knowledge to prepare solutions and their importance
CO-2	Able to apply this knowledge to the analysis and design of batteries.
CO-3	Applying knowledge to estimate the hardness of water in terms of Ca2+ & Mg2+ ions
CO-4	Able to acquire principles of various analytical techniques and their applications.
CO-5	An ability to design and conduct experiments, as well as to organize, analyze, and interpret data.
CO-6	Ability to know and to understand the various fuels and their occurrences, synthesis and purifications.

SEMESTER II:

Course Code:	HS1203
Course Title:	English Language and Communication Skills
Theory / Lab:	Lab
Course Outcomes:	
CO-1	To learn how to pronounce words using the rules of the International Phonetic Alphabet
CO-2	To acquire English speaking skills using rhythm and intonation

CO-3	To learn to overcome stage fear and make presentations with ease
CO-4	To learnto use words and phrases according to the needs and demands of the situation.
CO-5	To learn to face different types of interviews with confidence.
CO-6	To gain confidence to participate in group discussions.

Course Code:	BS1202
Course Title:	MATHEMATICS-2
Theory / Lab:	THEORY
Course Outcomes:	
CO-1	Develop the use of matrix algebra techniques that is needed by engineers for practical applications.
CO-2	Solve system of linear algebraic equations using Gauss elimination, Gauss Jordan, Gauss Seidel.
CO-3	Evaluate approximating the roots of polynomial and transcendental equations by different algorithms.
CO-4	Apply Newton's forward & backward interpolation and lagrange's formulae for equal and unequal intervals.
CO-5	Apply different algorithms for approximating the solutions of ordinary differential equations to its analytical computations.

Course Code:	BS1203
Course Title:	MATHEMATICS-3
Theory / Lab:	THEORY
Course Outcomes:	
CO-1	Interpret the physical meaning of different operators such as gradient, curl and divergence.

CO-2	Estimate the work done against a field, circulation and flux using vector calculus.
CO-3	Apply the laplace transform for solving differential equations.
CO-4	Find the fourier series of periodic signals.
CO-5	Know and be able to apply integral expressions for the forwards and inverse fourier transform to a range of non-periodic waveforms.
CO-6	Identify solution methods for partial differential equations that model physical processes.

Course Code:	BS1204
Course Title:	APPLIED PHYSICS
Theory / Lab:	THEORY
Course Outcomes:	
CO-1	Able to explain the need of coherent sources and the conditions for sustained interference.
CO-2	Able to analyze the physical significance of wave function.
CO-3	An ability to calculate the Fermi energy.
CO-4	An ability to identify the type of semiconductor using Hall effect.
CO-5	Able to summarize various types of polarization of dielectrics
CO-6	An ability to classify the magnetic materials based on susceptibility and their temperature dependence.

Course Code:	BS1205
Course Title:	APPLIED PHYSICS LAB
Theory / Lab:	LAB
Course Outcomes:	
CO-1	An ability to find thickness of a spacer using wedge film and parallel interference fringes.

CO-2	Able to acquire principles of various analytical techniques and their applications
CO-3	Ability to know and understand the Characteristics of Thermistor
CO-4	An ability to find Measurement of magnetic susceptibility by Gouy'smethod
CO-5	Able to Resolving Power of telescope
CO-6	An ability to find Hall voltage and Hall coefficients of a given semiconductor using Hall effect.

SEMESTER III:

Course Code:	R1621051
Course Title:	STATISTICS WITH R PROGRAMMING
Theory / Lab:	Theory
Course Outcomes:	
CO-1	List motivation for learning a programming language
CO-2	Access online resources for R and import new function packages into the R workspace
CO-3	Import, review, manipulate and summarize data-sets in R
CO-4	Explore data-sets to create testable hypotheses and identify appropriate statistical tests
CO-5	Perform appropriate statistical tests using R Create and edit visualizations

Course Code:	R1621052
Course Title:	MATHEMATICAL FOUNDATION OF COMPUTER SCIENCE
Theory / Lab:	Theory
Course Outcomes:	

CO-1	Student will be able to demonstrate skills in solving mathematical problems proficiency in using mathematical software
CO-2	Student will be able to comprehend mathematical principles and logic
CO-3	Student will be able to demonstrate knowledge of mathematical modeling and
CO-4	Student will be able to manipulate and analyze data numerically and/or graphically using appropriate Software
CO-5	Student will be able to communicate effectively mathematical ideas/results verbally or in writing

Course Code:	R1621053
Course Title:	DIGITAL LOGIC DESIGN
Theory / Lab:	Theory
Course Outcomes:	
CO-1	An ability to define different number systems, binary addition and subtraction, 2's complement representation and operations with this representation.
CO-2	An ability to understand the different switching algebra theorems and apply them for logic functions.
CO-3	An ability to define the Karnaugh map for a few variables and perform an algorithmic reduction of logic functions
CO-4	An ability to define the other minimization methods for any number of variables Variable Entered Mapping (VEM) and Quine-McCluskey (QM) Techniques and perform an algorithmic reduction of logic functions.

Course Code:	R1621054
Course Title:	**PYTHON PROGRAMMING**
Theory / Lab:	Theory
Course Outcomes:	

CO-1	Making Software easily right out of the box
CO-2	Experience with an interpreted Language.
CO-3	To build software for real needs.
CO-4	Prior Introduction to testing software

Course Code:	R1621055
Course Title:	DATA STRUCTURES THROUGH C++
Theory / Lab:	Theory
Course Outcomes:	
CO-1	Apply advanced data structure strategies for exploring complex data structures.
CO-2	Compare and contrast various data structures and design techniques in the area of Performance.
CO-3	Implement data structure algorithms through C++. • Incorporate data structures into the applications such as binary search trees, AVL and B Trees
CO-4	Implement all data structures like stacks, queues, trees, lists and graphs and compare their Performance and trade offs
CO-5	Distinguish between procedures and object oriented programming.

Course Code:	R1621056
Course Title:	**COMPUTER GRAPHICS**
Theory / Lab:	Theory

Course Outcomes:	
CO-1	Know and be able to describe the general software architecture of programs that use 3D computer graphics.
CO-2	Know and be able to discuss hardware system architecture for computer graphics.
CO-3	Know and be able to select among models for lighting/shading: Color, ambient light; distant and light with sources; Phong reflection model; and shading (flat, smooth, Gourand, Phong).
CO-4	This Includes, but is not limited to: graphics pipeline, frame buffers, and graphic accelerators/co-processors.

Course Code:	
Course Title:	**DATASTRUCTURES THROUGH C++ LAB**
Theory / Lab:	Lab
Course Outcomes:	
CO-1	Be able to design and analyze the time and space efficiency of the data structure
CO-2	Be capable to identity the appropriate data structure for given problem
CO-3	Have practical knowledge on the application of data structures

Course Code:	
Course Title:	**PYTHON PROGRAMMING LAB**
Theory / Lab:	Lab
Course Outcomes:	
CO-1	Write, Test and Debug Python Programs
CO-2	Use Conditionals and Loops for Python Programs
CO-3	Use functions and represent Compound data using Lists, Tuples and Dictionaries

CO-4	Use various applications using python

SEMESTER IV:

Course Code:	R1622051
Course Title:	SOFTWARE ENGINEERING
Theory / Lab:	Theory
Course Outcomes:	
CO-1	Define and develop a software project from requirement gathering to implementation.
CO-2	Obtain knowledge about principles and practices of software engineering.
CO-3	Focus on the fundamentals of modeling a software project.
CO-4	Obtain knowledge about estimation and maintenance of software systems

Course Code:	R1622052
Course Title:	**JAVA PROGRAMMING**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	Understand Java programming concepts and utilize Java Graphical User Interface in Program writing.
CO-2	Write, compile, execute and troubleshoot Java programming for networking concepts.
CO-3	Build Java Application for distributed environment
CO-4	Design and Develop multi-tier applications.
CO-5	Identify and Analyze Enterprise applications.

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Course Title:	ADVANCED DATA STRUCTURES
Theory / Lab:	Theory
Course Outcomes:	
CO-1	Be able to understand and apply amortised analysis on data structures, including binary search trees, mergable heaps, and disjoint sets
CO-2	Understand the implementation and complexity analysis of fundamental algorithms such as RSA, primality testing, max flow, discrete Fourier transform
CO-3	Have an idea of applications of algorithms in a variety of areas, including linear programming and duality, string matching

Course Code:	R1622054
Course Title:	**COMPUTER ORGANIZATION**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	Students can understand the architecture of modern computer.
CO-2	They can analyze the Performance of a computer using performance equation
CO-3	Understanding of different instruction types.
CO-4	Students can calculate the effective address of an operand by addressing modes
CO-5	They can understand how computer stores positive and negative numbers.
CO-6	Understanding of how a computer performs arithmetic operation of positive and negative numbers.

Course Code:	R1622055
Course Title:	**FORMAL LANGUAGE AND AUTOMATA THEORY**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	Classify machines by their power to recognize languages.
CO-2	Employ finite state machines to solve problems in computing

CO-3	Explain deterministic and non-deterministic machines
CO-4	Comprehend the hierarchy of problems arising in the computer science

Course Code:	R1622056
Course Title:	**PRINCIPLES OF PROGRAMMING LANGUAGES**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	Describe syntax and semantics of programming languages
CO-2	Explain data, data types, and basic statements of programming languages
CO-3	Design and implement subprogram constructs, Apply object - oriented, concurrency, and event handling programming constructs
CO-4	Develop programs in Scheme, ML, and Prolog
CO-5	Understand and adopt new programming languages

Course Code:	
Course Title:	**ADVANCED DATA STRUCTURES LAB**
Theory / Lab:	Lab
Course Outcomes:	
CO-1	Implement heap and various tree structure like AVL, Red-black, B and Segment trees
CO-2	Solve the problems such as line segment intersection, convex shell and Voronoi diagram

Course Code:	
Course Title:	**JAVA PROGRAMMING LAB**

Theory / Lab:	Lab
Course Outcomes:	
CO-1	Evaluate default value of all primitive data type, Operations, Expressions, Control-flow, Strings
CO-2	Determine Class, Objects, Methods, Inheritance, Exception, Runtime Polymorphism, User defined Exception handling mechanism
CO-3	Illustrating simple inheritance, multi-level inheritance, Exception handling mechanism
CO-4	Construct Threads, Event Handling, implement packages, developing applets

SEMESTER V:

Course Code:	R1631051
Course Title:	**COMPILER DESIGN**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	Acquire knowledge in different phases and passes of Compiler, and specifying different types of tokens by lexical analyzer, and also able to use the Compiler tools like LEX, YACC, etc.
CO-2	Parser and its types i.e. Top-down and Bottom-up parsers.
CO-3	Construction of LL, SLR, CLR and LALR parse table

CO-4	Syntax directed translation, synthesized and inherited attributes.
CO-5	Techniques for code optimization.

Course Code:	R1631052
Course Title:	**UNIX PROGRAMMING**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	Documentation will demonstrate good organization and readability. Project work will involve group participation.
CO-2	File processing projects will require data organization, problem solving and research.
CO-3	Scripts and programs will demonstrate simple effective user interfaces.
CO-4	Scripts and programs will demonstrate effective use of structured programming.
CO-5	Scripts and programs will be accompanied by printed output demonstrating completion of a test plan.
CO-6	Testing will demonstrate both black and glass box testing strategies

Course Code:	R1631053
Course Title:	**OBJECT ORIENTED ANALYSIS & DESIGN USING UML**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	Ability to find solutions to the complex problems using object oriented approach
CO-2	Represent classes, responsibilities and states using UML notation
CO-3	Identify classes and responsibilities of the problem domain

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Course Code:	R1631054
Course Title:	**DATA BASE MANAGEMENT SYSTEMS**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	Describe a relational database and object-oriented database.
CO-2	Create, maintain and manipulate a relational database using SQL
CO-3	Describe ER model and normalization f or database design.
CO-4	Examine issues in data storage and query processing and can formulate appropriate solutions.
CO-5	Understand the role and issues in management of data such as efficiency, privacy, security, ethical responsibility, and strategic advantage.
CO-6	Design and build database system for a given real world problem

Course Code:	R1631055
Course Title:	**OPERATING SYSTEMS**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	Design various Scheduling algorithms
CO-2	Apply the principles of concurrency.
CO-3	Design deadlock, prevention and avoidance algorithms
CO-4	Compare and contrast various memory management schemes.
CO-5	Design and Implement a prototype file systems.

CO-6	Introduction to Android Operating system Internals

Course Code:	R1631056
Course Title:	**UNIFIED MODELING LAB**
Theory / Lab:	Lab
Course Outcomes:	
CO-1	Understand the Case studies and design the Model.
CO-2	Understand how design patterns solve design problems.
CO-3	Develop design solutions using creational patterns.

Course Code:	R1631057
Course Title:	**OPERATING SYSEMS AND LINUX PROGRAMMING LAB**
Theory / Lab:	Lab
Course Outcomes:	
CO-1	To use Unix utilities and perform basic shell control of the utilities
CO-2	To use the Unix file system and file access control
CO-3	To use of an operating system to develop software
CO-4	Solve problems using bash for shell scripting
CO-5	Students will be able to use Linux environment efficiently

Course Code:	R1631058
Course Title:	**DATA BASE MANAGEMENT SYSTEM LAB**
Theory / Lab:	Lab
Course Outcomes:	
CO-1	Understand, appreciate and effectively explain the underlying concepts of database technologies
CO-2	Design and implement a database schema for a given problem-domain
CO-3	Populate and query a database using SQL DML/DDL commands.

CO-4	Normalize a database
CO-5	Declare and enforce integrity constraints on a database using a state-of-the-art RDBMS
CO-6	Programming PL/SQL including stored procedures, stored functions, cursors, packages.

SEMESTER VI:

Course Code:	R1632051
Course Title:	**COMPUTER NETWORKS**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	Understand OSI and TCP/IP models
CO-2	Analyze MAC layer protocols and LAN technologies
CO-3	Design applications using internet protocols
CO-4	Understand routing and congestion control algorithms
CO-5	Understand how internet works

Course Code:	R1632052
Course Title:	**DATA WARE HOUSING AND DATA MINING**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	Understand stages in building a Data Warehouse

CO-2	Understand the need and importance of preprocessing techniques
CO-3	Understand the need and importance of Similarity and dissimilarity techniques
CO-4	Analyze and evaluate performance of algorithms for Association Rules.
CO-5	Analyze Classification and Clustering algorithms

Course Code:	R1632053
Course Title:	**DESIGN AND ANALYSIS OF ALGORITHMS**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	Argue the correctness of algorithms using inductive proofs and invariants.
CO-2	Analyze worst-case running times of algorithms using asymptotic analysis.
CO-3	Describe the divide-and-conquer paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm. Synthesize divide-and conquer algorithms. Derive and solve recurrences describing the performance of divide and- conquer algorithms.
CO-4	Describe the dynamic-programming paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm. Synthesize dynamic programming algorithms, and analyze them
CO-5	Describe the greedy paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm. Synthesize greedy algorithms, and analyze them.

Course Code:	R1632054
Course Title:	**SOFTWARE TESTING METHODOLOGIES**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	Understand the basic testing procedures.

CO-2	Able to support in generating test cases and test suites.
CO-3	Able to test the applications manually by applying different testing methods and automation tools.
CO-4	Apply tools to resolve the problems in Real time environment

Course Code:	
Course Title:	**CYBER SECURITY**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	Cyber Security architecture principles
CO-2	Identifying System and application security threats and vulnerabilities
CO-3	Identifying different classes of attacks
CO-4	Cyber Security incidents to apply appropriate response
CO-5	Describing risk management processes and practices
CO-6	Evaluation of decision making outcomes of Cyber Security scenarios

Course Code:	
Course Title:	**NETWORK PROGRAMMING LAB**
Theory / Lab:	Lab
Course Outcomes:	

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

Course Code:	
Course Title:	**SOFTWARE TESTING LAB**
Theory / Lab:	Lab
Course Outcomes:	
CO-1	Find practical solutions to the problem
CO-2	Solve specific problems alone or in teams
CO-3	Manage a project from beginning to end
CO-4	Work independently as well as in teams

Course Code:	
Course Title:	**DATA WARE HOUSING AND DATA MINING LAB**
Theory / Lab:	Lab
Course Outcomes:	
CO-1	The data mining process and important issues around data cleaning, pre-processing and integration.
CO-2	The principle algorithms and techniques used in data mining, such as clustering, association mining, classification and prediction..

SEMESTER VII:

Course Code:	R1641051
Course Title:	**CRYPTOGRAPHY AND NETWORK SECURITY**

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

Course Code:	R1641052
Course Title:	**SOFTWARE ARCHITECTURE AND DESIGN PATTERNS**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	The Learner is equipped with the knowledge of estimating the Demand and demand elasticities for a product
CO-2	One is also ready to understand the nature of different markets and Price Output determination under various market conditions and also to have the knowledge of different Business Units.
CO-3	The Learner is able to prepare Financial Statements and the usage of various Accounting tools for Analysis and to evaluate various investment project proposals with the help of capital budgeting techniques for decision making.
CO-4	One is able to gain knowledge of understanding of the Input-Output-Cost relationships and estimation of the least cost combination of inputs.

Course Code:	R1641053
Course Title:	**WEB TECHNOLOGIES**

Theory / Lab:	Theory
Course Outcomes:	
CO-1	Analyze a web page and identify its elements and attributes.
CO-2	Create web pages using XHTML and Cascading Styles sheets.
CO-3	Build dynamic web pages.
CO-4	Build web applications using PHP.
CO-5	Programming through PERL and Ruby
CO-6	Write simple client-side scripts using AJAX

Course Code:	R1641054
Course Title:	**MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	The Learner is equipped with the knowledge of estimating the Demand and demand elasticities for a product and the knowledge of understanding of the Input-Output-Cost relationships and estimation of the least cost combination of inputs.
CO-2	One is also ready to understand the nature of different markets and Price Output determination under various market conditions and also to have the knowledge of different Business Units.
CO-3	The Learner is able to prepare Financial Statements and the usage of various Accounting tools for Analysis and to evaluate various investment project proposals with the help of capital budgeting techniques for decision making

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Course Code:	R164105B
Course Title:	**BIG DATA ANALYTICS**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	Preparing for data summarization, query, and analysis.
CO-2	Applying data modeling techniques to large data sets
CO-3	Creating applications for Big Data analytics
CO-4	Building a complete business data analytic solution

Course Code:	R164105F
Course Title:	**SOFTWARE PROJECT MANAGEMENT**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	To match organizational needs to the most effective software development model
CO-2	To understand the basic concepts and issues of software project management
CO-3	To develop the skills for tracking and controlling software deliverables
CO-4	To conduct activities necessary to successfully complete and close the Software projects
CO-5	To select and employ mechanisms for tracking the software projects
CO-6	To implement the project plans through managing people, communications and change

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Course Code:	
Course Title:	**SOFTWARE ARCHITECTURE AND DESIGN PATTERNS LAB**
Theory / Lab:	Lab
Course Outcomes:	
CO-1	The Learner is equipped with the knowledge of estimating the Demand and demand elasticities for a product
CO-2	One is also ready to understand the nature of different markets and Price Output determination under various market conditions and also to have the knowledge of different Business Units.
CO-3	The Learner is able to prepare Financial Statements and the usage of various Accounting tools for Analysis and to evaluate various investment project proposals with the help of capital budgeting techniques for decision making.
CO-4	One is able to gain knowledge of understanding of the Input-Output-Cost relationships and estimation of the least cost combination of inputs.

Course Code:	
Course Title:	**WEB TECHNOLOGIES LAB**
Theory / Lab:	Lab
Course Outcomes:	
CO-1	Students will be able to develop static web sites using XHTML and Java Scripts
CO-2	To implement XML and XSLT for web applications
CO-3	Develop Dynamic web content using Java Servlets and JSP
CO-4	To develop JDBC connections and implement a complete Dynamic web application

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SEMESTER VIII:

Course Code:	
Course Title:	**DISTRIBUTED SYSTEMS**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	Develop a familiarity with distributed file systems.
CO-2	Describe important characteristics of distributed systems and the salient architectural features of such systems
CO-3	Gaining practical experience of inter-process communication in a distributed environment
CO-4	Describe the features and applications of important standard protocols which are used in distributed systems.

Course Code:	
Course Title:	**MANAGEMENT SCIENCE**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	After completion of the Course the student will acquire the knowledge on management functions, global leadership and organizational behavior.
CO-2	Will familiarize with the concepts of functional management project management and strategic management.

Course Code:	
Course Title:	**MACHINE LEARNING**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	Recognize the characteristics of machine learning that make it useful to real-world Problems.

CO-2	Characterize machine learning algorithms as supervised, semi-supervised, and Unsupervised.
CO-3	Have heard of a few machine learning toolboxes
CO-4	Be able to use support vector machines.
CO-5	Be able to use regularized regression algorithms.
CO-6	Understand the concept behind neural networks for learning non-linear functions.

Course Code:	
Course Title:	**OPERATION RESEARCH**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	Methodology of Operations Research.
CO-2	Linear programming: solving methods, duality, and sensitivity analysis.
CO-3	Integer Programming.
CO-4	Game theory Dynamic programming**.**
CO-5	Decision making under uncertainty and risk.
CO-6	Multi-criteria decision techniques.

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M.Tech (Computer Science Technology)

Program Specific Outcomes:

1. **To apply the knowledge knowledge** obtained obtained through through rigorous analysis of algorithms for advancing the broad area of computer science and engineering.

2. **To bring forth the creative zeal** and work efficiently in designing the solution to various software and hardware problems by using state of the art tools.

3. **To assimilate professional ethics**, managerial skills and to officiate effectively as a leader in a team to manage diverse projects.

Program Outcomes:

1. **Engineering knowledge:** An ability to apply knowledge of Mathematics (including Probability & Statistics and Mathematical Foundation of Computer Science), Science, and Engineering.

2. **Problem analysis**: An ability to design and conduct experiments, as well as to analyze and interpret data including hardware and software components

3. **Design / development of solutions**: An ability to design a complex computing system or process to meet desired specifications and needs.

4. **Conduct investigations of complex problems**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

5. **Modern tool usage:** An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice

6. **The Engineer and Society**: Apply cyber laws and copyright policies to assess societal health, safety, legal and cultural issues.

7**. Environment and Sustainability**: The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental and demonstrate the knowledge need for sustainable development.

8. **Ethics** Apply and commit Professional Ethics to satisfy the norms of the engineering practice.

9. **Individual and team work** An ability to function on multi-disciplinary teams..

10. **Communication** An ability to communicate and present effectively

11. **Project Management and Finance** An ability to use the modern engineering tools, techniques, skills and management principles to do work as a member and leader in a team, to manage projects in multidisciplinary environments.

12. **Life-long Learning** A recognition of the need for, and an ability to engage in, to resolve contemporary issues and acquire lifelong learning.

COURSE OUTCOMES

SEMESTER I:

Course Code:	MTCSE1101
Course Title:	**Mathematical Foundations of Computer Science**
Theory / Lab:	THEORY
Course Outcomes:	
CO-1	• To understand the basic notions of discrete and continuous probability
CO-2	• To understand the methods of statistical inference, and the role that sampling distributions play in those methods.
CO-3	• To be able to perform correct and meaningful statistical analyses of simple to moderate complexity.

Course Code:	MTCSE1102
Course Title:	**Advanced Data Structures**
Theory / Lab:	THEORY
Course Outcomes:	
CO-1	• Understand the implementation of symbol table using hashing techniques
CO-2	• Develop and analyze algorithms for red-black trees, B-trees and Splay trees.

CO-3	• Develop algorithms for text processing applications.
CO-4	• Identify suitable data structures and develop algorithms for computational geometry problems.

Course Code:	MTCST11XX
Course Title:	**Cloud Computing**
Theory / Lab:	THEORY
Course Outcomes:	
CO-1	Articulate the main concepts, key technologies, strengths, and limitations of cloud computing and the possible applications for state-of-the-art cloud computing
CO-2	Identify the architecture and infrastructure of cloud computing, including SaaS, PaaS, IaaS, public cloud, private cloud, hybrid cloud, etc.
CO-3	Explain the core issues of cloud computing such as security, privacy, and interoperability.
CO-4	Provide the appropriate cloud computing solutions and recommendations according to the applications used.
CO-5	Collaboratively research and write a research paper, and present the research online.

Course Code:	MTCST11YY
Course Title:	**Big Data Analytics**
Theory / Lab:	THEORY
Course Outcomes:	
CO-1	Understand the programming requirements viz., generic types and methods to perform data analysis
CO-2	Understand the existing technologies and the need of distributed files systems to analyze the big data
CO-3	To understand and analyze Map-Reduce programming model for better optimization
CO-4	Collect, manage, store, query, and analyze big data; and identify the need of interfaces to perform I/O operations in Hadoop
CO-5	Identify the need based tools, viz., Pig and Hive and to handle
CO-6	Formulate an effective strategy to implement a successful Data analytics project

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SEMESTER II:

Course Code:	
Course Title:	**Advanced Algorithms**
Theory / Lab:	THEORY
Course Outcomes:	
CO-1	Analyze the complexity/performance of different algorithms
CO-2	Determine the appropriate data structure for solving a particular set of problems.
CO-3	Categorize the different problems in various classes according to their complexity
CO-4	Students should have an insight of recent activities in the field of the advanced data structure.

Course Code:	
Course Title:	**Machine Learning**
Theory / Lab:	THEORY
Course Outcomes:	
CO-1	Recognize the characteristics of machine learning algorithms and their applications to real world problems
CO-2	Able to write and evaluate hypothesis
CO-3	Apply kernel methods to solve real world problems.

Course Code:	

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Course Title:	**Internet of Things**
Theory / Lab:	THEORY
Course Outcomes:	
CO-1	Summarize on the term 'internet of things' in different contexts.
CO-2	Analyze various protocols for IoT.
CO-3	Design a PoC of an IoT system using Rasperry Pi/Arduino
CO-4	Apply data analytics and use cloud offerings related to IoT.
CO-5	Analyze applications of IoT in real time scenario

Course Code:	
Course Title:	**Object Oriented Software Engineering**
Theory / Lab:	THEORY
Course Outcomes:	
CO-1	Apply object-oriented programming principles to real-time problems..
CO-2	Analyze of a formally specified problem statement with respect to its accuracy and completeness, to effective testing of the software product.
CO-3	Examine the specialised knowledge, skill and judgement needed to develop complex software by formulating relevant responses at each stage of the software development life-cycle.
CO-4	Produce appropriate documentation accurately and to a professional standard.
CO-5	Apply skills relevant for academic progression and career development within the sector.

Course Code:	
Course Title:	**Advance Algorithms Lab**
Theory / Lab:	LAB
Course Outcomes:	

CO-1	Identify classes, objects, members of a class and relationships among them needed for a specific problem.
CO-2	Examine algorithms performance using Prior analysis and asymptotic notations.
CO-3	Organize and apply to solve the complex problems using advanced data structures (like arrays, stacks, queues, linked lists, graphs and trees.)
CO-4	Apply and analyze functions of Dictionary

Course Code:	
Course Title:	**Machine Learning Lab**
Theory / Lab:	LAB
Course Outcomes:	
CO-1	Implement procedures for the machine learning algorithms
CO-2	Apply appropriate data sets to the Machine Learning algorithms
CO-3	Identify and apply Machine Learning algorithms to solve real world problems
CO-4	Design Python programs for various Learning algorithms

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Department of Management Studies

MBA

Program Specific Outcomes:

A graduate will have

1. An ability to apply knowledge, skills and right attitude necessary to provide effective leadership in a global environment.
2. An ability to develop competent management professionals with strong ethical values, capable of assuming a pivotal role in various sectors of the Indian Economy & Society, aligned with the national priorities.
3. An ability to develop proactive thinking so as to perform effectively in the dynamic socio-economic and business ecosystem.
4. An ability to communicate effectively.

Program Outcomes:

1. Communicate effectively in a variety of formats
2. Identify the key issues facing a business or business subdivision
3. Utilize qualitative and quantitative methods to investigate and solve critical business problems
4. Integrate tools and concepts from multiple functional areas (i.e. finance, marketing, operations, etc.) to solve business problems
5. Evaluate and integrate ethical considerations when making business decisions
6. Incorporate diversity and multicultural perspectives when making business decisions

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COURSE OUTCOMES

SEMESTER I:

Course Code:	C-101
Course Title:	**Management and Organizational Behavior**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	Able to relate the different aspects of the human behavior to the individual, group & organizational perspectives of the workplace.
CO-2	Able to apply the frameworks & tools effectively to analyze & approach various Organizational situations.
CO-3	Able to modify their own beliefs, assumptions, and behaviors with respect to how individuals, groups and organizations act in order to expand the options of approaches and increase the own effectiveness.

Course Code:	C-102
Course Title:	**Managerial Economics**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	Understand tools and techniques of managerial economics to enable them to appreciate its relevance in decision making.
CO-2	Explore the economics of information and network industries
CO-3	Understand how economics affect the business strategy of companies in these industries
CO-4	Develop economic way of thinking in dealing with practical business

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Course Code:	C-103
Course Title:	**Accounting for Managers**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	Understand the basic concepts of financial accounting, cost accounting and management accounting in students
CO-2	Make use of various tools of accounting for analyze business situation and take decision
CO-3	Able to analyze the business financial position

Course Code:	C-104
Course Title:	**Quantitative Analysis for Business Decisions**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	Relate the concept and process of business research in business environment.
CO-2	Familiar to the use of tools and techniques for exploratory, conclusive and causal research.
CO-3	Apply concept of measurement in empirical systems.
CO-4	Interpret the result of statistical techniques for analysis of research data

Course Code:	C-105
Course Title:	**Legal and Business Environment**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	Acquaint with the general business law issues to become more informed, sensitive and effective business leaders.
CO-2	Understand fundamental legal issues pertaining to the business world to enhance their ability to manage businesses effectively.

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Course Code:	C-106
Course Title:	**Business Communication and Soft skills**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	Understand fundamentals of communication and able to use concept in day to day world
CO-2	Demonstrate necessary skills to handle day-to-day managerial responsibilities, such as - making speeches, controlling one-to-one

Course Code:	C-107
Course Title:	**Cross Cultural Management**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	Able to interact with people of different cultures than their own.
CO-2	Able to interact with people of different cultures of international business
CO-3	Able to practicing managers to be effective global managers
CO-4	Familiarize with the cross –cultural behavior and its management for successful operations of the international firms

Course Code:	C-108
Course Title:	**Business Communication and Soft skills Lab**
Theory / Lab:	LAB
Course Outcomes:	
CO-1	Understand fundamentals of communication and able to use concept in day to day world
CO-2	Demonstrate necessary skills to handle day-to-day managerial responsibilities, such as - making speeches, controlling one-to-one communication, enriching group activities and processes, giving effective presentations, writing letters, memos, minutes, reports and advertising, and maintaining one's poise in private and in public.
CO-3	Build confidence and to enhance competitiveness by projecting a positive image of themselves and of their future.

Course Code:	C-109
Course Title:	**Information Technology – Lab1 (Spreadsheet and Tally)**
Theory / Lab:	LAB
Course Outcomes:	
CO-1	Get familiarize with basic to intermediate skills for using Excel in the classroom vis-à-vis Business Applications
CO-2	Hands on experience on MS Excel Utilities
CO-3	Create solutions for Data Management and Reporting
CO-4	Hands on experience on TallyUtilities

SEMESTER II:

Course Code:	C-201
Course Title:	**Financial Management**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	Understand various concepts related to financial management.
CO-2	Able to use various tools and techniques in the area of finance
CO-3	Develop analytical skills this which facilitate the decision making in Business situations.

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Course Code:	C-202
Course Title:	**Human Resource Management**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	Demonstrate the role of HRM in an organization
CO-2	Utilize the knowledge to gain competitive advantage through people
CO-3	Develop and Design HRM system

Course Code:	C-203
Course Title:	**Marketing Management**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	Relate Marketing Mix as a framework for Marketing Decision making.
CO-2	Understand the need, importance and process of Marketing Planning and Control.
CO-3	Learn and examine the students to the dynamic nature of Marketing Function.
CO-4	Acquire an understanding of fundamental concepts of Marketing.

Course Code:	C-204
Course Title:	**Operations Management**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	Make the student understand the ways of managing risk in Operations Management
CO-2	Introduce various Environmental, Ethical and Technological issues in Operations Management
CO-3	acquaint them with application of discipline to deal with real life business problem.

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Course Code:	C-205
Course Title:	**Business Research Methods**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	Relate the concept and process of business research in business environment.
CO-2	Familiar to the use of tools and techniques for exploratory, conclusive and causal research.
CO-3	Apply concept of measurement in empirical systems.
CO-4	Interpret the result of statistical techniques for analysis of research data

Course Code:	C-206
Course Title:	**Technology Management**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	Understand fundamental technological issues pertaining to the business world to enhance their ability to manage businesses effectively.
CO-2	Able to understand the role of the technology.
CO-3	Equip the role of appropriate business process and technology management capabilities in managing

Course Code:	C-207
Course Title:	**IT Lab 2 (Programming R)**
Theory / Lab:	LAB
Course Outcomes:	
CO-1	Use R for statistical programming, computation, graphics, and modeling,
CO-2	Write functions and use R in an efficient way

CO-3	Fit some basic types of statistical models
CO-4	Use R in their own research,
CO-5	Be able to expand their knowledge of R on their own.

SEMESTER III:

Course Code:	
Course Title:	**STRATEGIC MANAGEMENT**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	Explore participants to various perspectives and concepts in the field of Strategic Management
CO-2	Develop skills for applying these concepts to the solution of business problems
CO-3	Create mastery in analytical tools of strategic management
CO-4	Students will demonstrate a clear understanding of the concepts, tools & techniques used by executives in developing and executing strategies and will appreciate its integrative and interdisciplinary nature
CO-5	Students will be able to demonstrate effective application of concepts, tools & techniques to practical situations for diagnosing and solving organisational problems.
CO-6	Students will be able to demonstrate capability of making their own decisions in dynamic business landscape.

Course Code:	
Course Title:	**LEGAL ASPECTS OF BUSINESS**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	Students will able to appreciate the importance of law and legal institutions in business
CO-2	Students will able to have a basic understanding of the laws relating to Indian contract act, 1872, essentials of contract, discharge of contract, breach of contact.
CO-3	Students will be able to understand the Sale of Goods act, Consumer protection act, 1986,

	Information Technology act , 2000
CO-4	Students will be able to understand the importance of Contract of agency, right of agents and principals, Negotioable Instruments act, 1881
CO-5	Students will be understand the concept of Indian Partnership act, 1932, types of partners, dissolution of partnership firm
CO-6	Students will be understand the Companies act, 1956 , types, formation of companies, memorandum of accociation, articles of association, duties of directors, winging up of company

Course Code:	
Course Title:	**BUSINESS ETHICS AND CORPORATE GOVERNANCE**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	Students will be able to understand the business ethics.
CO-2	The student will be able to Analyze corporate social Responsibility.
CO-3	The student will be able to analyze various ethical codes in corporate governance
CO-4	Stundent will be able to Analyze the Employees conditions and Business Ethics
CO-5	Understand the importance of ethics and CSR in the day-to-day working of organizations
CO-6	Learn scope of business ethics in Compliance, finance, Human resources, marketing, and production

Course Code:	
Course Title:	**LEADERSHIP MANAGEMENT**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	Understand how current technologies can be used to communicate effectively in professional environments.
CO-2	Be able to apply theories of leadership to create an effective team environment in the workplace.
CO-3	Have a broad understanding of effective leadership roles and strategies and be able to apply them in a variety of professional, personal, and civic environments.

CO-4	Be able to demonstrate the ability to understand and apply communication theory in order to effect appropriate change in a variety of leadership settings.
CO-5	Be able to gather, assess, and use information to make informed and well-reasoned decisions.
CO-6	Strengthen and deepen the leadership experience and expand Center for Leadership for Emerging Leaders.

Course Code:	
Course Title:	**COMPENSATION AND REWARD MANAGEMENT**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	Student will have awareness on Factors influencing Compensation, Managing compensation: designing a compensation system, Internal and external equity and the new trends in compensation management at national and international level
CO-2	Student will have understanding of job evaluation methods and compensation system.
CO-3	Student will have knowledge on wage and salary administration.
CO-4	Student will be understanding Role of various departments, Wage analysis, Cost accounting
CO-5	Student will have much awareness on Pay Structure and Tax Planning

Course Code:	
Course Title:	**PERFORMANCE MANAGEMENT**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	To identify leadership behaviours that foster a high performance culture
CO-2	To provide effective and regular feedback
CO-3	To set clear expectations that improve performance
CO-4	To demonstrate and understand the performance management process
CO-5	To examine the role of managers in the implementation and success of performance management systems and processes

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Course Code:	
Course Title:	**STRATEGIC HUMAN RESOURCE MANAGEMENT**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	Apply critical thinking skills in analysing theoretical and applied perspectives of strategic HRM and ER
CO-2	Analyse problems and develop managerial solutions to employment relations problems at both national and workplace level.
CO-3	Demonstrate the application of problem solving and evaluation skills in HRM and ER through exercises and case study work
CO-4	Communicate knowledge of SHRM and employment relations in both written and verbal formats reactive to both audience and purpose.
CO-5	Investigate and communicate the professional values of HRM including the ethical problems inherent in HRM and ER professional roles, including managers and consultants

Course Code:	
Course Title:	**SECURITY ANALYSIS AND PORTFOLIO MANAGEMENT**
Theory / Lab:	
Course Outcomes:	
CO-1	Describe the basic characteristics investment and its types
CO-2	Understand the risk and return concept and valuation of securities
CO-3	Analyze securities by using various tools and technique
CO-4	Student able to understand the Portfolio Managment Techniques
CO-5	Apply theories and practices of portfolio management and create optimal portfolios using
CO-6	Students understand the Portfolio Management Evaluation, Performance and Control

Course Code:	
Course Title:	**BANKING AND INSURANCE MANAGEMENT**
Theory / Lab:	Theory

Course Outcomes:	
CO-1	To understand the risks faced by banks and ways to overcome them
CO-2	To understand the difference between life and non life insurance
CO-3	To understand and how to choose life insurance policies based on their needs
CO-4	To know and understand the various services offered and various risks faced by banks.
CO-5	To understand various principles, provisions that govern the life general insurance contracts.

Course Code:	
Course Title:	**ADVANCED MANAGEMENT ACCOUNTING**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	Acquaintance with the basic concept of finance, cost accounting & financial management.
CO-2	Preparation & financial analysis of financial statement.
CO-3	Analyze financial data & develop critical thinking skills to manage the finance of an organization.
CO-4	Student know the cash flow and funds flow aspects
CO-5	Students ability to understand Management Accounting Tools and Techniques
CO-6	Students shuold learn advanced management accounting decisions

Course Code:	
Course Title:	**STRATEGIC FINANCIAL MANAGEMENT**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	Stduents will be able to contribute more effectively to corporate strategy by taking strategic decisions
CO-2	Students will be able to implement corporate financial strategies, EBIT- EPS analysis and dividend decisions.
CO-3	Students will be able understand the corporate investment techniques usingRisk Adjusted NPV, Risk Adjusted IRR, Capital Rationing and Decision Tree approach
CO-4	Students will be able to understand the concept of merger strategy, theories of mergers, dilution effect of merger and EPS.

CO-5	Students will be able to understand the corporate restructuing strategies, takeover strategies and takeover regulations.
CO-6	Students will be able understand the concept of evaluation of leasing Vs borrowing decisions.

Course Code:	
Course Title:	**CONSUMER BEHAVIOR**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	To identify the major influences in consumer behavior
CO-2	To establish the relevance of consumer behavior theories and concepts of marketing decisions
CO-3	To implement appropriate combination of theories and concepts
CO-4	Recognise social and ethical implications of marketing actions on consumer behavior
CO-5	Use most appropriate techniques to apply market solutions

Course Code:	
Course Title:	**RETAIL MANAGEMENT**
Theory / Lab:	
Course Outcomes:	
CO-1	to know about the retail industry importance and environmental issues
CO-2	to identify the retail marketing segmentations
CO-3	to study the importance of retail store location and layout
CO-4	to observe the significance of customerrelationship management in retail industry
CO-5	to focus on intetnational retail opportunities and benefits of going global

Course Code:	
Course Title:	**CUSTOMER RELATIONSHIP MANAGEMENT**
Theory / Lab:	

Course Outcomes:	
CO-1	Students will able to understanding of the importance of CRM, Processes and systems.
CO-2	Students will able to understanding of, how to maintain relationship with suppliers and implementations of strategies
CO-3	Students will be able to understand of the value of customer knowledge and Influence of the channels on pricing and the formation of relationships.
CO-4	Students will be able to understanding and Analyze the size of customer database, Data analysis and data mining, customer value assessment, Customer Retention strategies
CO-5	Students will able to understand the Call center Management, internet and the websites, traffic building and Causes for disappointing CRM results.

Course Code:	
Course Title:	**STRATEGIC MARKETING MANAGEMENT**
Theory / Lab:	
Course Outcomes:	
CO-1	Explain theories and concepts related to marketing management.
CO-2	Apply specific marketing management theories and concepts.
CO-3	Develop, implement and evaluate marketing management strategies.
CO-4	Communicate orally and in written contexts.

SEMESTER IV:

Course Code:	
Course Title:	**LOGISTICS AND SUPPLY CHAIN MANAGEMENT**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	To identify and analyse business models, business strategies and corresponding competitive advantage
CO-2	To formulate and implement warehouse best practices and strategies
CO-3	Plan warehouse logistics operations for optimum utilisation of resources
CO-4	To understand how warehouse management, and other functions in logistics fits into

	logistics and supply chain management
CO-5	To understand how managers take decisions-strategic, tactical and operations and how they are taken in to warehouse management functional area.
Course Code:	
Course Title:	**ENTREPRENEURSHIP DEVELOPMENT**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	Understand entrepreneurial process by way of studying different case studies and find exceptions to the process model of entrepreneurship
CO-2	Run a small enterprise with small capital for a short period and experience the science and art of doing business.
CO-3	Learn how to start an enterprise and design business plans those are suitable for funding by considering all dimensions of business.
CO-4	Know the parameters to assess opportunities and constraints for new business ideas
CO-5	Understand the systematic process to select and screen a business idea
CO-6	Design strategies for successful implementation of ideas
Course Code:	
Course Title:	**ORGANIZATIONAL DEVELOPMENT & CHANGE MANAGEMENT**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	Provide with an opportunity to become familiar with the basic theories of “change management,”
CO-2	Develop an awareness and fundamental knowledge of the need for change, why organizations change or fail to change, and how to plan for, manage and measure change
CO-3	Develop an awareness of the leadership issues and role of the leader in organizational change
CO-4	Help further develop and expand students critical thinking and analytical skills.
CO-5	Gaining knowledge about organizational development process
CO-6	Better understanding of change resistance and how to handle it.

Course Code:	
Course Title:	**Global HRM**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	To develop the understanding of the concept of human resource management and to understand its relevance in organizations.
CO-2	To develop necessary skill set for application of various HR issues.
CO-3	To analyse the strategic issues and strategies required to select and develop manpower resources.
CO-4	To integrate the knowledge of HR concepts to take correct business decisions.
CO-5	Integrated perspective on role of HRM in modern business. Ability to plan human resources and implement techniques of job design
CO-6	Ability to handle employee issues and evaluate the new trends in HRM
Course Code:	
Course Title:	**LABOR WELFARE & LEGISLATION**
Theory / Lab:	
Course Outcomes:	
CO-1	Students will able to understanding of the welfare legislation relating to Factories Act 1948, Mines Act 1952, Plantation Labour Act 1951, Contract Labour (Regulation and Abolition) Act 1970 and A.P.Shops and Establishments Act.
Course Code:	
Course Title:	**MANAGEMENT OF INDUSTRIAL RELATIONS**
Theory / Lab:	
Course Outcomes:	
CO-1	Students should able to elaborate the concept of Industrial Relations.
CO-2	The students should able to illustrate the role of trade union in the industrial setup.
CO-3	Students should able to outline the important causes & impact of industrial disputes.
CO-4	Students should able to elaborate Industrial Dispute settlement procedures

Course Code:	
Course Title:	**FINANCIAL MARKETS AND SERVICES**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	Students will be able to understand the role and functions of financial system.
CO-2	Stduents will ble able understand the concept of financial services, and growth of financial services and understanding ther cvonpcet of merchangt banking.
CO-3	Students will be able to understand the concpe of venture capital and its financing pattern
CO-4	Students will be able to implement the decision on leasing Vs borrowing options
CO-5	Students will be evaluate the credit rating system and understand the concepts of factoring, forfeiting and bill discounting concepts
CO-6	Students will be able to evaluate the investment strategies of mutual funds and understand the concept of NSDL and CSDL.

Course Code:	
Course Title:	**GLOBAL FINANCIAL MANAGEMENT**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	Students will be able to analyse and evaluate the information withing the global financial environment
CO-2	Students will ble able to identify market conventions on exchange rate quotations
CO-3	Students will be able demonstrate an intergrative understanding of the foreign exchange market and the relationship between interest rates, spot and forward rates.
CO-4	Students will be able to understand the inter5national investment decisions
CO-5	Students will be able to understand the external financial resources of multinational corporations
CO-6	Students will be able to understand the concept of global indebtness, external debt crisis and challenges faced by MNCs.

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Estd: 2008

BABA INSTITUTE OF TECHNOLOGY AND SCIENCES

(Approved by AICTE New Delhi, NAAC Accredited, Affiliated to JNTU Kakinada, *ISO 9001-2008 Certified*)
Bakkannapalem Village, Madhurawada Post, Visakhapatnam – 530 048

Course Title:	**RISK MANAGEMENT**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	To know the importance of Risk Management To overcoming the Risk Management problems
CO-2	To create an idea of importance of Risk Management
CO-3	To understand Techniques and Practical Applications of RM Importance of Risk Management issues
CO-4	To understand the Risk Management KMV model Students to know Applications of Black Scholes model and its practical learning
CO-5	To understand the Risk Management practical decision making
CO-6	To learned practical Application of Risk Management Tools
Course Code:	
Course Title:	**TAX MANAGEMENT**
Theory / Lab:	Theory
Course Outcomes:	
CO-1	To understand the tax structure of India To create an idea about direct tax and Indirect tax
CO-2	Students ability to file a Income Tax return Ability to file a Income tax return
CO-3	To understand file various types of income tax returns To know the various forms of income tax returns
CO-4	To understand International Taxations structure To know, how to made tax administrations
CO-5	Student should have an idea about Tax Audit and Tax Accounting
CO-6	Student should understand the Tax audit aspects
Course Code:	
Course Title:	**SERVICES MARKETING**
Theory / Lab:	

Course Outcomes:	
CO-1	Demonstrate an extended understanding of the similarities and differences in service-based and physical product based marketing activities
CO-2	Demonstrate a knowledge of the extended marketing mix for services
CO-3	Develop and justify marketing planning and control systems appropriate to service-based activities
CO-4	Specify, analyse and select markets for specific service products
Course Code:	
Course Title:	**PROMOTIONAL AND DISTRIBUTION MANAGEMENT**
Theory / Lab:	
Course Outcomes:	
CO-1	Understand the importance of promotion and distribution function in the entire chain of marketing
CO-2	Apply the concepts of public relations, sales management and physical distribution in business.
CO-3	Know on the concepts of retail management, supply chain management and virtual marketing.
Course Code:	
Course Title:	**GLOBAL MARKETING MANAGEMENT**
Theory / Lab:	
Course Outcomes:	
CO-1	the marketing principles that together constitute the field of study known as international marketing;
CO-2	the steps and processes involved in planning market entry strategy of a firm into a foreign market:
CO-3	the modifications that need to be made to the marketing mix variables need so as to cater to the multitude of differences that the firm will face when going into the offshore market;
Course Code:	
Course Title:	**SUPPLY CHAIN MANAGEMENT**

Theory / Lab:	
Course Outcomes:	
CO-1	Students will able to understanding of the objectives and managing technical challenges of supply chain management
CO-2	Students will able to have a basic Purchasing Issues, Operations and Distribution issues and Domestic and International Transportation Management in supply chain management
CO-3	Students will be able to understand of the role and key tools and Customer Service Capabilities Designing and Implementing Successful CRM
CO-4	Analyze and Sustaining Competitive Advantage in supply chain management in the market.
CO-5	Students will able understand the Methods of entry into Foreign Markets, Currency of Payments and Managing Transaction Risk- International Commercial Documents. In international supply chain management