



MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

R15 COURSE OUTCOMES

DEPARTMENT OF HUMANITIES & SCIENCES

I B.Tech – I Sem SUBJECTS COURSE OUTCOMES

(R15A0001) ENGLISH

- Write formal or informal letters and applications for different purposes.
- Select and extract relevant information through skimming and scanning.
- Utilize the strategy of brainstorming in preparing analytical, argumentative and expository essays.
- Draft concise emails following professional email etiquette.
- Enhance their grammatical competency by spotting errors

(R15A0021) MATHEMATICS – I

- After learning the contents of this Unit the student is able to write the matrix representation of a set of linear equations and to analyze solutions of system of equations.
- The student will be able to understand the methods of differential calculus to optimize single and multivariable functions.
- The student is able to identify the type of differential equation and uses the tight method to solve the differential equations. Also able to apply the theory of differential equations to the real world problems.
- The student is able to solve certain differential equations using Laplace Transform. Also able to transform functions on time domain to frequency domain using Laplace transforms.

(R15A0011) ENGINEERING PHYSICS-I

- The students would be able to learn the fundamental concepts of wave optics.
- The knowledge on fundamentals of quantum mechanics, statistical mechanics enables the student to apply to various systems like communications solar cells, LED's and so on.
- Finally, Engineering physics course helps the student to develop problem solving skills and analytical, practical skills

(R15A0013) ENGINEERING CHEMISTRY

- Familiarize the student with the fundamentals of the treatment technologies and the considerations for its design and implementation in water treatment plants.

- Understand the operating principles of various types of electrochemical cells, including fuel cells and batteries. Analyze and develop a technically sound, economic and sustainable solution to corrosion problems related to engineering service.
- Recently modern materials synthesized find applications in industry and creating instruments for solving problems of electronics, telecommunications, health care, agriculture, and technology etc., In order to emphasize the above the topics like composite materials, polymers, conducting polymers and nanomaterials have been incorporated in the curriculum.

(R15A0501) COMPUTER PROGRAMMING WITH C

- Demonstrate the basic knowledge of computer hardware and Software.
- Ability to apply solving and logical skills to programming in C language and also in other languages.

(R15A0301) ENGINEERING DRAWING

- Student's ability to convert sketches to engineered drawings will increase.
- Students will be able to draw orthographic projections and sections.
- Student's ability to perform basic sketching techniques will improve
- Analyze different angle of projections and will be able to gain on planes, solids like pyramid, frustum etc
- Understand the logic behind design and development of projections to apply appropriate technique resources and modern engineering and IT tools

(R15A0301) ENGINEERING MECHANICS

- Sketching free body diagrams and determine the resultant of forces and/or moments.
- Apply laws of mechanics to determine efficiency of simple machines with consideration of friction.
- Determine centroid and centre of gravity for various objects and bodies
- Analyze moment of inertia and mass moment of inertia
- Analyze kinetics and kinematics of a particle

(R15A0581) COMPUTER PROGRAMMING LAB

Understand the basic concept of C Programming, and its different modules that includes conditional and looping expressions, Arrays, Strings, Functions, Pointers, Structures and File programming

- Acquire knowledge about the basic concept of writing a program.
- Understand the Role of constants, variables, identifiers, operators, type conversion and other building blocks of C Language.
- Learn how to use of conditional expressions and looping statements to solve problems associated with conditions and repetitions.
- Understand the Role of Functions involving the idea of modularity.
- Understand the Concept of Array and pointers dealing with memory management.
- Learn Structures and unions through which derived data types can be formed
- Learn File Handling for permanent storage of data or record.

- Learn the Programming using gcc compiler in Linux.

(R15A0083) ENGINEERING PHYSICS / ENGINEERING CHEMISTRY LAB

The student is expected to learn from this laboratory course the concept of error and its analysis. It also allows the student to develop experimental skills to design new experiments in Engineering.

With the exposure to these experiments the student can compare the theory and correlate with experiment.

(R15A0081) ENGLISH LANGUAGE COMMUNICATION SKILLS LAB

- Better Understanding of nuances of language through audio-visual experience and group activities.
- Neutralization of accent for intelligibility
- Speaking with clarity and confidence thereby enhancing employability skills of the students.

I B.TECH II SEM

(R15A0002) PROFESSIONAL ENGLISH

- Usage of English Language, written and spoken.
- Enrichment of comprehension and fluency.
- Gaining confidence in using language in verbal situations.

(R15A0022) MATHEMATICS-II

- From a given discrete data, one will be able to predict the value of the data at an intermediate point and by curve fitting, one can find the most appropriate formula for a guesses relation of the data variables. This method of analysis data helps engineers to understand the system for better interpretation and decision making.
- The student will be able to find a root of a given equation and will be able to find a numerical solution for a given differential equation. Helps in describing the system by an ODE, if possible. Also, suggests to find the solution as a first approximation.
- One will be able to find the expansion of a given function by Fourier series.
- After studying this unit, one will be able to find a corresponding Partial Differential Equation for an unknown function with many independent variables and to find their solution.
- The student will be able to evaluate multiple integrals(line, surface volume integrals) and convert line integrals to area integrals and surface integrals to volume integrals.

(R15A0012) ENGINEERING PHYSICS-II

- The students would be able to learn the fundamental concepts on behavior of crystalline solids.
- The student will be able to think about the applications of dielectric, magnetic and nano materials.
- Finally Engineering physics course help the student to develop problem solving

skills and analytical skills.

(R15A0502) OBJECT ORIENTED PROGRAMMING

- Understand the concepts of object oriented and generic programming.
- Differentiate between object oriented programming and procedural programming.
- Design applications using object oriented features
- Understand to implement object oriented concepts

(R15A0201) ELECTRICAL CIRCUITS

- After going through this course the student gets a thorough knowledge on basics of network and circuit concepts, circuit elements, network analysis, single phase AC circuits, network theorems, transformers with which he/she can able to apply the above conceptual things to real-world problems and applications.

(R15A0014) ENVIRONMENTAL STUDIES

- Based on this course, the Engineering graduate will understand /evaluate / develop technologies on the basis of Ecological principles and environmental regulations which in turn helps in sustainable development.

(R15A0582) OBJECT ORIENTED PROGRAMMING LAB

- Able to analyze the necessity for Object Oriented Programming paradigm and over structured programming and become familiar with the fundamental concepts in OOP.

(R15A0084) IT WORKSHOP LAB / ENGINEERING WORKSHOP

- Apply knowledge for computer assembling and software installation
- Ability how to solve the trouble shooting problems.
- Apply the tools for preparation of PPT, Documentation and budget sheet etc.

(R15A0082) ENGLISH LANGUAGE COMMUNICATION SKILLS LAB-2

- Better Understanding of nuances of language through audio-visual experience and group activities.
- Neutralization of accent for intelligibility
- Speaking with clarity and confidence thereby enhancing employability skills of the students.

(R15A0003) HUMAN VALUES AND SOCIETAL PERSPECTIVES

- Understand the essential complementarily between 'VALUES' and skills' to ensure sustained happiness and prosperity which are the core aspirations of all human beings.
- Learn the development of a Holistic perspective among students towards life, profession and happiness, based on a correct understanding of the Human reality and the rest of Existence. Such a holistic perspective form the basis of Value based living in a natural way.
- Learn implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually satisfying human behavior and

mutually enriching interaction with Nature.

DEPARTMENT OF AERONAUTICAL ENGINEERING
Course Outcomes
R15

II YEAR I SEM R15

MECHANICS OF FLUIDS	
CO No.	STATEMENTS
1	To introduce and explain about fundamentals of Fluid Mechanics, which makes the student ready to understand about the applications of Aerodynamics, Hydraulics, Gas dynamics etc.
2	To give fundamental knowledge of fluid, its properties and behavior under various conditions of internal and external flows.
3	To develop understanding about hydrostatic law, and application of mass, momentum and energy equation in fluid flow
4	Assess the fluid flow and flow parameters using measuring devices.
5	To make students understand about dimensional analysis and similitude. With which Students can able to create models for experimental analysis.

MECHANICS OF SOLIDS	
CO No.	STATEMENTS
1	Understand the fundamental concepts of stress and strain in materials
2	Knowledge of beams and analysis of Shear Force and Bending moments
3	Apply the basic concepts to find the shear stress distribution and deflection in simply supported and Cantilever beam
4	Analysis of Elastic stability in columns under loading conditions
5	Knowledge on failure theories and factor of safety

THERMODYNAMICS	
CO No.	STATEMENTS
1	Basic concepts can be applied by the students
2	To apply the knowledge of mathematics, science and engineering fundamentals to model the energy conversion phenomenon
3	Students can correlate cycles applicable for engines.
4	To investigate the effectiveness of energy conversion process in mechanical power generation for the benefit of mankind
5	Students should be able to analyze the relationship between various processes and working mechanisms of the engines.

AIRCRAFT PRODUCTION TECHNOLOGY	
CO No.	STATEMENTS
1	Acquire a knowledge of various manufacturing methods and the techniques involved in joining and forming process performed in aircraft industry.
2	Able to understand the various advancements in the machining process and the working principle of the equipment
3	understand the importance and process involved in unconventional machining process

4	Acquire a knowledge on material processing of various metal and alloys and also the techniques for improvement of their mechanical and physical properties.
5	Understand the various Assembly stages, Tools and equipment and inspection techniques used aircraft Assembly

AIRCRAFT ENGINEERING DRAWING	
CO No.	STATEMENTS
1	Ability to understand and apply the knowledge of machine drawing as a system of communication
2	Develop detailed drawings of machines parts from assembly drawing
3	Ability to get exposed to existing national standards related to technical drawings
4	Ability to evaluate external and internal details of the machine component from which it can be manufactured
5	Ability to model assembly drawings of aircraft components

MANAGERIAL ECONOMICS AND FINANCIAL ACCOUNTANCY	
CO No.	STATEMENTS
1	Understand the role of economics and financial analysis in business development
2	Carry out financial analysis of R&D projects to establish their sustainability
3	Develop strategies for designing and marketing of new products as part of business development
4	Develop forecasting models for predicting technological changes and to identify market needs
5	Identify different modes of technology transfer and pricing of the technology transfer

CAD LAB	
CO No.	STATEMENTS
1	Knowledge of various softwares available for engineering purpose.
2	Learning the basics of AutoCAD software
3	Application of various commands in AutoCAD to draw orthographic and isometric figures
4	Learning procedure to draw 3D figures by using AutoCAD
5	Learning different operations like threading, sweep and swept blend and implementation in modeling various components by using CREO software

MOS AND MOF LAB	
CO No.	STATEMENTS
1	Analyze various strength of materials through characterization
2	Understand various characterization methods depending on the type of loading
3	Prove good understanding of concepts and their applications in the laboratory

4	Demonstrate practical understanding of friction losses in internal flows.
5	Demonstrate the ability to work in groups on small design projects that are appropriate to the course

FOREIGN LANGUAGE (GERMAN)	
CO No.	STATEMENTS
1	Students familiarize with a modern foreign language – German
2	The students with German get acquainted for basic communication in everyday situations.
3	Students will know with the basics of writing simple direct sentences and short compositions.
4	Students get to know the basics of German language to communicate in the work place when they find the necessity.
5	Students will attain creative speaking skills

II YEAR II SEM

AEROSPACE PROPULSION	
CO No.	STATEMENTS
1	Understand operation of different air breathing propulsion systems and their applications
2	Learn construction and design features of inlets, compressors and turbines
3	Develop knowledge on function of combustors and exhaust nozzles and their performance measurement techniques
4	Identify problems of high speed propulsion systems and study combined cycle engines suitable for hypersonic applications
5	Classify different non-air breathing propulsion systems and their applications

AERODYNAMICS	
CO No.	STATEMENTS
1	Defines basic understanding of Aircraft Structural members.
2	Illustrate the methodologies to analyze beams and approximate aircraft structural members.
3	Solve complex problems such as indeterminate structures.
4	Analyze Columns with various boundary conditions.
5	Compare classical methods with Energy methods to justify solutions.

AEROSPACE VEHICLE STRUCTURES - I	
CO No.	STATEMENTS
1	Defines basic understanding of Aircraft Structural members.
2	Illustrate the methodologies to analyze beams and approximate aircraft structural members.
3	Solve complex problems such as indeterminate structures.
4	Analyze Columns with various boundary conditions.
5	Compare classical methods with Energy methods to justify solutions.

ELECTRICAL & ELECTRONICS ENGINEERING	
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STATEMENTS	
CO No.	
1	Knowledge on the concepts of electrical DC and AC circuits, basic law's of electricity, instruments to measure the electrical quantities
2	Gain the knowledge on different methods to solve the electrical networks and construction operational features of energy conversion devices.
3	Apply the basic theory in conceptual things to real-world electrical, electronic problems and applications.
4	Acquaint knowledge on constructional features and operation of measuring instruments like voltmeter, ammeter, wattmeter etc.
5	Emphasis on basics of electronics, semiconductor devices and their characteristics and operational features

AIRCRAFT PERFORMANCE	
CO No.	
1	To know about various mission profiles and estimate operational safety and performance
2	Acquaint with features involved in cruise performance also to understand effects of WAT on performance
3	Acquire knowledge in determine & applying the concept of climb and descent performance and to calculate bank angle, turn speed and radius in steady horizontal turning flight at a given load factor
4	Could explore the methods to calculate take off, landing runway distances and understands fuel planning, safety and environment effects of aircraft performance
5	understanding the Principal design features of rockets and missiles

MANAGEMENT SCIENCES	
CO No.	
1	Understand the role of R&D in technological innovation leading to business development
2	Carry out financial analysis of R&D projects to establish their sustainability
3	Develop strategies for designing and marketing of new products as part of business development
4	Develop forecasting models for predicting technological changes and to identify market needs
5	Identify different modes of technology transfer and pricing of the technology transfer

GENDER SENSITIZATION	
CO No.	
1	Develop sensibility with regard to issues of gender in contemporary India.
2	Expose critical perspective on the socialization of men and women
3	To introduce students to information about some key biological aspects of genders
4	To expose the students to debates on the politics and economics of work
5	To help students reflect critically on gender violence

AIRCRAFT PRODUCTION TECHNOLOGY LAB	
CO No.	
1	Students able apply some of the manufacturing process for preparation of complicated jobs.
2	Hands on experience on operating machinery
3	Students can corelate various welding technologies
4	Knowledge on sandwich structures and wood gluing concepts

5	Acquire knowledge on CNC operation and part programming
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ELECTRICAL & ELECTRONICS ENGINEERING LAB	
CO No.	STATEMENTS
1	Study different meters and instruments for measurement of electronic quantities
2	Study the characteristics of different devices like generators, motors etc experimentally
3	Design and experiment with various application circuits using diodes
4	Design and experiment with various signal and power amplifier circuits using BJTs and FETs
5	Design and experiment with various voltage regulation circuits

III YEAR I SEM R15

INTRODUCTION TO SPACE TECHNOLOGY	
CO No.	STATEMENTS
1	Basic Understanding of rocket propulsion, types equation, their stages as well as trajectories
2	Ability to understand about Atmospheric Re-entry
3	Analysis of orbit Mechanics and their maneuvers
4	Knowledge of Attitude determination of spacecraft/satellites
5	Analysis the space mission operations

HIGH SPEED AERODYNAMICS	
CO No.	STATEMENTS
1	Explain brief review of thermodynamics and fluid mechanics in relation to compressible flows
2	Demonstrate different types of shock waves and expansion waves and its properties across different situations.
3	Understand the importance of quasi one dimensional flow for obtaining supersonic speeds.
4	Illustrate the concepts of method of characteristics and its applications in nozzle designs.
5	Demonstrate the experimental methods and characteristics of various wind tunnels.

AEROSPACE VEHICLE STRUCTURES - II	
CO No.	STATEMENTS
1	Understand theoretical foundations, complexities, and design of modern aircraft structures.
2	Analyze shear flow and bending stress in various structural members
3	Idealize a real aircraft structure and apply theoretical foundations to convert into an analytical form.

4	Analyze various structural components like wing and fuselage subject to different loading conditions
5	Design and create simple aerospace structures to support mechanical loads.

AIRCRAFT STABILITY & CONTROL	
CO No.	STATEMENTS
1	student will be able to understand the need of static stability, marginal stability and the need for stability of the aircraft
2	Derive an expression for static longitudinal stability of the aircraft
3	Explain the condition for static longitudinal stability, lateral and directional stability
4	Differentiate the aircraft components contribution for the longitudinal static stability of the aircraft
5	Formulate the importance of the aerodynamic derivatives i.e stability derivatives and control derivatives

AEROSPACE MATERIALS & COMPOSITES	
CO No.	STATEMENTS
1	Study the types of mechanical behavior of materials for aircraft applications.
2	Understand the mechanical properties of materials by heat treatment processes.
3	Understand the analysis of composite laminates under different loading conditions and different environmental conditions.
4	Knowledge in usage of composite materials in aircraft component design.
5	Learning NDT methodologies

TOTAL QUALITY MANAGEMENT	
CO No.	STATEMENTS
1	Understand the role of R&D in technological innovation leading to business development
2	Carry out financial analysis of R&D projects to establish their sustainability
3	Develop strategies for designing and marketing of new products as part of business development
4	Develop forecasting models for predicting technological changes and to identify market needs
5	Identify different modes of technology transfer and pricing of the technology transfer

AERODYNAMICS & PROPULSION LAB	
CO No.	STATEMENTS
1	Analyze aerodynamic performance of various models
2	Ability to understand details of piston and gas turbine engine

3	Ability to characterize various aircraft fuels
4	Ability to analyze the performance of 2 stroke and 4 stroke engines
5	Ability to estimate the efficiency of compressors

AEROSPACE STRUCTURES LAB	
CO No.	STATEMENTS
1	Analyze the theoretical and experimental results of beams with various end conditions
2	Investigate the Maxwell's Reciprocal theorem and Principle of superposition using beams under various load conditions.
3	Analyze the shear centre for open and closed sections.
4	Ability to evaluate unsymmetrical bending stresses under various loading conditions
5	Ability to analyze the defects in materials by performing NDT

III YEAR II SEM R15

FINITE ELEMENT ANALYSIS	
CO No.	STATEMENTS
1	Describe the general steps used in the finite element analysis to model problems in engineering.
2	Develop stiffness matrices for spring, truss, beam, plane stress problems and three dimensional problems
3	Develop the finite element formulations for heat transfer problems
4	Describe the concept of direct equilibrium method and potential energy method for structural mechanics problems.
5	Develop the finite element formulation for dynamic loadings

CONTROL THEORY OF AIRCRAFT	
CO No.	STATEMENTS
1	Define the basic concepts associated with control Theory and its application
2	Understand the control system performance with the time domain description
3	Analyze the steady state response and application of feedback in augmentation controls
4	Determine the flying qualities of aircraft and requirements.
5	Explain the displacement and rate feedback determination of gains conflict with pilot inputs resolution.

FLIGHT VEHICLE DESIGN	
CO No.	STATEMENTS
1	Define the design process overview followed during the design of the aircraft.

2	Demonstrate initial sizing and layout preparation and handwork for geometric sizing.
3	Discuss material properties, geometry, size and systems requirement to construct flight envelope.
4	understand performance and trade studies which allows to distinguish type of engine and design to be adopted.
5	Interpret importance of design on stability and control of the aircraft.

AIRCRAFT SYSTEMS	
CO No.	STATEMENTS
1	Knowledge of the Hydraulic and Pneumatic Systems, Components and types of Instruments and its operation.
2	Impart the Airplane Control and Modern Control Systems and Understanding of Auto Pilot System.
3	Provide the Knowledge of Fuel System for Piston and Jet Engines
4	Understanding of the Air Conditioning Systems and Pressurization Systems in Aircraft.
5	Impart the Aircraft Electrical Systems.

AIR TRANSPORTATION SYSTEMS	
CO No.	STATEMENTS
1	To understand the operational structure, establishment of the Airport
2	To gain insights in tosetting up Airport and the economic considerations involved in it
3	To study the basic governing bodies of ATS, its laws and regulations
4	To understand the economic andbusiness outcomes of the ATS operations
5	The student with acquire operational knowledge of air transport system

GREEN ENERGY SYSTEMS	
CO No.	STATEMENTS
1	Basic knowledge on Non-conventional energy resources and their importance
2	Ability to Design renewable/hybrid energy systems that meet specific energy demands
3	Ability to analyze the economic feasibility
4	Able to design energy resources to have a minimal impact on the environment
5	Application of renewable energy

TECHNICAL COMMUNICATION & SOFT SKILLS	
CO No.	STATEMENTS

1	Acquire the language proficiency of the students in with emphasis on LSRW skills.
2	Utilize subjects more professionally using the theoretical and practical components of the English syllabus
3	To develop the professional skills and communication skills in formal and informal situations
4	Hone the required professional ethics and learn to be proficient formally
5	To develop the attitude and plan for professional career

FLIGHT VEHICLE DESIGN & INSTRUMENTATION LAB	
CO No.	STATEMENTS
1	Students can perform the weight estimation and sizing of an a/c for a given mission profile
2	Able to generate graphs for CL, CD
3	Students will be able to generate airfoil, tail configurations
4	Students acquire a knowledge of modelling 3D aircraft
5	Acquire knowledge on the working of landing gear, hydraulic and pneumatic systems

PROGRAMMING LANGUAGE FOR MATHEMATICAL MODELS	
CO No.	STATEMENTS
1	Basic knowledge on mathematical programming language
2	Develop skills in programming language
3	Ability to model aerospace problems through mathematical models
4	Revise computational strategies for developing applications
5	Ability to develop Simple to Complex applications using programming language

IV YEAR I SEM R15

COMPUTATIONAL AERODYNAMICS	
CO No.	STATEMENTS
1	Solve differential equations governing fluid flow problems.
2	The student will demonstrate an ability to recognize the type of fluid flow that is occurring in a particular physical system and to use the appropriate model equations to investigate the flow

3	Generation of grid according to geometry of flow and complexity of flow.
4	The student can be able to select appropriate discretization method to solve given problem
5	Application of CFD techniques for aerospace problems

AIRFRAME STRUCTURAL DESIGN	
CO No.	STATEMENTS
1	The student will be able to describe overall flight loads acting an aircraft with safe life and fail safe conditions.
2	Different types of fasteners and joints on aeronautical field.
3	Define complete knowledge about wing and tail unit functions, structural components and their design criteria.
4	Students will be attained complete knowledge about fuselage and landing gear functions, structural components and their design criteria.
5	History of Aircraft materials, fatigue analysis and different failure theories.

MECHANICAL VIBRATIONS & STRUCTURAL DYNAMICS	
CO No.	STATEMENTS
1	Identifies various vibrating systems and brief introduction on vibration terminology.
2	Understand the response of harmonically excited vibrating systems.
3	Analyze response of a vibration systems under various forcing conditions.
4	Evaluate frequencies and responses of higher order degree systems using numerical methods.
5	Devise solutions for application based real time solutions.

AVIONICS	
CO No.	STATEMENTS
1	Define the Importance and role of Avionics in modern aircraft
2	Understand the use of Helmet mounted displays, Head tracking systems and Head down displays
3	classify principles of gyroscope and accelerometers and Air data sensors and computing
4	Determine types of Navigation systems used in airplanes
5	Explain flight planning-navigation and Guidance, performance prediction and flight path optimization

CAD/CAM	
CO No.	STATEMENTS
1	Define the concepts of design and manufacturing of a product thorough CAD/CAM tools and describe the various hardware and software requirements for CAD/CAM applications

2	Construct the Geometric modeling and its facilities desired and apply the transformation equation to solve any irregular geometry.
3	Deliver the concept of CNC Machine centers and to Write a CNC programme for manufacturing the product.
4	Define different grouping techniques to Generate a code for a component or object and develop various process planning of a product
5	Give knowledge about advanced quality control methods and illustrates concepts of computer integrated manufacturing system and material handling system.

AIRCRAFT MAINTENANCE ENGINEERING	
CO No.	STATEMENTS
1	Introduce the knowledge of Maintenance Programs
2	Understand the procedure of Aviation Certification Requirements and Documentation for Maintenance and Engineering and also for overhaul of Aero-Engine.
3	Analysis of the function of Engineering Department, Production Planning and Control. Improve the knowledge of Training Courses in Aviation Industry.
4	Ability in Maintenance and Line operation and also Material Support.
5	Ability to Prepare Aircraft Maintenance Manuals and Art & Science of Trouble Shooting.

COMPUTATIONAL AERODYNAMICS LAB	
CO No.	STATEMENTS
1	Experience in computing aerodynamic problems and understanding flow physics over the objects.
2	Knowledge in estimating flow analysis for different mach numbers.
3	Determining the aerodynamic forces like mainly lift and drag.
4	Analyze the coefficient of pressure, lift, drag and moment for different bodies for different flow conditions.
5	Develop a programme for solving the One dimensional equations using explicit method of lax equations using finite difference method

COMPUTATIONAL STRUCTURES LAB	
CO No.	STATEMENTS
1	Students will gain the knowledge of various structural elements and structural analysis under ANSYS platform.
2	Student gains knowledge about one dimensional element and respective mesh selection for a beam analysis.
3	Can able to understand 2D and 3D element and respective mesh. Also define compressive strength of plate with and without cutouts.

4	Students can understand the knowledge about open and closed thin wall structure behavior. Further, gives knowledge about design and analysis of 3D structures like wingbox and fuselage.
5	Structural analysis of column-beam can understand by students pictorially.

IV YEAR II SEM R15

HELICOPTER ENGINEERING	
CO No.	STATEMENTS
1	Understand the basic concepts of Helicopter flying, different configurations
2	Understand the difference between Aircraft and Helicopter principles, mechanisms
3	Understand the principles, theories and stability and control pertaining to it
4	Acquire the knowledge of rotor operations.
5	The significance of Stability and Control in different conditions

AIRLINE & AIRPORT MANAGEMENT	
CO No.	STATEMENTS
1	Understand the functioning of the airline industry.
2	Focus on the underlying marketing, financial, operational and competitive factors that influence airline viability.
3	Investigate how the sensitivity of airline profitability impacts airline management decisions
4	Analyze the principles of airline economics, costs and pricing.
5	The student and assess the individual characteristics of low-cost carriers and business only airlines.

MINI PROJECT	
CO No.	STATEMENTS
1	Acquire system integration skills, Documentation skills, Project management skills, Problem solving skills
2	Ability to Identify problems and solutions and also solve real-life problems
3	Develop Professionalism
4	Develop oral as well as written and presentation skills.
5	Team work to complete the task effectively

TECHNICAL SEMINAR	
CO No.	STATEMENTS
1	Ablility to identify important concepts from the readings and provided depth in coverage of the topic.
2	Able to work in a group.
3	Develop effective group communication and presentation skills.
4	Develop self-management & reflection skills.
5	Capable for industry or workshop exposure

MAJOR PROJECT	
CO No.	STATEMENTS
1	Acquire System integration skills, Documentation skills, Project management skills, Problem solving skills
2	Ability to Identify problems and solutions and also solve real-life problems
3	Develop Professionalism
4	Develop oral as well as written and presentation skills.
5	Capable for industry or workshop exposure enabling lifelong learning

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
R15 COURSE OUTCOMES
B.TECH CSE - II YEAR I SEM

Mathematical Foundations of Computer Science	
Course Outcomes	
C201.1	Able to illustrate by examples the basic terminology of functions, relations, sets, group theory and demonstrate knowledge of their associated operations
C201.2	Able to distinguish between Statement Logic and Predicate Logic
C201.3	Able to apply induction and other proof techniques towards solving recurrences and other problems in elementary algebra.
C201.4	Able to demonstrate in practical applications the use of basic counting principles of permutations, combinations, inclusion /exclusion principle and the pigeonhole methodology.
C201.5	Able to represent and Apply Graph theory in solving computer science problems.

Data Structures Using C++	
Course Outcomes	
C202.1	Understand the concepts of Abstract data Type, data structure, performance measurement, time and space complexities of algorithms
C202.2	Implement the linear data structures such as stacks, queues and lists and know the applications of them.
C202.3	To illustrate the implementation of different non linear data structures such as trees and graphs know the applications.
C202.4	To Learn various search data structures such as hashing, binary search trees, red black trees, splay trees and b-trees.
C202.5	To Understand internal sorting techniques and analyze their time and space complexities

Principles of Programming Languages	
Course Outcomes	
C203.1	Compare various categories of Programming Languages and their implementation methods, and represent the programming languages syntax using BNF, EBNF.
C203.2	Explore Semantic issues of variables in different programming languages and the design issues of the various categories of data types.
C203.3	Analyse statement level constructs and explore design issues of subprograms.
C203.4	Explore the process of responding to the occurrence of exceptions & events in Ada, C++ and Java.
C203.5	Analyse various kinds of concurrency and explore design issues for providing support for concurrency by Ada, Java and C# languages.

Probability & Statistics	
Course Outcomes	
C204.1	Students will be able to analyze the basic principles of probability
C204.2	Students will be able to apply conditional probability
C204.3	Students have ability to apply the basic discrete distributions (Binomial)
C204.4	Students have ability to apply the basic continuous distributions (Uniform)
C204.5	Students will be able to collect, organize, and represent data, and be able to

	recognize and describe relationships
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Electronic Devices & Circuits	
Course Outcomes	
C205.1	Students will be able to apply the knowledge of PN Junction diode and some special function diodes.
C205.2	Students will be able to design a rectifier circuit
C205.3	Students will be able to design various filter circuits
C205.4	Students will be able to apply the concepts of BJT and FET in electronics circuits
C205.5	Students will be able to design an amplifier circuit with proper biasing techniques using both BJT and FET

Digital Logic Design	
Course Outcomes	
C206.1	students will be able to solve problems in number system, Boolean algebra and logic gates.
C206.2	students will be able to learn the methods for simplifying Boolean expressions
C206.3	students will be able to design logic circuits with minimization and mapping using HD.
C206.4	students will be able to design synchronous and asynchronous sequential circuits useful for real time applications.
C206.5	students will be able to explore storage in registers, RAM, ROM, PROM, PA, P.A and constituents of memory and its functioning.

Electrical & Electronics Lab	
Course Outcomes	
C207.1	Students will be able to know the basic circuit elements and the properties of elements so that he would be able to design a circuit
C207.2	Students will be able to understand the design and working of transformers.
C207.3	Students will be able to apply the knowledge of PN Junction diode and some special function diodes.
C207.4	Students will be able to design a rectifier circuit.

Data Structures using C++ Lab	
Course Outcomes	
C208.1	Students will be able to write C++ program for given problem using appropriate data structure.
C208.2	Students will be able to implement stacks ADTs, queues ADT's, Dictionaries and Binary search trees using linked lists.
C208.3	Students will be implementing different searching and sorting techniques.
C208.4	Students will be able to implement graph traversals techniques such as DFS and BFS

B.TECH CSE - II YEAR II SEM

Formal Languages and Automata Theory	
Course Outcomes	
209.1	Students will be able to design the finite automata for computational problems
209.2	Students will be able to construct regular expressions for real problems and

	finite automata
209.3	Students will be able to Construct context free grammar for various languages, minimization of grammar, applying normal form techniques on grammar
209.4	Students will be able to design PDA for any given problem
209.5	Students will be able to design Turing Machine for real problems, understand complexity theory including the classes P and NP, and the NP- complete problems

Java Programming	
Course Outcomes	
210.1	Students can apply object oriented concept for writing simple programs
210.2	Students can able to Demonstrate the ability to employ various types of selection constructs in a Java program. Be able to employ a hierarchy of Java classes to provide a solution to a given set of requirements.
210.3	Students can able to apply the exception handling technique for writing user defined exceptions in program.
210.4	Students can able to connect to database from java program through JDBC.
210.5	Students can able to develop applications using Applet, AWT, JDBC and Swings

Design and Analysis of Algorithms	
Course Outcomes	
211.1	Students will be able to analyze algorithms and improve the efficiency of algorithms
211.2	Students will be able to apply Searching and Traversal Techniques to solve real world problems.
211.3	Students will be able to apply different design methods for development of algorithms to realistic problems such as divide and conquer, greedy and etc.
211.4	Students will be able to analyze different backtracking and branch and bound problems.
211.5	Know the concepts of tractable and intractable problems and the classes P, NP and NP-complete problems.

Database Management System	
Course Outcomes	
C212.1	Students are able to conceptualize data using different data models.
C212.2	Students are able to design E-R model and convert E-R diagrams into RDBMS and formulate SQL queries on the respective data.
C212.3	Students will be able to normalize database design.
C212.4	Students will be able to understand transaction and their properties and locking protocols used to ensure Isolation.
C212.5	Students will be able to apply the storage and recovery techniques of database system.

Computer Organization	
Course Outcomes	
C213.1	Students will be able to explain the architecture of modern computer

C213.2	Students will be able to explain different instruction types
C213.3	Students will be able to understand different addressing modes and can perform computer arithmetic operations.
C213.4	Students will be able to explain I/O and memory organization in depth
C213.5	Students will be able to write assembly language programs for various applications

Managerial Economics and Financial Analysis

Course Outcomes

C214.1	Students will be able to apply Concepts of managerial economics roles, responsibilities of manager and relation of managerial economics with other disciplines
C214.2	Students will be able to identifying the roles and responsibilities of a manager
C214.3	Students will be able to identifying the demand and supply of a product and factors relation to it
C214.4	Exploring the importance of pricing strategies and price fixation
C214.5	Students will be able to design various demand forecasting methods of products

Database Management Systems Lab

Course Outcomes

C215.1	Students will be able to model database for real world problem.
C215.2	Students are able write queries using DDL, DML, and DCL languages of SQL.
C215.3	Students are able write queries using Selection qualifiers and aggregate functions of SQL.
C215.4	Students are able to write Procedures, Triggers & Cursors for dynamic databases

Java Programming Lab

Course Outcomes

C216.1	Students can able to Demonstrate the ability to employ various types of selection constructs in a Java program. Be able to employ a hierarchy of Java classes to provide a solution to a given set of requirements.
C216.2	Students can able to apply the exception handling technique for writing user defined exceptions in program.
C216.3	Students can able to connect to database from java program through JDBC.
C216.4	Students can able to develop applications using Applet, AWT, JDBC and Swings

B.TECH CSE - III YEAR I SEM

Software Engineering

Course Outcomes

C301.1	Outline the fundamentals of software engineering concepts and software process standards.
C301.2	Demonstrate appropriate process model and software engineering practices.
C301.3	Analyze requirements of software system and explore all requirements gathering approaches
C301.4	Creating an architectural design using design engineering process.
C301.5	Apply software strategies and software testing tactics for testing real time projects effectively

Compiler Design

Course Outcomes	
C302.1	Explain the importance of language translation and the types of different language translators in use
C302.2	Understand the principles, techniques and tools used in the design of different phases of a compiler by hand
C302.3	Solve the problems in compiler construction, Design Algorithms, Implement and test them for the results
C302.4	Apply different code Optimization techniques to and produce optimal compilers
C302.5	Learn and Use the automatic generation tools lex, flex, Yacc and bison in compiler construction

Operating Systems	
Course Outcomes	
C303.1	Students will be able to identify the functional aspects and implementation methods (system call And System programs of different modules in a general purpose operating System).
C303.2	Students will be able to evaluate scheduling and communication methods of processes handled by Operating systems through examples.
C303.3	Students will be able to evaluate memory management strategies such as paging and segmentation, Virtual Memory, swapping, and page replacement algorithms.
C303.4	Students will be able to analyse the implementation strategies of file systems regarding directory, Allocation, free space management and file recovery.
C303.5	Students will be able to analyse the process synchronization methods and deadlock handling Approaches employed in operating systems.

Computer Networks	
Course Outcomes	
C304.1	Understand how the data is transmitted from point-to-point.
C304.2	Summarize Data Link Layer Protocols.
C304.3	Analyze of different Medium Access Control protocols.
C304.4	Evaluate different routing protocols and Transport layer protocols.
C304.5	Understand the concepts of Presentation and Application Layer Protocols

Computer Graphics	
Course Outcomes	
C305.1	Will be able work in computer aided design for content presentation
C305.2	Better analogy data with pictorial representation.
C305.3	Able to Write program functions to implement graphics primitives
C305.4	Design algorithms that demonstrate geometrical transformations and computer graphics animation.
C305.5	Create interactive graphics applications in C using one or more graphics application programming interfaces

Management Science	
Course Outcomes	
C306.1	Students will be able to develop responsibilities of manager and relations of

	with management other disciplines
C306.2	Students will be able to Identifying the roles and responsibilities of a manager
C306.3	Students will be able to explain the importance of organization behavior and leadership.
C306.4	Students will be able to develop production and production related functions.
C306.5	Students will be knowing the basic management practices, functional areas of the organization which helps the students to build up their career in the corporate world

Compiler Design Lab	
Course Outcomes	
C307.1	Understand the practical approach of how a compiler is designed.
C307.2	Apply the techniques used in compiler construction in developing compiler modules.
C307.3	Construct components of the compiler for the mini language using C and compiler generation tools
C307.4	Students will be able to apply the knowledge of lex and yacc tools to develop a scanner and parsers.

Computer Networks and Operating Systems Lab	
Course Outcomes	
C308.1	This course will introduce the basic principles in Operating System and basics of Computer Networks
C308.2	Students willing the knowledge in writing the software routines and modules or implementing various concepts of operating system.
C308.3	Students will be able to design different Error Detection techniques.
C308.4	Students will be able to simulate different packet routing algorithms.

B.TECH CSE - III YEAR II SEM

Object Oriented Design and Analysis	
Course Outcomes	
C309.1	Understand Unified Modeling Language Notation and Apply models for object-oriented system development
C309.2	Identify system development design patterns.
C309.3	Create use case diagram to represent the scope of development problem domain.
C309.4	Develop domain model, sequence diagram, activity diagram and state chart diagram based on use case narrative.
C309.5	Apply Unified Modeling Language Notation to object-oriented models.

Information Security	
Course Outcomes	
C310.1	Students will be able to understand the difference between Security Metrics and Audits.
C310.2	Students will get knowledge on Vulnerability Management.
C310.3	Students will be able to know the Information Security Audit Tasks, Reports and Post Auditing Actions.

C310.4	Students will be able to understand Information Security Assessments.
C310.5	Students will get knowledge on Configuration Management

Web Technologies

Course Outcomes

C311.1	Design web pages by using HTML and DHTML
C311.2	Develop user defined tags and transfer data between components by using XML and Java Beans.
C311.3	Create data driven web applications by applying database connectivity techniques.
C311.4	Design and implement dynamic WebPages using server side components like servlets.
C311.5	Understand concepts of JSP and struts framework and apply them in solving real world problems

Software Testing Methodologies

Course Outcomes

C312.1	Interpret a model for testing and understand the process of testing.
C312.2	Visualize control flow graph and demonstrate complete path testing to achieve C1+C2 and identify the complications in a transaction flow testing and anomalies in data flow testing.
C312.3	Apply domain testing strategies for different domains.
C312.4	Apply reduction procedures to control flow graph and simplify it into a single path expression and understand the use of decision tables in test case design.
C312.5	Identify effective approach for node reduction.

Distributed Systems

Course Outcomes

C313.1	Students will understand the fundamentals of Distributed Systems and be able to Design.
C313.2	Students are able to identify the Processes, Synchronization, Consistency, Fault Tolerance and Security.
C313.3	Students will identify the core concepts of distributed systems: the way in which several machines orchestrate to correctly solve problems in an efficient, reliable and scalable way.
C313.4	Students will examine how existing systems have applied the concepts of distributed systems in designing large systems, and will additionally apply these concepts to develop sample systems.
C313.5	Students are able to Develop Distributed Systems and Applications

Embedded System Design

Course Outcomes

C314.1	Understand and design embedded systems and real-time systems
C314.2	Understand the hardware/software trade-offs inherent in embedded systems.
C314.3	Understand the particular requirements of real-time systems.
C314.4	Apply this understanding to carry out the design process.
C314.5	Ability to build a prototype circuit on breadboard using

	8051 microcontroller
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Case Tools and Web Technologies Lab	
Course Outcomes	
C315.1	Ability to understand the history, cost of using and building CASE tools.
C315.2	Ability to construct and evaluate hybrid CASE tools by integrating existing tools.
C315.3	Students will be able to design and implement dynamic websites with good aesthetic sense of designing and latest technical know-how's.
C315.4	Students will be able to have a Good grounding of Web Application Terminologies, Internet Tools, E – Commerce and other web services.

Software Testing Methodologies Lab	
Course Outcomes	
C316.1	Students will be able to write the test plan and test cases for testing an application.
C316.2	Students will be able test the software application using tools like Winrunner, Selenium, Bugzilla and Test link.
C316.3	Apply the knowledge gained for the testing phase of their project.
C316.4	Apply the knowledge of control flow graphs

B.TECH CSE - IV YEAR I SEM

Data Warehousing and Data Mining	
Course Outcomes	
C401.1	Students will be able to distinguish between OLTP and data warehouses and should able to model the data warehouse using Star/Snow flake/Fact Constellation schemas
C401.2	Students will be able to understand the data mining tasks and should able to apply the data preprocessing techniques to improve the quality of the data.
C401.3	Students will be able to mine the association rules from transactional databases.
C401.4	Students will be able to mine classification models and should able to classify the data by applying various classification techniques.
C401.5	Students will be able to apply the various clustering & outlier techniques to group the data into different clusters.

LINUX Programming	
Course Outcomes	
C402.1	Able to write shell scripts for Administration tasks.
C402.2	Able to create multiple processes and can provide the synchronization among them.
C402.3	Implement the Orphan process and Zombie process
C402.4	Students can write programs for communication among processes on a single system.
C402.5	Analyze multi-processing in Linux Kernel

Design Patterns	
Course Outcomes	
C403.1	Have a deeper knowledge of the principles of object - oriented design
C403.2	Understand how these patterns related to object - oriented design.

C403.3	Understand the design patterns that are common in software applications.
C403.4	Will able to use patterns and have deeper knowledge of patterns.
C403.5	Will be able to document good design pattern structures.

Cloud Computing	
Course Outcomes	
C404.1	Analyze various delivery and deployment models.
C404.2	Analyze the virtual machine provisioning and virtualized storage Strategies.
C404.3	Explore the PAAS Services.
C404.4	Explore the SAAS Services.
C404.5	Identify the issues in monitoring and management in cloud environment and also identifying the components for deployment of applications on the cloud.

Big Data Analytics	
Course Outcomes	
C405.1	understand the concept and challenges of big data
C405.2	collect, manage, store, query, and analyze various form of big data
C405.3	gain hands-on experience on large-scale analytics tools to solve some open big data problems
C405.4	understand the impact of big data for business decisions and strategy
C405.5	To understand why existing technology is inadequate to analyze the big data

Semantic Web and Social Networks	
Course Outcomes	
C406.1	Students are able to design a small Semantic Web and Social Network.
C406.2	Students are able to identify the different methods in Semantic Web and Social Networking using Web Intelligence
C406.3	Students are able to design the small Resource Description Framework (RDF) for proper communication.
C406.4	Students are able to generate and create a Web Ontology Services
C406.5	Ability to build a blogs and social networks

Linux Programming Lab	
Course Outcomes	
C407.1	Ability to understand the Linux environment
C407.2	Ability to perform the file management and multiple tasks using shell scripts in Linux environment
C407.3	Ability to verify the attributes of files
C407.4	Ability to create processes and enable communication between them in shared mode

Data Warehousing and Data Mining Lab	
Course Outcomes	
C408.1	Understand the need of data mining and the details of different algorithms

	made available by popular commercial data mining software.
C408.2	Solve real data mining problems by using the right tools to find interesting Patterns and obtain hands-on experience with some popular data mining software
C408.3	Students will be able to identify the relevant attributes and are able to analyze the data sets of any organization.
C408.4	Students will be able to classify the data sets by constructing decision tree in WEKA Tool.

B.TECH CSE - IV YEAR II SEM

Web Services	
Course Outcomes	
C409.1	Explain how web services provide a more open approach to distributed computing than prior models, and give an evaluation of the potential impact that they have on business processes
C409.2	create service descriptions suitable for implementing a range of message exchange patterns
C409.3	incorporate existing web services into an application to introduce new functionality or provide access to online information
C409.4	critically evaluate different types of web services, functions and value to a business
C409.5	describe and explain quality of service aspects of web-service provision, and show how these can be applied to existing services to add value to them

Software Project Management	
Course Outcomes	
C410.1	Students will be able to describe and determine the purpose and importance of project management from the perspectives of planning, tracking and completion of project.
C410.2	Students will be able to compare and differentiate organization structures
C410.3	Students will able to implement a project to manage project schedule, expenses
C410.4	Students will able to manage resources with the application of suitable project management tools
C410.5	Students will be able to compare and differentiate project structures.

Industry Oriented Mini Project	
Course Outcomes	
C411.1	The students understands the process to be followed in the software development life cycle.
C411.2	Finds practical solutions to the problems
C411.3	Manage a project from beginning to end
C411.4	Define, formulate and analyze a problem

Technical Seminar	
Course Outcomes	
C412.1	Students will be able to express and master public speaking during technical

	presentations.
C412.2	Students will be able to get an opportunity; where in individuals can meet others with the same Interests/problems/concerns and also to envisage emerging technologies.
C412.3	Students will be able to have a sense of renewed hope and inspiration, as sometimes business concerns are lessened by sharing experiences with others.
C412.4	Students will be able to have a great morale booster for students for career making advancement

Major Project	
Course Outcomes	
C413.1	Students will be able to get innovative ideas to develop
C413.2	Students will be able to function effectively on teams to accomplish a common goal.
C413.3	Students will be able to use current techniques, skill and tools necessary for computing practices.
C413.4	Students will be able to design and development principles in the construction of software systems of varying complexity.

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING
COURSE OUTCOMES-R15

II Year I & II Semesters

1. Mathematics – III

- Evaluate the improper Integrals, Beta and Gamma functions.
- Identify Bessel equation and Legendre equation and solve them under special conditions with the help of series solutions method. Also identify recurrence relations and orthogonality properties of Bessel and Legendre polynomials.
- Analyze the complex functions with reference to their analyticity, Integration using Cauchy's integral theorem.
- Find the Taylor's and Laurent series expansion of complex functions.
- The conformal transformations of complex functions can be dealt with ease.

2. Electronic Devices and Circuits

- Understand and analyze the different types of diodes, operation and its characteristics.
- Design and analyse the DC bias circuitry of BJT and FET.
- Design biasing circuits using diodes and transistors.
- To analyze and design diode application circuits, amplifier circuits and oscillators employing BJT, FET devices.

3. Signals & Systems

- Understand the basic elementary signals
- Determine the Fourier Series for Continuous Time Signals
- Analyze the signals using F.T, L.T & Z.T and study the properties of F.T., L.T. & Z.T.
- Understand the principal of Linear System and Filter Characteristics of a System.
- Understand the concepts of auto correlation and cross correlation and power Density Spectrum.

4. Probability Theory and Stochastic Process

- To compute Simple probabilities using an appropriate sample space.
- To compute Simple probabilities and expectations from probability density functions (PDF)
- To compute Likelihood ratio tests from PDF for statistical engineering problems.
- To compute Least –square & maximum likelihood estimators for engineering problems.
- To compute Mean and covariance functions for simple random processes.

5. Electrical Technology

- Be able to do the transient analysis of the first & second order circuits.

- Be able to understand the concepts of two port networks, conversion, reciprocity, symmetry etc.
- Understand and analyze different type of filters & attenuators.
- Be able to analyze and draw the locus diagrams of various circuits studied.
- Be able to understand the operation of DC machines with which they will be able to apply the concepts to the real world problems.

6. Managerial Economics and Financial Analysis

- Able to set objectives for the firm & to analyze Demand
- Analyze Production, Cost, BEP Investment, and Market & set the prices for maximization of profits.
- Able to start enterprise & estimate sources of capital and their implication to the business.
- To provide knowledge on the principles of financial and management accounts as applicable to real life business situations by determining profits, assets, liabilities & performance of a firm through simple problems.
- Provide knowledge to assess the financial strengths and weaknesses of a firm through Ratio Analysis.

7. Electronic Devices and Circuits Lab

- To analyze voltage and current characteristics of semiconductor circuits and devices.
- To design & analyze rectifiers with & without filters.
- Analyze and realize the characteristics of various Diodes and Transistors.
- Design, Analysis, Implementation and testing of amplifiers using BJT.
- Design, Analysis, Implementation and testing of Transistorized Voltage regulators.

8. Basic Simulation Lab

- Understand & simulate generation of basic waveforms and general operations in linear time invariant systems.
- Understands the Concept of auto correlation, cross correlation and Convolution of given signal/ sequence and simulate it accordingly.
- Develop a precise understanding of various transforms in and its applications in signal processing areas.
- Better understanding of the concepts of PDF, PSD, and MSV etc practically.
- Gain comprehensive understanding about filter design.

9. Foreign Language: French

- The student will be in a position to speak in French, Which is the second most widely learned foreign language after English, and the ninth most widely spoken language in the world. French is also the only language, alongside English, that is taught in every country in the world.

- The Student will get the ability to speak French is an advantage on the international job market.
- Students with a good level of French are eligible for French government scholarships to enrol in postgraduate courses in France in any discipline and qualify for internationally recognized French degrees.

10. Control Systems

- A thorough knowledge on open loop and closed loop control systems, concept of feedback in control systems.
- Transfer function representation through block diagram algebra and signal flow graphs.
- Time response analysis of different ordered systems through their characteristic equation.
- Time domain specifications, stability analysis of control systems in s-domain through R-H criteria.
- Root locus techniques, frequency response analysis through Bode diagrams, Nyquist, Polar plots.
- The basics of state space analysis, design of lag, lead compensators, with which he/she can able to apply the above conceptual things to real world electrical and electronics problems and applications.

11. Pulse and Digital Circuits

- Understand the applications of diode as linear wave shaping circuits integrator, differentiator, Attenuators.
- Understand the applications of diode as non -linear wave shaping circuits Clippers & Clampers.
- Understand concept of transistor as switch & design of different types of Multivibrators.
- Understands the concept of Voltage & current Time base generators.
- Basic operating principle of sampling gates. Realizing logic gates using diodes and transistors.

12. Electronic Circuit Analysis

- Understand the applications of diode as linear wave shaping circuits integrator, differentiator, Attenuators.
- Understand the applications of diode as non -linear wave shaping circuits Clippers & Clampers.
- Understand concept of transistor as switch & design of different types of Multivibrators.
- Understands the concept of Voltage & current Time base generators.
- Basic operating principle of sampling gates. Realizing logic gates using diodes and transistors.

13. Electromagnetic Theory and Transmission Lines

- To acquire understanding and ability to analyze static electric and magnetic fields, time-varying electric and magnetic fields, wave propagation in different types of media.
- To have knowledge of, physical interpretation and ability to apply Maxwell's equations to determine field waves, potential waves, energy and charge conservation conditions.
- Understand how EM waves will propagate in free space and their characteristics at the boundary between media.
- Analyze electromagnetic wave propagation and attenuation in various medium and propagation through boundaries between media.
- To have acquired techniques for the measurement of basic transmission line parameters, such as the reflection coefficient, standing wave ratio, and impedance.

14. Switching Theory and Logic Design

- Be able to manipulate numeric information in different forms, e.g. different bases, signed integers, various codes such as ASCII, Gray, and BCD.
- Be able to manipulate simple Boolean expressions using the theorems and postulates of Boolean algebra and to minimize combinational functions.
- Be able to design and analyze small combinational circuits and to use standard combinational functions/building blocks to build larger more complex circuits.
- Be able to design and analyze small sequential circuits and devices and to use standard sequential functions/building blocks to build larger more complex circuits.
- Analyze Synchronous sequential circuits using State diagram, Finite state machine. Design Asynchronous & Synchronous counters.

15. Intellectual Property Rights

- It allows students how to prepare and protect the Inventions , start up ideas and rights of patents and copy rights etc.,
- This subject brings awareness to the students the basic legal aspects at present following at Global level.

16. EC & PC Lab

- Have the ability to design and analyze circuits using the analog building blocks like diodes, BJT, FET etc for performing various functions.
- Be able to make a qualitative analysis and design simple models of circuits using hardware and software tools.
- Design, Analysis, Implementation and testing of Linear & Non-Linear wave shaping circuits using Diodes.
- Design; analyze the implementation of pulse generating circuits such as multivibrators which are used in future in designing some communication system modules.

- Designing of Single stage & multiple Stage Amplifiers & Power Amplifiers.

17. Electrical Technology Lab

- Design electric circuits to verify the basic KVL & KCL.
- Design electric circuits to determine different parameters of two port networks.
- Analyze electric circuits using Network Theorems.
- Evaluate the efficiency of the machine & generators by analyzing test results.
- Have the practical ideas about the Electrical Circuits and Machines.

18. Gender Sensitization

- Students will have developed a better understanding of important issues related to gender in contemporary India.
- Students will be sensitized to basic dimensions of the biological, sociological, psychological and legal aspects of gender. This will be achieved through discussion of materials derived from research, facts, everyday life, literature and film.
- Students will attain a finer grasp of how gender discrimination works in our society and how to counter it.
- Students will acquire insight into the gendered division of labour and its relation to politics and economics.
- Men and Women students and professionals will be better equipped to work and live together as equals.

III Year I & II Semesters

1. IC Applications

- Have a thorough understanding of operational amplifiers with linear integrated circuits.
- Have a thorough understanding of the different families of Digital integrated circuits and their characteristics and be able to design circuits using IC555 timer and IC565 PLL for various applications.
- Be able to design circuits using operational amplifiers for various applications like ADCs and DACs.
- Also be able to design circuits using the Digital Integrated Circuit ICs for various applications.
- Be familiarized with Sequential Logic IC's and memories.

2. Analog Communications

- Have broad idea on the fundamentals of communication systems and comprehensive description of telecommunication system.
- Be able to give mathematical and theoretical description of linear(amplitude) modulation

- Be able to give mathematical and theoretical description of angle modulation.
- Be able to analyze and compare the performance of the modulation techniques using SNR as a parameter and can work on improvising the techniques.
- Be able to relate the concepts of modulation and demodulation in radio transmitter and receiver. Have a basic understanding of pulse modulation techniques.

3. Computer Organization and Operating Systems

- Basic structure of a digital computer & Arithmetic operations of binary number system
- The organization of the Control Unit, Arithmetic and Logical Unit, Memory Unit and the I/O unit.
- Operating system functions, types, system calls.
- Memory management techniques and dead lock avoidance
- Operating systems file system and implementation and its interface.

4. Digital System Design through Verilog

- Describe Verilog HDL & Design Digital circuits.
- Write behaviour model of digital circuits.
- Write RTL models of digital circuits & verify behaviour.
- Describe standard Cell Libraries and FPGAs.
- Synthesize RTL models to standard cell libraries and FPGAs.

5. Digital System Design

- Develop a digital logic & apply it to solve real time problems
- Analyze, design & implement combinational circuits.
- Analyze, design & implement sequential circuits.
- Analyze a digital system using PLD's and identify faults in circuits by applying different Algorithms.
- Design SM charts for simple applications.

6. JAVA programming

- An understanding of the principles and practice of object oriented programming and design in the construction of robust, maintainable programs which satisfy their requirements
- A competence to design, write, compile, test and execute straightforward programs using a high level language;
- An appreciation of the principles of object oriented programming;
- An awareness of the need for a professional approach to design and the importance of good documentation to the finished programs.

- Be able to implement, compile, test and run Java programs comprising more than one class, to address a particular software problem.
- Be able to make use of members of classes found in the Java API.
- Demonstrate the ability to employ various types of selection constructs in a Java program. Be able to employ a hierarchy of Java classes to provide a solution to a given set of requirements.
- Able to develop applications using Applet, awt and GUI Programming.

7. IC Applications & HDL Simulation Lab

- Design, Analysis, Implementation and testing of logic gates, combinational circuits, flip-flops, registers and counters
- To demonstrate basic engineering practices and conduct experiments using basic operational amplifiers.
- Test, measure and provide valid conclusions on oscillator and amplifier design using op-amps and other linear integrated circuits.
- Apply the knowledge of theoretical & practical aspects of transistor circuits to meet desired needs within realistic constraints.
- Be able to make a qualitative analysis and design simple models of circuits using hardware and software tools.

8. Analog Communications Lab

- Design, test and analyze different amplitude modulation & demodulation circuits (AM, DSBSC, SSB) used in communication system & simulate.
- Design, test and analyze Frequency modulation & demodulation circuits & simulate.
- Spectrum Analysis of amplitude & angle modulation using simulation.
- Analyze the Implementation of different analog Pulse modulation techniques.
- Design & analyze different circuits used in communication system (AGC, Pre & De emphasis).

9. Technical Communications & Soft Skills

- The student will become proficient in LSRW skills.
- They develop formal LSRW skills approach to different situations.
- They hone professional ethics and learn to be proficient formally.

10. Digital Communications

- Analyze different digital pulse modulation techniques.
- Give mathematical and theoretical description of different digital modulation techniques.
- Design optimum receivers for digital modulation techniques and Analyze the error performance of digital modulation techniques studied using probability.
- Understand concepts of Information theory & Channel Capacity.

- Know about different error detecting and error correcting codes like block codes, cyclic codes and convolution codes.

11. Microprocessors and Microcontrollers

- Understand architecture and operations of a microprocessor system in depth
- Demonstrate programming proficiency using the various addressing modes and data transfer instructions of the microprocessor
- Analyze, specify, design, write and test assembly language programs of moderate complexity
- Perform the detailed hardware design of a microprocessor system, and program the microprocessor using suitable techniques and software tools to interface the processor to external devices.
- Understand the fundamentals of 8051 microcontrollers, Design and interface the different peripheral device to the microcontroller. Understand the basics of ARM Processor

12. Digital Signal Processing

- Perform time, frequency and z-transform analysis on signals and systems.
- Understand the inter relationship between DFT and various transforms.
- Understand the significance of various filter structures and effects of rounding errors.
- Design a digital filter for a given specification.
- Understand the fast computation of DFT and Appreciate the FFT processing.
- Understand the trade-off between normal and multi rate DSP techniques and finite length word effects

13. Antennas and Wave Propagation

- Aware of antenna parameter considerations.
- Capable to analyze the designed antenna and field evaluation under various conditions and formulate the electric as well as magnetic fields equation set for far field and near field conditions.
- Understand the array system of different antennas and field analysis under application of different currents to the individual antenna elements.
- Understand the operation of fundamental antennas and their operation methodology in practice.
- Design a lens structure and also the bench set up for antenna parameter measurement of testing for their effectiveness and knowledge about the means of propagation of electromagnetic waves.

14. Electronic Measurements & Instruments

- Describe the fundamental concepts and principles of instrumentation
- Explain the operation of various instruments required in measurements
- Apply the measurement techniques for different types of tests

- To select specific instruments for specific measurement function.
- Understand principle of operation and working of different electronic instruments
- Students will understand functioning, specification and application of signal analyzing instruments

15. (a) Data Base Management System

- Student can define ER model for mini and main projects
- Student can develop RDBMS relation schemas from ER diagrams
- Student can develop queries required
- Student can develop concurrent queries and optimize them using queries manually

15. (b) Apps Design & Development

- Ability to identify the minimum requirements for the development of application.
- Ability to apply different multimedia development tools to produce web based and stand-alone user interfaces.
- Gain knowledge of client side scripting, understanding of server side scripting with java.

16. Microprocessors and Microcontrollers Lab

- Develop & execute various arithmetic, logical, String manipulation assembly language programs on 8086.
- Interface 8086 with different peripheral devices.
- Analyze & execute simple programs on 8051 micro controller
- Apply the concepts in interfacing the external devices to the processor and controllers according to the user requirements to create novel products and solutions for the real time problems
- Work in an industrial environment with a lifelong learning needed in embedded and real time system design.

17. Digital Signal Processing Lab

- Generate & Perform different operations on discrete time signals and systems.
- Analyze and implement digital systems using the Discrete Fourier Transform and Fast Fourier Transform (FFT) techniques using MATLAB and signal processing toolboxes.
- Use Z transforms to analyze a digital system finding the region of convergence using MATLAB and signal processing toolboxes.
- Design and Implement digital FIR and IIR filters.
- Design Up converter, Down converter & Sample rate converter.

IV Year I & II Semesters

1. VLSI Design

- Acquire quality knowledge about the fabrication process of IC using MOS Transistor.
- Draw the layout of any logic circuits which helps to understand and estimate parasitic of any logic circuit.
- Provide design concepts required to design building blocks of data path using gates.
- Design simple logic circuits using PLA, PAL, FPGA and CPLD
- Understand different types of faults that can occur in a system and learn the concept of testing and adding extra hardware to improve the testability of the system.

2. Microwave Engineering

- Understand the basic properties and application areas of microwaves.
- Analyze the transmission lines, analyze the waveguides, and analyze the microwave networks.
- Be able to analyze methods to determine circuit properties of passive/active microwave devices.
- Be able to model and study of characteristics of a microwave circuit or system.
- Can set up a microwave bench for measuring microwave parameters.

3. Cellular & Mobile Communications

- Understand impairments due to multipath fading channel.
- Understand the fundamental techniques to overcome the different fading effects.
- Understand co-channel and non co-channel interferences.
- Familiarize with cell coverage/signal and traffic, diversity techniques and mobile antennas.
- Understand the frequency management, channel assignment and types of handoffs.

4. Computer Networks

- Explain the hierarchical, layered structure of typical network architecture.
- Understand & analyze the different layers of the OSI model and compare it with TCP/IP model.
- Explore various protocols like Data link layer protocols, multiple access protocols and Routing algorithms.
- Understand the concepts of Internetworking, different Internet transport protocols and World Wide Web.
- Administrate a network and flow of information. Can also relate to the concepts of network security.

5. Embedded Systems Design

- Understand the basics of Embedded Systems and its application areas.
- Understand the embedded firmware design approaches and Embedded C programming.
- Understand types of memory and interfacing to external world.
- Understand the basics of OS & Real Time Operation Systems (RTOS).
- Understand the basics of Onboard and external communication interfaces.

6. Digital Image Processing

- Have an appreciation of the fundamentals of Digital Image Processing including the topics of filtering, transforms and morphology, and image analysis and compression
- Be able to implement basic image processing algorithms in MATLAB.
- Have the skill base necessary to further explore advanced topics of Digital Image Processing.
- Be in a position to make a positive professional contribution in the field of Digital Image Processing.
- At the end of the course the student should have a clear impression of the breadth and practical scope of Digital Image Processing and have arrived at a level of understanding that is the foundation for most of the work currently underway in this field.

7. eCAD and VLSI Lab

- Design different types of logic gates using CMOS inverter and analyze their transfer characteristics.
- Provide design concepts required to design building blocks of data path using gates and digital circuits using Xilinx and FPGA kits.
- Design simple memories using MOS transistors and can understand design of large memories.
- Design & simulation of different digital devices using the front end tools.
- Designing of ALU to perform arithmetic & logical operations.

8. Microwave Engineering & Digital Communications Lab

- Apply analysis methods to determine circuit properties of passive/active microwave devices
- Set up a microwave bench for measuring microwave parameters.
- Analyze the characteristics of microwave tubes and compare them
- Understand and analyze the different types of digital pulse modulation techniques and their application like TDM
- Understand and analyze the different types of digital modulation techniques.

9. RADAR Systems

- Demonstrate an understanding of the factors affecting the radar performance using Radar Range Equation
- Analyze the principle of FM-CW radar and apply it in FM-CW Altimeter.
- Differentiate between a MTI Radar and a Pulse Doppler Radar based on their working principle
- Demonstrate an understanding of the importance of Matched Filter Receivers in Radars
- Familiarize with the different types of Radar Displays and their application in real time scenario

10. Wireless Communications and Networks

- Have a fundamental understanding of the Wireless communication, networks & layered architecture.
- Understand the processes happening in Mobile radio propagation.
- Have a good knowledge about the different LAN networks.
- Understand the basic principles of GSM, Wireless ATM & HIPERLAN.
- Be familiar with some of the existing and emerging wireless standards and present them.

11. Mini Project

- Select a suitable project making use of the technical and engineering knowledge gained from previous courses with the awareness of impact of technology on the society and their ethical responsibilities.
- Collect and disseminate information related to selected project.
- Form a team and distribute the work among them.
- Understand, Plan and execute a Mini Project with team, using necessary literature survey.
- Design and Implementation of electronic system using appropriate hardware, software. Troubleshooting techniques & prepare technical report based on the Mini Project.

12. Technical Seminar

- An ability to write technical documents and give oral presentations related to the work completed and improves personality development and communication skills.
- Train the students to approach ethically any multidisciplinary engineering challenges with economic, environmental and social contexts and to set them for future recruitment by potential employers.
- Identify and apply appropriate well-rehearsed note-taking interactive and time-management strategies to their academic studies.
- Develop audience-centred presentations meeting concrete professional objectives and integrating ethical and legal visual aids.

- Identify and critically evaluate the quality of claims, explanation, support, and delivery in public and professional discourse, and understand the factors influencing a speaker's credibility.

13. Major Project

- Select a suitable project making use of the technical and engineering knowledge gained from previous courses with the awareness of impact of technology on the society and their ethical responsibilities.
- Collect and disseminate information related to selected project. Identify and work with the modern tools required for the implementation of the project.
- Form a team and distribute the work among them. Communicate technical and general information by means of oral as well as written presentation skills with professionalism.
- Refine and complete the selected project making use of the technical and engineering knowledge which meets the expected outcome.
- Acquire problem solving, system integration, project management and documentation skills.

DEPARTMENT OF INFORMATION TECHNOLOGY

II BTECH I SEM R-15 COURSE OUTCOMES

COMPUTER ORGANIZATION	
Course Outcomes	
C201.1	Learn the concepts of computer organization for several engineering applications
C201.2	Write assembly language program for specified microprocessor for computing 16 bit multiplication, division and I/O device interface
C201.3	Develop the ability and confidence to use the fundamentals of computer organization as a tool in the engineering of digital systems
C201.4	Learn the techniques to enhance the performance using pipelining, parallelism and RISC methodology
C201.5	Write a flowchart for Concurrent access to memory and cache coherency in Parallel Processors and describe the process
DATA STRUCTURES USING C++	
Course Outcomes	
C202.1	Ability to select the data structures that efficiently model the information in a problem
C202.2	Ability to assess efficiency trade-offs among different data structure implementations or combinations.
C202.3	Implement algorithms for searching and sorting
C202.4	Design programs using a variety of data structures, including hash tables
C202.5	Implement advanced data structures, including search trees, AVL-trees, heaps and graphs
DIGITAL LOGIC DESIGN	
Course Outcomes	
C203.1	Understand the basic postulates of Boolean algebra and shows the correlation between Boolean expressions
C203.2	Learn the methods for simplifying Boolean expressions
C203.3	Understand the formal procedures for the analysis and design of combinational circuits and sequential circuits
C203.4	Describe the concept of memories and programmable logic devices

C203.5	Gain knowledge in the concept of synchronous and asynchronous sequential circuits
MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE	
Course Outcomes	
C204.1	For a given logic sentence express it in terms of predicates, quantifiers, and logical connectives
C204.2	For a given a problem, derive the solution using deductive logic and prove the solution based on logical inference
C204.3	For a given a mathematical problem, classify its algebraic structure
C204.4	Evaluate Boolean functions and simplify expressions using the properties of Boolean algebra
C204.5	Develop the given problem as graph networks and solve with techniques of graph theory
PROBABILTY AND STATISTICS	
Course Outcomes	
C205.1	Describe randomness in certain realistic situation which can be either discrete or continuous type
C205.2	To calculate mean and proportions (small and large samples) and to make important decisions from few samples which are taken out of unmanageably huge populations. It is mainly useful for non-branches of engineering
C205.3	To find the expected queue length, the ideal time the traffic intensity and the waiting time. these are very useful tools in many engineering and data management problems in the industry
C205.4	Understand the importance of sampling distribution of a given statistic of a random sample.
C205.5	Draw statistical inference using samples of a given size which is taken from a population and to apply statistical methods for analyzing experimental data.
ELECTRONIC DEVICES AND CIRCUITS	
Course Outcomes	
C206.1	Understand and Analyse the different types of diodes, operation and its characteristics
C206.2	Understand and analyze the BJT Transistor
C206.3	Design and analyse the DC bias circuitry of BJT and FET
C206.4	Learn the methods for simplifying Boolean expressions
C206.5	To analyze and design diode application circuits, amplifier circuits and oscillators employing BJT, FET devices
ELECTRICAL AND ELECTRONICS LAB	
Course Outcomes	

C207.1	Able to verify power transfer theorems
C207.2	Able to find the characteristics of various diodes
C207.3	Able to implement rectifiers and also analyse transistor characteristics
Data Structures USING C++ LAB	
Course Outcomes	
C208.1	Implement a given Search problem (Linear Search and Binary Search)
C208.2	Implement for a given problem of Stacks, Queues and linked list and analyze the same to determine the time and computation complexity
C208.3	Write program for Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort and compare their performance in term of Space and Time complexity.
FRENCH	
Course Outcomes	
	The students will be able to communicate in French at A1 level.
	The student will have an advantage in the competitive job market.
	This course benefits the graduates when pursuing study opportunities in the countries where French is the official language.

II BTECH II SEM R-15 COURSE OUTCOMES (2-2)

SOFTWARE ENGINEERING	
Course Outcomes	
C210.1	To compare and select a process model for a business system.
C210.2	To identify and specify the requirements for the development of an application.
C210.3	To develop and maintain efficient, reliable and cost effective software solutions.
C210.4	To critically think and evaluate assumptions and arguments of the client.
C210.5	Gain knowledge in risk management and quality standards
FORMAL LANGUAGES AND AUTOMATA THEORY	
Course Outcomes	
C211.1	Apply knowledge in designing or enhancing compilers
C211.2	Design grammars and automata (recognizers) for different language classes
C211.3	Ability to implement practical aspects of automata theory.

C211.4	Able to prove or disprove theorems in automata theory using its properties
C211.5	Apply knowledge in developing tools for language processing or text processing
JAVA PROGRAMMING	
Course Outcomes	
C212.1	An understanding of the principles and practice of object oriented analysis and design in the construction of robust, maintainable programs that satisfy their requirements
C212.2	Demonstrate the ability to employ various types of selection constructs in a Java program. Be able to employ a hierarchy of Java classes to provide a solution to a given set of requirements
C212.3	An appreciation of the principles of object oriented programming
C212.4	Be able to implement, compile, test and run Java programs comprising more than one class, to address a particular software problem
C212.5	Able to make use of members of classes found in the Java API
DATABASE MANAGEMENT SYSTEMS	
Course Outcomes	
C213.1	Develop RDBMS relation schemas from ER diagrams
C213.2	Express an ability to identify the data models for relevant problems
C213.3	Design entity relationship and convert entity relationship diagrams into RDBMS and formulate SQL queries on the respective data
C213.4	Develop concurrent queries and optimize them using queries manually and apply normalization for the development of application software
C213.5	Identify recovery techniques in concurrent transactions
MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS	
Course Outcomes	
C214.1	To apply the basic economic principles, forecast the demand and supply
C214.2	To estimate cost and understand market structure and pricing practices
C214.3	To interpret the financial results of the organization
JAVA PROGRAMMING LAB	
Course Outcomes	
C215.1	Able to analyze the necessity for Object Oriented Programming paradigm and over structured programming and become familiar with the fundamental concepts in OOP.
C215.2	Demonstrate an ability to design and develop java programs, analyze, and interpret object oriented data and report results.

C215.3	Demonstrate an ability to design an object oriented system, AWT components or multithreaded process as per user needs and specifications.
C215.4	Demonstrate an ability to visualize and work on laboratory and multidisciplinary tasks like console and windows applications both for standalone and Applets program
DATABASE MANAGEMENT SYSTEMS LAB	
Course Outcomes	
C217.1	In drawing the ER, EER, and UML Diagrams.
C217.2	In analyzing the business requirements and producing a viable model for the implementation of the database.
C217.3	In converting the entity-relationship diagrams into relational tables.
C217.4	To develop appropriate Databases to a given problem that integrates ethical, social, legal, and economic concerns.
DESIGN AND ANALYSIS OF ALGORITHMS	
Course Outcomes	
C216.1	Able to analyze algorithms and improve the efficiency of algorithms
C216.2	Evaluate and Analyze the complexity of certain divide and conquer, greedy, and dynamic programming algorithms.
C216.3	Demonstrate the use of graph theory concepts and apply them in solving the real life problems.
C216.4	Apply different designing methods for development of algorithms to realistic problems, such as backtracking, branch and bound
C216.5	Distinguish the classes P, NP, and NP-Complete and examine whether a problem is NP Complete or not.

III BTECH I SEM R-15 COURSE OUTCOMES (3-1)

LINUX PROGRAMMING	
Course Outcomes	
C301.1	Identify and use Linux utilities to create and manage simple file processing operations
C301.2	Develop shell scripts to perform more complex tasks.
C301.3	Illustrate file processing operations such as standard I/O and formatted I/O.
C301.4	Develop client server Inter Process Communication (IPC) Mechanisms. Generalize Signal generation and handling signals.

C301.5	Illustrate multithreading concepts to reduce the wastage of CPU time.
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OPERATING SYSTEMS	
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Course Outcomes	
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C302.1	Apply optimization techniques for the improvement of system performance
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C302.2	Ability to understand the synchronous and asynchronous communication mechanisms in their respective OS
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C302.3	Learn about minimization of turnaround time, waiting time and response time and also maximization of throughput with keeping CPU as busy as possible
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C302.4	Ability to understand the file system management
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C302.5	Gain knowledge in deadlock characterization and understand the principles to protect the system .
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WEB TECHNOLOGIES	
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Course Outcomes	
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C303.1	Analyze a web page and identify its elements and attributes.
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C303.2	Create web pages using XHTML and Cascading Styles sheets
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C303.3	Installation and usage of Server software's.
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C303.4	Establish connection to various databases and web applications.
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C303.5	Build web applications using Servlet and JSP
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DISTRIBUTED SYSTEMS	
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Course Outcomes	
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C304.1	Identification and analysis of the core concepts of distributed systems.
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C304.2	To design and implement sample distributed systems.
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C304.3	Examine how existing systems have applied the concepts of distributed systems in designing large systems
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C304.4	Summarize the file systems in a distributed environment
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C304.5	Explain concurrent transactions and identify the control mechanisms
LINUX PROGRAMMING LAB	
Course Outcomes	
C305.1	Ability to understand the Linux environment
C305.2	Ability to perform the file management and multiple tasks using shell scripts in Linux environment
C305.3	Ability to verify the attributes of files
C305.4	Ability to create processes and enable communication between them in shared mode
C305.5	Develop interaction between server and client process using sockets
WEB TECHNOLOGIES LAB	
Course Outcomes	
C306.1	Use WAMP Stack for web applications
C306.2	Use Tomcat Server for Servlets and JSPs
C306.3	Write simple applications with Technologies like HTML, Javascript, AJAX, PHP, Servlets and JSPs
C306.4	Connect to Database and generate optimum results
C306.5	Parse XML files using Java (DOM and SAX parsers)
COMPILER DESIGN	
Course Outcomes	
C307.1	Able to describe the design of a compiler and the phases of program translation from source code to executable code and the files produced by these phases.
C307.2	Able to explain lexical analysis phase and its underlying formal models such as finite state automata, push-down automata and their connection to language definition through regular expressions and grammars.
C307.3	Able to explain the syntax analysis phase and identify the similarities and differences among various parsing techniques and grammar transformation techniques.
C307.4	Able to use formal attributed grammars for specifying the syntax and semantics of programming languages.

C307.5	Able to identify the effectiveness of optimization and explain the differences between machine-dependent and machine-independent translation.
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MANAGEMENT SCIENCE

Course Outcomes

C308.1	To know the basic management practices
C308.2	Identify the functional areas of the organisation . Capacity to manage projects
C308.3	Build up their career in the corporate world.Capable to formulate strategies

TECHNICAL COMMUNICATION AND ANALYTICAL SKILLS

C309.1	The students will be able to understand information which assists in completion of the assigned job tasks more successfully.
C309.2	Students will be able to communicate their ideas by writing projects, reports,instructions, diagrams and many other forms of professional writing.
C309.3	Students will be able to strengthen their individual and collaborative work strategies
C309.4	Students will also be able to adhere to ethical norms of scientific communication.

III BTECH II SEM R-15 COURSE OUTCOMES (3-2)

SOFTWARE TESTING METHODOLOGIES

Course Outcomes

C310.1	Ability to apply the process of testing and various methodologies in testing for developed software.
C310.2	Ability to write test cases for given software to test it before delivery to the customer.
C310.3	Master attributes and assessment of quality, reliability and security of software,
C310.4	Able to Know and perform the process for system test planning, execution and reporting, which validates that the system meets requirements.
C310.5	Master the knowledge and comparison of various testing strategies

DATA WAREHOUSING AND DATA MINING

Course Outcomes

C311.1	Understand the main characteristics of different data warehousing and data mining techniques and Knowledge discovery process
C311.2	Design a data warehouse or data mart to present information needed by management in a form that is usable for managers
C311.3	Describe and implement the main algorithms in data warehousing and data mining in a computationally efficient way.

C311.4	Apply data mining techniques to solve classification and clustering problems in other disciplines
C311.5	Apply data mining methodologies with information systems and which can be used by strategic level decision makers in well-defined business problems
CLOUD COMPUTING	
Course Outcomes	
C312.1	To distinguish the different models and computing paradigms.
C312.2	To realise the levels of virtualization and resources virtualization.
C312.3	To analyze the reasons for migrating into cloud.
C312.4	To effectively use the cloud services in various operating platforms.
C312.5	To apply the services in the cloud for real world scenarios
COMPUTER NETWORKS	
Course Outcomes	
C313.1	Exploration of the various Computer Networks, Protocols and routing algorithms.
C313.2	Employ the World Wide Web concepts and will be able to express the need for network security.
C313.3	Ability to administrate a network and flow of information.
C313.4	Describe the transport layer services and classify the flow control mechanisms
C313.5	Identify the application layer services.
WIRELESS NETWORKS AND MOBILE COMPUTING	
Course Outcomes	
C314.1	Ability to understand the strengths and limitations of mobile/wireless networks
C314.2	Ability to design and analyse the performance of location update algorithms for cellular networks
C314.3	Understand the wireless protocols applied in the network layer
C314.4	To understand the database issues from query processing , data recovery processing and quality service issues

C314.5	Gain knowledge in data dissemination methods and synchronization
OBJECT ORIENTED ANALYSIS AND DESIGN	
Course Outcomes	
C315.1	Apply fundamental concepts of object-oriented analysis and design approach
C315.2	Create use case diagram to represent the scope of development problem domain
C315.3	Develop domain model, sequence diagram, activity diagram and state chart diagram based on use case narrative.
C315.4	Apply Unified Modeling Language Notation to object-oriented models.
C315.5	Build up experience on adopting object-oriented approach as an alternative methodology for system development
DATAWARE HOUSING & DATAMINING LAB	
Course Outcomes	
C316.1	Gain knowledge in data warehouse schemas and algorithms for preprocessing data
C316.2	Develop algorithms for data extraction and transformation
C316.3	Ability to apply mining techniques for real world data
C316.4	Ability to add mining algorithms as a component to the existing tools
C316.5	Construct classification algorithms for data analysis
CASE TOOLS AND STM LAB	
Course Outcomes	
C317.1	Ability to understand the history, cost of using and building CASE tools
C317.2	Ability to construct and evaluate hybrid CASE tools by integrating existing tools
C317.3	Ability to deliver the product with qualitative testing

IV BTECH I SEM R-15 COURSE OUTCOMES (4-1)

HUMAN COMPUTER INTERACTION	
Course Outcomes	
C401.1	Able to demonstrate the knowledge and ability on the GUI & UI.
C401.2	How to make a good design and information about design process
C401.3	Demonstrate the knowledge in Components involved in designing a process or GUI
C401.4	Apply an interactive design process and universal design principles to designing HCI systems
C401.5	Analyze and identify user models, user support, socio-organizational issues, and stakeholder requirements of HCI systems
DESIGN PATTERNS	
Course Outcomes	
C402.1	Ability to understand and apply common design patterns in incremental/iterative development
C402.2	Apply appropriate design patterns for a given problem
C402.3	Develop design solutions using creational patterns
C402.4	Apply structural patterns to solve design problems
C402.5	Construct design solutions by using behavioural patterns
MOBILE APPLICATION DEVELOPMENT	
Course Outcomes	
C403.1	Appreciate the Mobility landscape
C403.2	Familiarize with Mobile apps development aspects
C403.3	Design and develop mobile apps, using Android as development platform, with key focus on user experience design, native data handling and background tasks and notifications.
C403.4	Perform testing, signing, packaging and distribution of mobile apps.
C403.5	The student can design and develop mobile application using J2ME
BUSINESS DATA ANALYTICS	

Course Outcomes	
C404.1	Summarize Big data concepts and its deployment in business market
C404.2	Categorize the different big data analytics
C404.3	Apply statistical tools to solve complex problems
C404.4	Gain knowledge in data analytic tools
C404.5	Apply machine learning algorithms for a real world dataset
SCRIPTING LANGUAGES	
Course Outcomes	
C405.1	Develop programs in Basic and advanced perl scripting.
C405.2	Perform advanced php programming
C405.3	Gain knowledge on Tk Visual tool kits
C405.4	Develop integrated web applications in python scripting
C405.5	Apply the knowledge on projects
APPLICATION PROGRAMMING	
Course Outcomes	
C406.1	Acquire the skills to edit, test and implement software for a client-server environment
C406.2	Develop programs to retrieve data from forms and files to produce user displays and reports;
C406.3	Develop code to use regular expressions, handle exceptions and validate data for file and database storage
C406.4	Learn object oriented programming constructs and develop programs that use strings, dates, arrays, functions, classes and objects
C406.5	Learn data access technology communication in connected and disconnected layers
COMPUTER FORENSICS	
Course Outcomes	

C407.1	Understand the usage of computers in forensic and how to use various forensic tools for a wide variety of investigations
C407.2	Describe the types of computer forensics technology
C407.3	Illustrate the methods for data recovery, evidence collection and data seizure
C407.4	Summarize duplication and preservation of digital evidence
C407.5	It gives an opportunity to students to continue their zeal in research in computer forensics

MOBILE APPLICATION DEVELOPMENT LAB

Course Outcomes

C408.1	Design and Implement various mobile applications using emulators
C408.2	Deploy applications to hand-held devices
C408.3	Develop an application using basic graphical primitives and databases

APPLICATION PROGRAMMING LAB

Course Outcomes

C409.1	Design and develop small applications using Visual Studio
C409.2	Apply object oriented concepts to construct a program and implement to exhibit their behaviour
C409.3	Create console applications that handles exceptions and also demonstrate the priority of the process using thread concepts

IV BTECH II SEM -15 COURSE OUTCOMES (4-2)

SOFTWARE PROJECT MANAGEMENT

Course Outcomes

C410.1	Able to understand the pros and cons of conventional and modern software development practices.
C410.2	Able to design and analyze the software architectures.
C410.3	Able to build a cost model for the estimation of cost and effort needed in a product development.
C410.4	Able to develop and evaluate various artifacts sets for better understanding of software development.
C410.5	Apply the skills in managing various resources, artifacts and teams of a software project.

E-COMMERCE

Course Outcomes

C411.1	Understand the nature of E-commerce and recognise the impact and potential of e-commerce
C411.2	Able to explain the e-commerce technologies required to make e-commerce viable
C411.3	Discuss the current drivers and inhibitors facing the business world in adopting and using ecommerce
C411.4	Explain the economic consequences of e-Commerce
C411.5	Discuss the trends in e-Commerce and the use of the Internet

WEB SERVICES

Course Outcomes

C412.1	Able to develop and build java web services
C412.2	Gain knowledge in web services architecture
C412.3	Able to build enterprise web services
C412.4	Thorough understanding the basic details of WSDL, UDDI, SOAD
C412.5	Implement WS client and server with interoperable systems

MINI PROJECT

Course Outcomes

C413.1	Interpret literature with the purpose of formulating a project proposal
C413.2	Planning, analyzing, designing and implementing a software project using SDLC model.
C413.3	Finding the solution of identified problem with help of modern technology
C413.4	Giving priority to real life problem
C413.5	Learning to work as a team and to focus on getting a working project done within a stipulated period of time.

TECHNICAL SEMINAR

Course Outcomes

C414.1	The students will be able to understand information which assists in completion of the assigned job tasks more successfully.
C414.2	Students will be able to communicate their ideas by writing projects, reports, instructions, diagrams and many other forms of professional writing.
C414.3	Students will be able to strengthen their individual and collaborative work strategies
C414.4	Students will also be able to adhere to ethical norms of scientific communication.

MAJOR PROJECT

Course Outcomes

C415.1	Understand programming language concepts,object oriented concepts as well as software engineering principles or go through the research work and gather knowledge over the field and develop an ability to apply them to software design of real life problems in an industry/ commercial environment
C415.2	Plan, analyze, design a software project and demonstrate the ability to communicate effectively in speech and writing
C415.3	Demonstrate originality in the application of knowledge, together with a practical understanding of how established techniques professional enquiries are used to create and interpret knowledge in their discipline.
C415.4	Introduce with major software engineering topics and position them to lead medium sized software projects in industry or propose any new model over the selected field of research that will be useful for future activities
C415.5	Advance their knowledge and to develop new skills to a high level with complex issues both systematically and creatively, make sound judgments on the complete data, and communicate their conclusions clearly to specialist and non-specialist audiences

Bachelor of Technology

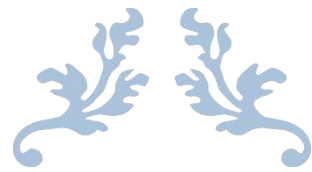


R 15 Course Outcomes



in

Mechanical Engineering



I Year B.Tech I-Sem



I YEAR	ENGLISH
S No	COURSE OUTCOMES
1	Usage of English Language, written and spoken.
2	Enrichment of comprehension and fluency.
3	Gaining confidence in using language in verbal situation.
I YEAR	MATHEMATICS -I
S No	COURSE OUTCOMES
1	After learning the contents of this Unit the student is able to write the matrix representation of a set of linear equations and to analyze solutions of system of equations.
2	The student will be able to understand the methods of differential calculus to optimize single and multivariable functions.
3	The student is able to identify the type of differential equation and uses the tight method to solve the differential equations. Also able to apply the theory of differential equations to the real world problems.
4	The student is able to solve certain differential equations using Laplace Transform. Also able to transform functions on time domain to frequency domain using Laplace transforms.
I YEAR	Engineering Physics-I
S No	COURSE OUTCOMES
1	The students would be able to learn the fundamental concepts of wave optics.
2	The knowledge on fundamentals of quantum mechanics, statistical mechanics enables the student to apply to various systems like communications solar cells, LED's and so on.
3	Finally, Engineering physics course helps the student to develop problem solving skills and analytical, practical skills
I YEAR	ENVIRONMENTAL STUDIES
S No	COURSE OUTCOMES
1	Based on this course, the Engineering graduate will understand /evaluate / develop technologies on the basis of ecological principles and environmental regulations which in turn helps in sustainable development.

I YEAR**COMPUTER PROGRAMMING WITH C**

S No	COURSE OUTCOMES
1	Demonstrate the basic knowledge of computer hardware and Software.
2	Ability to apply solving and logical skills to programming in C language and also in other languages

I YEAR**ENGINEERING MECHANICS**

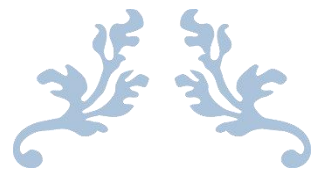
S No	COURSE OUTCOMES
1	Gain the knowledge on the concepts of force, moment and its application
2	Understand and apply the knowledge on drawing free body diagrams and solve the problems using analytical methods and law of triangle of forces.
3	Students are capable of finding centroid, center of gravity, moment of inertia and polar moment of inertia including transfer methods and their applications.
4	Understanding the motion in straight line and in curvilinear paths, its velocity and acceleration computation and methods of representing plane motion.
5	Understand and apply the knowledge on concepts of D'Alembert's principle and particle motion

I YEAR**COMPUTER PROGRAMMING LAB**

S No	COURSE OUTCOMES
1	Role of Functions involving the idea of modularity.
2	Concept of Array and pointers dealing with memory management.
3	Structures and unions through which derived data types can be formed
4	File Handling for permanent storage of data or record.
5	Programming using gcc compiler in Linux.

I YEAR	IT WORKSHOP LAB / ENGINEERING WORKSHOP
S No	COURSE OUTCOMES
1	Apply knowledge for computer assembling and software installation
2	Ability how to solve the trouble shooting problems.
3	Apply the tools for preparation of PPT, Documentation and budget sheet etc.
ENGINEERING WORKSHOP	
1	Prepare basic joints used in carpentry
2	Prepare edges for better joint for fitting
3	Perform basic house wiring connections
4	Prepare various shapes and objects by using Tin smithy and Black smithy.

I YEAR	ENGLISH LANGUAGE COMMUNICATION SKILLS LAB
S No	COURSE OUTCOMES
1	Better Understanding of nuances of language through audio-visual experience and group activities.
2	Neutralization of accent for intelligibility
3	Speaking with clarity and confidence thereby enhancing employability skills of the students.

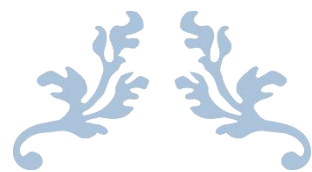


I Year B.Tech II-Sem



I-II	PROFESSIONAL ENGLISH
S No	COURSE OUTCOMES
1	Usage of English Language, written and spoken.
2	Enrichment of comprehension and fluency.
3	Gaining confidence in using language in verbal situations
I-II	MATHEMATICS – II
S No	COURSE OUTCOMES
1	From a given discrete data, one will be able to predict the value of the data at an intermediate point and The student will be able to find a approximate root of a given equation.
2	By curve fitting, one can find the most appropriate formula for a guesses relation of the data variables. This method of analysis data helps engineers to understand the system for better interpretation and decision making. and will be able to find a numerical solution for a given differential equation.
3	One will be able to find the expansion of a given function by Fourier series.
4	After studying this unit, one will be able to find a corresponding Partial Differential Equation for an unknown function with many independent variables and to find their solution.
5	The student will be able to evaluate multiple integrals(line, surface volume integrals) and convert line integrals to area integrals and surface integrals to volume integrals.
I-II	ENGINEERING PHYSICS-II
S No	COURSE OUTCOMES
1	The students would be able to learn the fundamental concepts on behavior of crystalline solids.
2	The student will be able to think about the applications of dielectric, magnetic and nano materials.
3	Finally Engineering physics course help the student to develop problem solving skills and analytical skills
I-II	ENGINEERING CHEMISTRY
S No	COURSE OUTCOMES
1	To impart the basic concepts and ideas in chemistry, to develop scientific attitudes and enable the students to correlate the concepts of chemistry with the core programmes.
2	Electrochemistry unit give conceptual knowledge about spontaneous processes and how can they be harnessed for producing electrical energy and efficiency of systems. Fuel cells which are the alternate energy sources for generating electrical energy on spot and portable applications.
3	Understand various techniques involved in polymerization and application of polymer technology in the area of various engineering fields and manufacturing process of important metallurgical materials.

4	To impart the basic concepts and ideas in chemistry, to develop scientific attitudes and enable the students to correlate the concepts of chemistry with the core programmes.
5	Electrochemistry unit give conceptual knowledge about spontaneous processes and how can they be harnessed for producing electrical energy and efficiency of systems. Fuel cells which are the alternate energy sources for generating electrical energy on spot and portable applications.
I-II	ENGINEERING DRAWING
S No	COURSE OUTCOMES
1	Get knowledge on usage of various drawing instruments and capable to draw various curves like conic curves, cycloidal curves and involutes.
2	Understand the Orthographic Projections of Points and Lines and are able to improve their visualization skills so that they can apply these skills in developing the new products.
3	Understand about orthographic projection and able to draw planes and solids according to orthographic projections.
4	Can employ freehand 3D pictorial sketching to aid in the visualization process and to efficiently communicate ideas graphically.
5	To convert and draw the given orthographic view to isometric view and vice versa.
I-II	ENGINEERING PHYSICS / ENGINEERING CHEMISTRY LAB
S No	COURSE OUTCOMES
1	The student is expected to learn from this laboratory course the concept of error and its analysis. It also allows the student to develop experimental skills to design new experiments in Engineering. With the exposure to these experiments the student can compare the theory and correlate with experiment.



II Year B.Tech I-Sem



II YEAR THERMODYNAMICS

S No	COURSE OUTCOMES
1	To differentiate between quality and quantity of energy, heat and work, enthalpy and entropy, Etc.
2	Quantify the irreversibility's associated with each possibility and choose an optimal cycle.
3	Able to analyze Mollier chart, Gas tables in order to estimate thermodynamic properties such as WBT, DBT, RH etc.
4	Able to utilize psychrometric chart and estimate the various psychrometric properties.
5	Assess which cycle to use for a given application and source of heat.

II-I**MATERIAL SCIENCE**

S No	COURSE OUTCOMES
1	Summarizing the concepts of material science properties in the design and development of mechanical systems.
2	Creativeness in new systems components and processes in the field of engineering.
3	Interpreting the heat treatment process and types of alloys for mechanical engineering applications useful to the society.
4	Produce different methods of composite materials for automobile and aeronautical applications.
5	To recalling relevant knowledge from long term memory in types of polymers.

II YEAR**ELECTRICAL AND ELECTRONICS ENGINEERING**

S No	COURSE OUTCOMES
1	After going through this course the student gets a thorough knowledge on basic electrical circuits, parameters, electromechanical energy conversion, construction and operational characteristics of DC and AC machines
2	The constructional features and operation of measuring instruments like voltmeter, ammeter, wattmeter etc., different semiconductor devices, operation of diodes and transistors, their voltage-current characteristics, realization of various electronic circuits with the various semiconductor devices ,and cathode ray oscilloscope,
3	With which he/she can able to apply the above conceptual things to real-world electrical, electronic problems and applications.

II YEAR**STRENGTH OF MATERIALS**

S No	COURSE OUTCOMES
1	Determine the simple stresses and strains when members are subjected to axial loads.
2	Draw the shear force and bending moment diagrams for the beam subjected to

	different loading conditions.
3	Evaluate stresses induced in different cross-sectional members subjected to shear loads.
4	Evaluate the deflections in beams subjected to different loading conditions.
5	Analyze the Shafts and thick cylindrical shells.

II YEAR

KINEMATICS OF MACHINERY

S No	COURSE OUTCOMES
1	Distinguish kinematic and kinetic motion. Identify the basic relations between distance, time velocity, and acceleration. Apply vector mechanics as a tool for solving kinematic problems. Create a schematic drawing of a real-world mechanism.
2	Determine the degrees-of-freedom (mobility) of a mechanism. Use graphical and analytic methods to study the motion of a planar mechanism. Use computer software to study the motion of a mechanism. Design basic gear trains. Design basic cam systems.
3	This course contributes to the assessment of the following program (student) outcomes: an ability to apply knowledge of mathematics, science and engineering an ability to identify, formulate, and solve engineering problems
4	Will be able to determine the degree of freedom of a given mechanical system.
5	Will be able to understand the importance of mechanisms and their applications and to develop new mechanisms for various applications.

II YEAR

PROBABILITY AND STATISTICS

S No	COURSE OUTCOMES
1	Students would be able to identify distribution in certain realistic situation. It is mainly useful for circuit as well as non circuit branches of engineering. Also able to differentiate among many random variables involved in the probability models. It is quite useful for all branches of engineering.
2	The student would be able to calculate mean and proportions (small and large samples) and to make important decisions from few samples which are taken out of unmanageably huge populations. It is mainly useful for non-branches of engineering. The student would be able to find the expected queue length, the ideal time the traffic intensity and the waiting time.
3	These are very useful tools in many engineering and data management problems in the industry. It is useful for all branches of engineering

II YEAR

JAVA PROGRAMMING

S No	COURSE OUTCOMES
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1	An understanding of the principles and practice of object oriented analysis and design in the construction of robust, maintainable programs which satisfy their requirements .A competence to design, write, compile, test and execute straightforward programs using a high level language.
2	An appreciation of the principles of object oriented programming. An awareness of the need for a professional approach to design and the importance of good documentation to the finished programs. Be able to implement, compile, test and run Java programs comprising more than one class, to address a particular software problem. Demonstrate the ability to use simple data structures like arrays in a Java program
3	Be able to make use of members of classes found in the Java API (such as the Math class). Demonstrate the ability to employ various types of selection constructs in a Java program. Be able to employ a hierarchy of Java classes to provide a solution to a given set of requirements. Able to develop applications using Applet,awt,JDBC and Swings

II YEAR

TECHNOLOGY MANAGEMENT

S No	COURSE OUTCOMES
1	Improvement of best practices in companies.
2	Assessment of impact of technology in different areas to meet desired outputs.
3	Identification of tech mgt activities and areas of strength and weaknesses in specific sectors of businesses. Insight into detailed process of key areas of technology

II YEAR

ELECTRICAL AND ELECTRONICS ENGINEERING LAB

S No	COURSE OUTCOMES
1	Students can simulate building and test basic analog circuit Assignments that .. demonstrate accomplishment of this outcome: 1) Lab Exercises and Assignments Objective 2) An understanding of amplifiers
2	Students can simulate building and test amplifier circuits Assignments that demonstrate accomplishment of this outcome: 1) Lab Exercises and Assignments

II YEAR

MATERIAL SCIENCE AND STRENGTH OF MATERIALS LAB

S No	COURSE OUTCOMES
1	Summarizing can understand micro structures of different material

2	Different heat treatment methods and change of mechanical properties based on micro structure of methods.
3	Produce different methods in Iron carbon equilibrium diagrams for material science applications.
4	Analyze and design structural members subjected to tension, compression, torsion, bending and combined stresses using the fundamental concepts of stress, strain and elastic behavior of materials.
5	Understand the basic concepts of stress, strain, deformation, and material behavior under different types of loading (axial, torsion, bending).

II YEAR

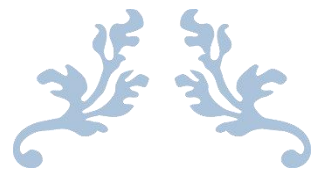
FOREIGN LANGUAGE: FRENCH

S No	COURSE OUTCOMES
1	The student will be in a position to speak in French, Which is the second most widely learned foreign language after English, and the ninth most widely spoken language in the world. French is also the only language, alongside English, that is taught in every country in the world.
2	The Student will get the ability to speak French is an advantage on the international job market.
3	Students with a good level of French are eligible for French government scholarships to enroll in postgraduate courses in France in any discipline and qualify for internationally recognized French degrees.
4	The student will be in a position to speak in French, Which is the second most widely learned foreign language after English, and the ninth most widely spoken language in the world. French is also the only language, alongside English, that is taught in every country in the world.
5	The Student will get the ability to speak French is an advantage on the international job market.

II YEAR

FOREIGN LANGUAGE: GERMAN

S No	COURSE OUTCOMES
1	Students familiarize with a modern foreign language – German
2	The students with German get acquainted for basic communication in everyday situations.
3	Students will know with the basics of writing simple direct sentences and short compositions.
4	Students get to know the basics of German language to communicate in the work place when they find the ne
5	Students familiarize with a modern foreign language – German



II Year B.Tech II-Sem



II YEAR**DYNAMICS OF MACHINERY**

S No	COURSE OUTCOMES
1	Recall the mechanisms and dynamic principles of particles and rigid systems.
2	Apply principles of engineering dynamics for gyroscopes
3	Differentiate the types of clutches, bearings and brakes and dynamometers.
4	Recognizes the importance of vibration due to unbalance in machinery and solve the vibration problems of single degree of freedom
5	Create a clutch, flywheel and governor mechanisms and able to study them

II YEAR**THERMAL ENGINEERING**

S No	COURSE OUTCOMES
1	To be able to recognize main and supplementary elements of SI and CI engines and define operational principles.
2	To be able to describe the most important combustion concepts and problems in concern with SI engines and CI engines.
3	To be able to analyze energy distribution in an internal combustion engines. Develop problem solving skills through the application of thermodynamics.
4	To understand the velocity triangles in compressors. Solve problems associated with Rotodynamic compressors.
5	Solve problems associated with reciprocating compressors and expanders and internal combustion engines .

II YEAR**FLUID MECHANICS AND HYDRAULIC MACHINERY**

S No	COURSE OUTCOMES
1	Gain the knowledge on fluid mechanics fundamentals like fluid statics and fluid kinematics
2	Have basic idea about the fundamental equations used in Fluid Dynamics and are able to apply these concepts in real working environment
3	Study the fundamentals of turbo machinery and elements of hydroelectric power plant.
4	Measure the performance of the different types of Hydraulic Turbines
5	Calculate the performance of the different types of Hydraulic Pumps.

II YEAR**MACHINE DRAWING**

S No	COURSE OUTCOMES
1	Student will be able to Visualize and prepare detail drawing of a given object.
2	Student will able to draw threads, bolts, nuts, stud bolts, tap bolts, set screws, Keys, cottered joints and knuckle joint.
3	Draw Riveted joints, shaft coupling, pipe joints.
4	Draw details and assembly of mechanical systems, Read and interpret a given drawing
5	Create 2-D and 3-D models using any standard CAD software with manufacturing considerations

II YEAR**MANUFACTURING SCIENCE**

S No	COURSE OUTCOMES
1	Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2	Acquire knowledge and hands-on competence in applying the concepts of manufacturing science in the design and development of mechanical systems.
3	Competence to design a system, component or process to meet societal needs within realistic constraints.
4	Demonstrate creativeness in designing new systems components and processes in the field of engineering in general and mechanical engineering in particular.
5	An ability to formulate solve complex engineering problem using modern engineering and information Technology tools.

II YEAR**INDUSTRIAL ENGINEERING**

S No	COURSE OUTCOMES
1	The concepts of management and organization structure are understood by students
2	The plant location and work study objectives are learned and remembered
3	Importance of material management and TQM are known
4	Evaluated PERT CPM various techniques for various projects
5	Applied quality control techniques and remembered functions of HRM

II YEAR**INTELLECTUAL PROPERTY RIGHTS**

S No	COURSE OUTCOMES
1	It allows students how to prepare and protect the Inventions , start up ideas and rights of patents and copy rights etc.,
2	Students gets the knowledge on TRIPS.
3	This subject brings awareness to the students the basic legal aspects at present following at Global level.
4	Student gets the exposure of license agreement legal systems and generalities.
5	Student gets exposure to licensing and transfer of intellectual property and the agreements based on transfer.

II YEAR**ENTERPRISE RESOURCE PLANNING**

S No	COURSE OUTCOMES
1	Understanding ERP systems by the students,
2	Evaluated ERP software and modules for real time implementation
3	Various analyses done to Implementation of ERP
4	post implementation on ERP observed for various markets
5	extended emerging trends on ERP for business analytics

MANUFACTURING SCIENCE LAB

S No	COURSE OUTCOMES
1	Learn about patterns and casting of metals.
2	Understand the concept of Arc, Spot, TIG welding and brazing process.

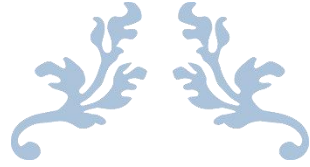
3	Understand the Process of simple, compound and progressive press and Hydraulic press
4	Learn the Moulding process of plastic materials
5	Understand the processing of different materials in the lab.

II YEAR
FLUID MECHANICS AND HYDRAULIC MACHINERY LAB

S No	COURSE OUTCOMES
1	To provide the students' knowledge in calculating performance analysis in turbines.
2	Students exposure to study various operating characteristics of Centrifugal pump and Reciprocating pump.
3	Analyze a variety of fluid flow devices and utilize fluid mechanics principles in design.
4	Get Exposure to verification of Bernoulli's Theorem.
5	To provide the students with a solid foundation in fluid flow principles

II YEAR
GENDER SENSITIZATION

S No	COURSE OUTCOMES
1	Students will have developed a better understanding of important issues related to gender in contemporary India.
2	Students will be sensitized to basic dimensions of the biological, sociological, psychological and legal aspects of gender. This will be achieved through discussion of materials derived from research, facts, everyday life, literature and film.
3	Students will attain a finer grasp of how gender discrimination works in our society and how to counter it.
4	Students will acquire insight into the gendered division of labor and its relation to politics and economics.
5	Men and women students and professionals will be better equipped to work and live together as equals.



III Year B.Tech I-Sem



ADVANCED THERMAL ENGINEERING	
S No	COURSE OUTCOMES
1	Recognize and recall the importance of thermal power plant and its thermodynamic analysis for improvement of efficiency.
2	Understand the operation of steam boiler, steam nozzle, condenser and steam turbine.
3	Able to do thermodynamic analysis for steam nozzles, condensers and steam turbines.
4	Evaluate the thermodynamic efficiency of gas turbine and jet propulsion systems.
5	Create the jet propulsion system and do the thermodynamic analysis for better efficiency.

MACHINE DESIGN-I	
S No	COURSE OUTCOMES
1	Acquires the knowledge about the principles of design, material selection, component behavior subjected to loads, and criteria of failure.
2	Understands the concepts of principal stresses, stress concentration in machine members and fatigue loading. Analyze the fluctuating loads that will cause failure in real parts using the Soderberg, Gerber and Goodman techniques.
3	Understand different welded and riveted joints structure and able to apply its knowledge to analyze its strength when subjected to simple to simple, coplanar and eccentric loading
4	Explain and design the basic of mechanical design process of simple machine components like, key, cotter joints and coupling
5	Design of helical springs for two wheel vehicle and laminated springs for trucks

MACHINE TOOLS	
S No	COURSE OUTCOMES
1	To analyze various machining processes and calculate relevant quantities such as velocities, forces and powers.
2	Analyze the classification of cylindrical work parts and their operations performed on turning machines.
3	Explain the features, working principles and applications of lathe, shaper, planer, slotter, milling, and drilling machines.
4	Evaluate the surface finishing operations with abrasive processes such as grinding and broaching machines, types and working principle.
5	Discuss the constructional features and the terminologies related to honing & lapping machines and various types of Jigs and Fixtures.

III YEAR

METROLOGY AND SURFACE ENGINEERING

S No	COURSE OUTCOMES
1	Explore knowledge & ability to design tolerances and fits for selected product quality.
2	Demonstrate knowledge with Linear Measurement, Measurement of Angles and Tapers and Limit Gauges.
3	Understand Principles of Optical & Flat Surface measuring instruments , gauges and their uses.
4	Explore the use of appropriate method for determination of Surface Roughness Measurement by using different parameters.
5	They can choose appropriate method and instruments for inspection of various gear elements and thread elements with the help of comparators

ALTERNATIVE FUELS FOR IC ENGINES

S No	COURSE OUTCOMES
1	Understanding of availability and suitability of alternative fuels for IC engines
2	To acquaint the students with various requirements of liquid fuels in S.I engines
3	To be able to understand various types of alternative liquid fuels for C.I engine
4	To impart the knowledge of properties, performance and emission characteristics of gaseous fuels in S.I engines
5	To impart the knowledge of properties, performance and emission characteristics of gaseous fuels in C.I engines

VEHICULAR POLLUTION AND CONTROL

S No	COURSE OUTCOMES
1	Understand contemporary pollution issues. Have insight into specific examples of vehicular pollution.
2	Understand the causes and effects of key types of vehicular pollution.
3	Appreciate different pollution control strategies. Awareness of vehicular emission control Laws & Acts.
4	Students will have Knowledge on sources and effects of air pollution.
5	Students will have comprehensive Knowledge on control of both particulate and gaseous air pollutants

III YEAR

COMBUSTION TECHNOLOGY

S No	COURSE OUTCOMES
1	Recognize and understand reasons for differences among operating characteristics of different engine types and designs.
2	Given an engine design specification, predict performance and fuel economy

	trends with good accuracy.
3	Based on an in-depth analysis of the combustion process, predict concentrations of primary exhaust pollutants.
4	Exposure to the engineering systems needed to set-up and run engines in controlled laboratory environments.
5	Develop skills to run engine dynamometer experiments.

III YEAR **MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS**

S No	COURSE OUTCOMES
1	To understand fundamental concepts of economics and enables students how these concepts are utilized in business management.
2	Evaluates students to understand the production, technical relationship in factors of production, its process and impact of various costs on production.
3	To understand students to know types of markets and how firms determine their production levels in different competitive situations.
4	It remembers students to understand how business will maintain accounting books and financial position of the business in the market.
5	To understand Students should be able that how to take better decisions towards investment proposals.

WEB TECHNOLOGIES	
S No	COURSE OUTCOMES
1	Analyze a web page and identify its elements and attributes. Create web pages using XHTML and Cascading Styles sheets.
2	Installation and usage of Server software's.
3	Database Connectivity to web applications. Build web applications using Served and JSP

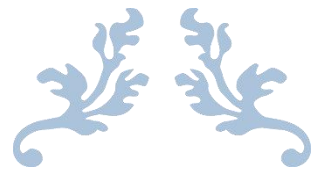
SOLID WASTE MANAGEMENT	
S No	COURSE OUTCOMES
1	Understand the design and operation of a resource recovery facility.
2	Demonstrate the design and operation of a waste-to-energy facility.
3	Student able to understand about the different wastages.

III YEAR**MACHINE TOOLS AND METROLOGY LAB**

S No	COURSE OUTCOMES
1	Demonstrate knowledge of different machine tools used in machine shop.
2	Perform step, taper turning, knurling and threading operations on lathe.
3	Practical exposure on Flat Surface machining, Shaping, Slotting, Milling and grinding operations.
4	Apply the procedures to measure length, width, depth, bore diameters, external tapers, tool angles, and surface roughness by using different instruments.
5	Measure the angle and taper using Bevel protractor and Sine bar.

III YEAR**THERMAL ENGINEERING LAB**

S No	COURSE OUTCOMES
1	Draw the valve and port timing diagram of SI engine & CI engine.
2	Calculate & Compare the performance characteristics of diesel and petrol engines.
3	Apply the concept of Morse test on multi cylinder SI engine.
4	Analyze the efficiency of reciprocating air compressor.
5	Understand the working of boilers



III Year B.Tech II-Sem



III YEAR**MACHINE DESIGN-II**

S No	COURSE OUTCOMES
1	Design journal bearings, ball bearings and roller bearings and to know the advantages of rolling contact bearings against sliding contact bearings. Select suitable bearings and its constituents from manufacturers catalogues under given loading conditions
2	To know various forces acting on I C engine parts and failure criteria to be adopted for various parts.
3	Design belt drives for different input conditions. Select suitable belt drives under given loading conditions.
4	Design spur and helical gears for different input conditions. Select appropriate gears for power transmission on the basis of given load and speed.
5	Design machine tool elements and Analyze power screws subjected to loading

III YEAR**FINITE ELEMENT METHOD**

S No	COURSE OUTCOMES
1	Identify mathematical model to solve common engineering problems by applying the finite element method and formulate the elements for one dimensional bar structures and solve problems in one dimensional bar structures.
2	Formulate FE characteristic equations for two dimensional elements and analyze plain stress, plain strain and Derive element matrices to find stresses in beams.
3	Formulate FE characteristic equations for axisymmetric problems and isoparametric elements.
4	Derive element matrices to find stresses in trusses and heat transfer problems
5	Solve dynamic problems where the effect of mass matters during the analysis.

III YEAR**HEAT TRANSFER**

S No	COURSE OUTCOMES
1	To identify the modes of heat transfer and calculate the conduction in
2	various solids, calculate steady state and unsteady state heat conduction problems applied to different geometries
3	To solve the heat convection in various medium.
4	To learn about the radiation and its use in real life
5	To evaluate the heat transfer in phase change process

REFRIGERATION AND AIR CONDITIONING

S No	COURSE OUTCOMES
1	Understand the basic cycle, working principle, classification, performance of various components in the domestic refrigerator and refrigeration cycles
2	Examine the purpose and functioning of vapour compression refrigeration system analyzing the concept of sub-cooling and super heating in improving the COP.

3	Analyze the basic cycle, working principle of various types of vapour absorption refrigeration systems, its calculation of COP And Refrigerant properties.
4	Evaluate various Psychometric Properties, calculations of heat loads for various applications and selection of air-conditioning system based on climatic Seasons.
5	Select different heat pump circuits based on the requirement and Air conditioning equipment.
COMPRESSIBLE FLUID FLOW	
S No	COURSE OUTCOMES
1	Students will demonstrate the ability to apply the basic equations of compressible flow, isentropic flows, and the shock wave relationships to calculate pressures, temperatures, Mach number and velocities for various internal and external flow configurations.
2	Students will demonstrate the ability to analyze flows in one-dimensional diffusers and inlets.
3	Students will demonstrate the ability to perform preliminary design of supersonic inlets, diffusers, wind tunnels and other compressible flow devices by using one-dimensional compressible flow theory.
4	Students will demonstrate the ability to analyze and perform appropriate calculations for supersonic and subsonic flows with friction or heat addition.
5	Students will demonstrate the ability to evaluate devices for measuring pressure, temperature and pressure in compressible flows

III YEAR

COMPUTATIONAL FLUID DYNAMICS

S No	COURSE OUTCOMES
1	Students will be able to use Finite Difference and Finite Volume methods in CFD modeling.
2	Students will be able to generate and optimize the numerical mesh.
3	Students will be able to simulate simple CFD models and analyze its results.
4	Provide the student with a significant level of experience in the use of modern CFD software for the analysis of complex fluid-flow systems.
5	Improve the student's understanding of the basic principles of fluid mechanics

COMPOSITE MATERIALS	
S No	COURSE OUTCOMES
1	Explain concept of the composite materials and its terminologies used.
2	Analyze the different processing/ fabrication techniques of composite materials especially fiber components
3	Describe the polymer materials and its applications which are having better improved properties to suit with conventional materials.
4	Analyze the fiber and matrix properties for structural applications.
5	Evaluate the optimum fabrication techniques for metal matrix materials and powder metallurgy techniques to enhance material properties.

APPS DESIGN AND DEVELOPMENT	
S No	COURSE OUTCOMES
1	Ability to identify the minimum requirements for the development of application.
2	Ability to apply different multimedia development tools to produce web based and stand-alone user interfaces.
3	Gain knowledge of client side scripting, understanding of server side scripting with java

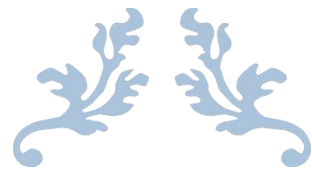
PRODUCTION AND OPERATIONS MANAGEMENT	
S No	COURSE OUTCOMES
1	The understand significance of POM, students able to Illustrate production planning functions and manage manufacturing functions in a better way.
2	memorable competency in scheduling and sequencing in manufacturing operations and effect affordable manufacturing lead time.
3	To apply the techniques of quality control and control inventory with cost effectiveness.
4	Get conversant with various documents procedural aspects and preparation of orders for various MRP and stores management.
5	Analyzed and applied various techniques in cost reduction.

NANO MATERIALS	
S No	COURSE OUTCOMES
1	Understand fundamentals of nano science with respect to material and processing methods.
2	Understand the properties of nano materials and compare with bulk materials.
3	Understand methodologies and techniques of synthesis, processing and characterization of major classes of nano materials.

4	Recognize major application areas of nano materials and nanotechnologies in contemporary world and generate creative solutions.
5	Will develop knowledge in characteristic nonmaterial.
HEAT TRANSFER LAB	
S No	COURSE OUTCOMES
1	Perform experiments to determine the thermal conductivity of a metal rod
2	Conduct experiments to determine convective heat transfer coefficient for free and forced convection and correlate with theoretical values.
3	Estimate the effective thermal resistance in composite slabs
4	Determine surface emissivity of a test plate
5	Estimate performance of effectiveness of fin

CAD LAB	
S No	COURSE OUTCOMES
1	Understand the need of computers in industrial manufacturing, product cycle, CAD/CAM hardware, computer graphics.
2	Understand the geometric modeling to represent curves and surfaces.
3	Understand the basic geometric commands and numerical control.
4	Understand the concept of group technology, production flow analysis, process planning.
5	Understand computer aided quality control and computer integrated manufacturing

TECHNICAL COMMUNICATION AND SOFT SKILLS	
S No	COURSE OUTCOMES
1	The student will become proficient in LSRW skills.
2	They develop formal LSRW skills approach to different situations.
3	They hone professional ethics and learn to be proficient formally



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OPERATIONS RESEARCH	
S No	COURSE OUTCOMES
1	Student will be able to Identify and develop operational research models from the verbal description of the real system.
2	Understand the mathematical tools that are needed to solve optimization problems.
3	Develop a report that describes the model and the solving technique, analyses the results and propose recommendations in language understandable in Management Engineering.
4	Student able to understand Multi-criteria decision techniques, Decision making under uncertainty and risk, Game theory, and Dynamic programming.
5	Use mathematical software to solve the proposed simulation models.

CAD/CAM	
S No	COURSE OUTCOMES
1	Understand the applications of computer in the design and manufacturing.
2	Understand and develop the Mathematical representations of curves used in geometric construction.
3	Understand the concept of Drafting commands for solid modeling and Understand the concept and working principle of NC, CNC, and DNC and can develop a program using G and M codes.
4	Make use of GT and CAPP concepts and are able to apply these concepts in bringing the benefits of mass production in real working environment.
5	Plan the computer integrated production planning in working environment and able to analyze the quality of a product through computer aided quality control

MECHANICAL MEASUREMENTS AND CONTROL SYSTEMS	
S No	COURSE OUTCOMES
1	To study concept of architecture of the measurement system.
2	To deliver working principle of mechanical measurement system.
3	To impart knowledge of mathematical modeling of the control system and control system under different time domain.
4	To analyze the stress and strain measurements and humidity measurements
5	To understand the Measurement of Force, Torque and Power Elements of Control Systems

AUTOMOBILE ENGINEERING	
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S No	COURSE OUTCOMES
1	Ability to identify & description of different components & system of automobile.
2	Students will able to explain working principle of various systems automobile.
3	Students will be able to understand different alternative energy sources used in IC engine.
4	Students will able to explain working principle of transmission systems.
5	Able to understand steering, brakes & suspension systems

POWER PLANT ENGINEERING	
S No	COURSE OUTCOMES
1	Enable students to understand about the coal handling and ash handling systems in thermal power plants
2	To understand various gas power cycles and combined power cycles
3	To illustrate the students to get the exposure of different renewable energy resources, hydro electric power plants and direct energy conversion methods
4	To interpret Nuclear power station and radioactive waste disposal methods
5	To execute and exemplify economics of power plants and pollution control techniques

JET PROPULSION AND ROCKET ENGINEERING	
S No	COURSE OUTCOMES
1	Analyze the propulsion system along with the advanced propulsion system.
2	Understand and examine various parameters used in a chemical rockets, especially in solid rocket motor and a liquid rocket engine.
3	Explain the fundamental concept of a nozzle along with their designing challenges.
4	Comprehend and illustrate the basics of thrust chamber in terms of their designing approach.
5	Relate the significance of test facilities and their associated parameters.

CNC TECHNOLOGY	
S No	COURSE OUTCOMES
1	Understand fundamentals in NC machining and develop Part program with G codes and M codes.
2	Understand machine structure and tooling of NC Machines

3	Develop NC APT program for 2D machining.
4	Understand the methods of optimizing machining conditions while using NC machines.
5	Understand the working principle and applications of logic controllers.

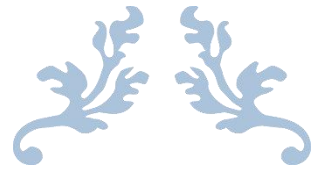
MODERN MACHINING PROCESSES	
S No	COURSE OUTCOMES
1	Understand the knowledge on need for unconventional machining process and can perform experiments on USM process and are able to apply these concepts in academic research.
2	Learn the working of AJM, WAJM and WJM, can perform experiments on those processes and are able to apply these concepts in academic research. Understand the fundamental concepts of CM, ECM process and can perform experiments on those processes.
3	Understand the fundamental concepts of EDM and WEDM process and can perform experiments on those processes and are able to apply these concepts in academic research.
4	Understand the fundamental concepts of LBM, PAM and Magnetic abrasive finishing, Abrasive flow finishing process and can perform experiments on those processes and are able to apply these concepts in academic research.
5	Understands metal removal mechanism, metal removal process and application. Can perform experiments on different metal removing techniques

ROBOTICS	
S No	COURSE OUTCOMES
1	Classify various types of automation & manufacturing systems
2	Discuss different robot configurations, motions, drive systems and its performance parameters.
3	Describe the basic concepts of control systems, feedback components, actuators and power transmission systems used in robots.
4	Explain the working of transducers, sensors and machine vision systems.
5	Discuss the future capabilities of sensors, mobility systems and industrial applications.

MECHANICAL VIBRATIONS	
S No	COURSE OUTCOMES
1	Ability to analyze the mechanical model of a linear vibratory system
2	To be able to model reciprocating and oscillatory motions of mechanical systems
3	To be able to model undamped and damped mechanical systems and structures
4	To be able to model single- and multi-degree of freedom systems
5	An ability to identify, formulate, and solve engineering problems

COMPUTER AIDED DESIGN AND COMPUTER AIDED MANUFACTURING LAB	
S No	COURSE OUTCOMES
1	Understand the need of computers in industrial manufacturing, product cycle, CAD/CAM hardware, computer graphics.
2	Understand the geometric modeling to represent curves and surfaces.
3	Understand the basic geometric commands and numerical control.
4	Understand the concept of group technology, production flow analysis, process planning.
5	Understand computer aided quality control and computer integrated manufacturing

MECHANICAL MEASUREMENTS AND CONTROL SYSTEMS LAB / PRODUCTION DRAWING PRACTICE LAB	
S No	COURSE OUTCOMES
1	Ability to understand and apply differential equations, integrals, matrix theory, probability theory and Laplace, Fourier and Z transformations for engineering problems
2	Ability to understand and apply basic science, circuit theory, control theory signal processing and apply them to engineering problems.
3	Ability to model and analyze transducers.
4	Ability to understand and analyze Instrumentation systems and their applications to various industries.
5	Student get expourse of limits, fits, tolerences and different symbols used in drawing practice.



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PRODUCTION PLANNING AND CONTROL	
S No	COURSE OUTCOMES
1	Student should be able to understand the co-ordination between Production, Planning and control systems in manufacturing.
2	Student should know about line balancing & qualitative methods and quantitative methods.
3	Student should know about ABC Analysis, MRP, ERP, JAPANEES Concept.
4	Student should know about routing and scheduling.
5	Student should know about Aggregate planning.

MAINTANANCE AND SAFETY ENGINEERING	
S No	COURSE OUTCOMES
1	Describe the various categories of maintenance.
2	Assemble, dismantle and align mechanisms in sequential order.
3	Carry out plant maintenance using tribology, corrosion and preventive maintenance.
4	Student gets the exposure of Maintenance Policies and Preventive Maintenance.
5	Explain the repair methods of material handling equipments

MATERIAL HANDLING SYSTEMS	
S No	COURSE OUTCOMES
1	Demonstrate ability to successfully complete Fork Lift Certification to safely and effectively operate in the manufacturing environment.
2	Demonstrate proficiency in supply chain operations, utilizing appropriate methods to plan and implement processes necessary for the purchase and conveyance of goods in a timely and cost-effective manner
3	It explains about the different types of material handling, advantages and disadvantages. It also suggests the selection procedure for the material handling along with its specifications.
4	Need for Material handling also explained with different techniques like Automated Material handling Design Program, Computerized material handling Planning will be dealt.
5	The Material handling is explained with models, selection procedure of material handling is depending on different function oriented systems. This also related with plant layout by which the minimization of the handling charges will come down.

MANUFACTURING MANAGEMENT	
S No	COURSE OUTCOMES
1	Understand the standards and guidelines in manufacturing systems.
2	Understand the concepts of economic principles applied to manufacturing systems.
3	Understand the concepts of new product development and customer need and value engineering analysis.
4	Understand different furcating methods in production.
5	Study the concepts of maintenance and reliability in manufacturing.

AUTOMATION IN MANUFACTURING	
S No	COURSE OUTCOMES
1	The importance of design in innovation.
2	Design tools and processes can generate innovative new ideas.
3	Design and design thinking to innovative in areas such as engineering, software development and business operations.
4	Strengthen students' individual and collaborative capabilities to identify customer needs, create sound concept hypotheses, collect appropriate data, and develop a prototype that allows for meaningful feedback in a real-world environment.
5	To describe the various case studies for design for environment

TRIBOLOGY	
S No	COURSE OUTCOMES
1	Describe the viscosity and laws of fluid flow with reference to lubrication
2	Analyze mathematical approach of hydrodynamic and hydrostatic lubrication
3	Describe the concept of idealized journal bearing and slider bearing under different load carrying conditions
4	Describe the oil flow through bearings lubricated under pressure and thermal equilibrium
5	Illustrate the behavior of tribological components subjected to different working conditions and describe different tribological measures

