PROGRAM OUTCOME (PO), PROGRAM SPECIFIC OUTCOME (PSO), COURSE OUTCOME (CO) (2023-24)

PROGRAM NAME	BCA

PROGRAM OUTCOME

PO1:To develop skilled and professionally motivated technocrats, equipped with critical reasoning and ethical values that fosters scientific temperament with a sense of social responsibility.
PO2:To produce knowledgeable and competent human resources who are employable in all walk of life.
PO3:To create, identify and implement appropriate techniques, resources, and modern engineering and IT tools.
PO4:To impart expertise required for planning, designing and building complex software systems as well as provide support to automated systems.
PO5:To build calibre to tackle both personal and social challenges and improve the quality of life.

PROGRAM SPECIFIC OUTCOME

PSO-1:
Ability to acquire knowledge in various fields of computer science, and to apply in industry, entrepreneurship and/or higher studies, for a thriving career.
PSO-2:
Understanding to incorporate knowledge of computing and technological advances appropriate to the program.
PSO-3:
Ability to develop software systems to enable the convenient use of the computing system and possess technical credentials.
PSO-4:
Ability to exercise the principles of management and strategic concepts required for teamwork as well as team management.

COURSE OUTCOME

SEMESTER	COURSE NAME	COURSE CODE	COURSE OUTCOME	
I	FUNDAMENTALS OF COMPUTER AND ITS APPLICATIONS	NBCA-101	CO1	Understand the components, characteristics and limitation of the computer system.
			CO2	Understand different types of input devices, output devices and their advantages and disadvantages.
			CO3	Understand various types of storage devices and their storage capacities.
			CO4	Understand the concept of number system.
			CO5	Understand the computer software need and types of software.
	PROGRAMMING IN C	NBCA-102	CO1	Understand about writing, compiling and executing a program in C language.
			CO2	Learn the fundamental building blocks of C Language like constants, variables, identifiers, operators, and type conversion.
			CO3	To write programs in C-

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				language that involves decisions and iterations.
			CO4	Understand the implementation of functions, arrays and pointers in C programming language.
	BASICS OF INFORMATION SYSTEM	NBCA-103	CO1	Understand fundamental of Information system
			CO2	Visualize structure of management information system & decision support system.
			CO3	Learn various business application of information system.
			CO4	Explore ERP, supply chain management and CRM based information system
	MATHEMATICS	NBCA-104	CO1	Use matrices, determinants and techniques for solving systems of linear equations in the different areas of Linear Algebra, Solve Eigen value problems and apply Cayley Hamilton Theorem.
			CO2	Study the functions of more than one independent variable and calculate partial derivatives along with their applications.
			CO3	Understand and implement the concept of differential equations and learn various methods to solve ordinary differential equations.
			CO4	Identify a range of techniques to form the partial differential equations (PDF) and solutions of standard linear PDFs.
			CO5	Compute and interpret the results of Bivariate Regression and Correlation Analysis.
	SOFT SKILLS AND PERSONALITY DEVELOPMENT	NBCA-105	CO1	Understand personality and personality aspects.
			CO2	be able to communicate professionally.
			CO3	be able to put forward own view point and create a professional and profitable Pitch.
			CO4	be able to communicate across organizational levels and cultures effectively.
			CO5	be able to negotiate with the odds and bring in best of the results with specific success.

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			CO6	Understand the need for feedback and constant improvement.
II	**DATA STRUCTURE**	NBCA-201	CO1	Learn how to represent arrays, linked lists, stacks, queues in memory using the algorithms and their common applications.
			CO2	Understanding the concept of recursion, application of recursion and its implementation and removal of recursion.
			CO3	Learn the computational efficiency of the sorting and searching algorithms.
			CO4	Learn implementation of Trees and Graphs, and various operations on these data structure.
			CO5	Identify the alternative implementations of data structures with respect to its performance to solve a real world problem.
	DATABASE MANAGEMENT SYSTEM	NBCA-202	CO1	Understand database concepts, structures and query language.
			CO2	Understand the ER model and relational model.
			CO3	Design and build a simple database system and demonstrate competence with the fundamental tasks involved with modeling, designing, and implementing a DBMS.
			CO4	Understand concept of transaction processing and concurrency control.
	OPERATING SYSTEM	NBCA-203	CO1	After the completion of the course, students are expected to have the ability to:
			CO2	Analyze various process scheduling Algorithms and their comparisons.
			CO3	Understand the process synchronization problems.
			CO4	Implement the concept of deadlock detection and avoidance.
			CO5	Compare and contrast various Memory management schemes and Page replacement policies.
			CO6	Understand the concept of File and Disk management.

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	DISCRETE MATHEMATICL STRUCTURES	NBCA-204	CO1 CO2 CO3 CO4	Apply logical skills developed in this course, in various computer applications. Apply the computing skills to formulate, solve and analyse interdisciplinary real-world problems for higher study and research. Apply various algebraic structures in different branches of computer science Apply Graph theoretical concepts to modal, analyse and solve real-world problems.
	DIGITAL ELECTRONICS AND COMPUTER ORGANIZATION	NBCA-205	CO1 CO2 CO3 CO4 CO5	Design various logic gates and simplify Boolean functions. Design various flip flops, shift registers and determining outputs. Analyze, design and implement combinational logic circuits. Perform computer arithmetic operations. Understand the Control unit, memory design and I/O organization of computer system.
III	**COMPUTER BASED NUMERCAL AND STATISTICAL TECHNIQUES**	BCA 301		CO-1. Apply numerical methods to obtain the approximate solutions to the linear and nonlinear transcendental and polynomial equations and find error. CO-2. Identify numerical methods for various mathematical operations and tasks, such as interpolation formulae like forward, backward, and divided difference formulae. CO-3. Apply the appropriate techniques for numerical differentiation and integration problems. CO-4. Design the numerical solution of initial value problems of the ordinary differential equations with implicit and explicit methods as appropriate. CO-5. Work numerically on the partial differential equations using different methods through of finite difference.
	OBJECT ORIENTED PROGRAMMING USING JAVA	BCA 302		CO-1. Understand the basic concepts of object-oriented modeling and designing. CO-2. Write, compile, run, and test simple object-oriented Java programs. CO-3. Understand the use of inheritance, arrays and Interface in

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			java. CO-4. Implement the concept of exception handling, threads and packages.
	OPERATING SYSTEM	BCA 303	CO-1. Analyze various process scheduling Algorithms and their comparisons. CO-2. Understand the process synchronization problems. CO-3. Implement the concept of deadlock detection and avoidance. CO-4. Compare and contrast various Memory management schemes and Page replacement policies. CO-5. Understand the concept of File and Disk management.
	MANAGEMENT INFORMATION SYSTEM	BCA 304	CO-1. Understand fundamental of information system. CO-2. Visualize structure of management information system & decision support system. CO-3. Learn various business application of information system. CO-4. Explore ERP, supply chain management and CRM based information system
	COMPUTER ARCHITECTURE	BCA 305	CO-1. Understand the instruction types and different architectures of a computer. CO-2. Learn about parallel computing and various performance metrics and measure. CO-3. Understand about pipelining concept and its scheduling. CO-4. Analyze partitioning & scheduling of program and get a detailed explanation of its flow mechanism
IV	**DISCRETE MATHEMATICS**	BCA 401	CO-1. Understand the concept of Set theory, relation &function. CO-2. Understand the concept of algebraic structures such as homomorphism, isomorphism and auto-morphism of groups. CO-3. Explore and analyze partial order sets and lattices. CO-4. Explore the concept of propositional logic and predicate logic.
	BUSINESS ECONOMICS	BCA 402	CO-1. To understand and incorporate principles of Business Economics and the theory of supply and demand for economic problems prevalent in the market. CO-2. To identify the various determinants of firm's demand for factor services, the relationship between investment and savings, and

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			demonstrate investment multiplier. CO-3. To critique the various types of investment function analysis and understand the elements of social cost benefit analysis. CO-4. To study the process of calculating national income, identify its components (GDP, GNP, NNP) and demonstrate circular flow of income, monetary policy and international trade.
	COMPUTER GRAPHICS & MULTIMEDIA SYSTEM	BCA 403	CO-1. Learn about working of display systems. CO-2. Execute various Scan Conversion algorithms in laboratory so as to draw Graphics primitives. CO-3. Familiarize with 2D and 3D graphic concepts. CO-4. Create 2D objects using Geometrical Transformations. CO-5. Describe the types of media and define multimedia system. CO-6. Describe the stages of a project in multimedia and its hardware and software requirements.
	DATA BASE MANAGEMENT SYSTEM	BCA 404	CO-1. Understand database concepts, structures and query language. CO-2. Understand the E R model and relational model. CO-3. Design and build a simple database system and demonstrate competence with the fundamental tasks involved with modeling, designing, and implementing a DBMS. CO-4. Create and manage database with all integrity constraints. CO-5. Refine the schema of database by applying normal forms. CO-6. Understand concept of transaction processing and concurrency control.
	SOFTWARE ENGINEERING	BCA 405	CO-1. Understand the basic concepts of software engineering. CO-2. Understand the requirement analysis and importance of SRS documentation. CO-3. Understand the designing principles of software product. CO-4. Learn about the working environment of CASE tools. CO-5. Apply various software measures and metrics for estimation.
V	**DATA COMMUNICATION AND COMPUTER NETWORK**	BCA 501	CO-1. Understand basic computer network technology. CO-2. Identify different types of network topologies and protocols. CO-3. Understand the layers of the OSI model and TCP/IP. CO-4. Understand the concept of IP

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			addressing, subnetting and routing mechanisms.
	DESIGN ANALYISIS AND ALOGORITHM	BCA 502	CO-1. Implementation of various sorting algorithm and their comparisons. CO-2. Analyze the concept of Divide & Conquer and Greedy techniques. CO-3. Implementation of Dynamic Programming concept in solving various problems. CO-4. Understand the concepts such as NP-completeness and randomized algorithms.
	WEBDESIGN CONCEPT	BCA 503	CO-1. Understand the internet related concepts that are vital in understanding web application development. CO-2. Analyze and apply the role of markup languages like HTML, DHTML, and XML in the workings of the web and web applications. CO-3. Programming web pages with JavaScript. CO-4. Design and implement dynamic web pages using client-side programming Java Script and also develop the web application using servlet and JSP.
	UNIX AND SHELL PROGRAMMING	BCA 504	CO-1. Describe UNIX operating system commands. CO-2. Understand the UNIX Architecture, File systems and use of basic Commands. CO-3. Understand and analyze UNIX System calls, Process Creation, Control & Relationship. CO-4. Understand Shell Programming and to write shell scripts.
	DATA MINING AND DATA WAREHOUSING	BCA 5051 (ELECTIVE-I)	CO-1. Explore data warehouse and multi-dimensional data models. CO-2. Gain insight into the challenges and limitations of different data mining technology. CO-3. Understand the concepts such as classification, regression and clustering. CO-4. Understand the concept of OLAP in data warehousing.
	SOFTWARE TESTING METHODOLOGY	BCA 5052 (ELECTIVE-I)	CO-1. Explain fundamental concepts in software testing, including software testing objectives, process, criteria, strategies, and methods. CO-2. Understand and implement the methods of functional and structural

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			testing. CO-3. Plan a test project, design test cases and data, conduct testing operations, manage software problems and defects, generate a testing report. CO-4. Understand the advanced software testing topics, such as object-oriented software testing methods, system testing and testing of internet applications.
	OPEN SOURCE SOFTWARE	BCA 5053 (ELECTIVE-I)	CO-1. Understand the concepts, strategies, and methodologies related to open-source software development. CO-2. Be familiar with open-source software products and development tools currently available on the market. CO-3. To utilize open-source software for developing a variety of software applications, particularly Web applications. CO-4. Understand the open-source operating system and implement the open-source database and programming languages.
	INFORMATION SYSTEM: ANALYSIS AND DESIGN & IMPLEMENTATION	BCA 5054 (ELECTIVE-I)	CO-1. Describe principles, concepts and practice of System Analysis and Design process. CO-2. Explain the processes of constructing the different types of information systems. CO-3. Understand the various software development life cycle models and system documentation. CO-4. Apply object-oriented concepts to capture a business requirement. CO-5. Learn the concept of system testing, evaluation and performance
VI	**E COMMERCE**	BCA 601	CO-1. Understand the foundations and importance of E-commerce. CO-2. Understand the concept of Mobile commerce. CO-3. Analyze the importance of encryption on E-commerce. CO-4. Determining the effectiveness of electronic payments as an emerging financial instrument
	CYBER LAW AND INTERNET SECURITY	BCA 602	CO-1. Understand the social and intellectual property issues emerging from cyber space. CO-2. Explore the legal and policy developments in various countries to regulate cyber space. CO-3. Understand the Intellectual Property Rights, Domain Names and Trademark Dispute. CO-4. Learn about developing secure information system and security

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			policies to prevent criminal activity on the Internet.
	MOBILE COMPUTING	BCA 603	CO-1. Explain the principles and theories of mobile computing technologies. CO-2. Describe infrastructures and technologies of mobile computing technologies. CO-3. Learn the concept of cellular network and GSM. CO-4. List out the data management issues in mobile computing. CO-5. Understand the concept of Ad-hoc Network and Routing Protocols.
	OPTIMIZATION TECHNIQUES	BCA 6041 (ELECTIVE-II)	CO-1. Understand the theory of optimization methods and algorithms developed for solving various types of optimization problems. CO-2. Develop and promote research interest in applying optimization techniques in problems of Engineering and Technology. CO-3. Apply the mathematical results and numerical techniques of optimization theory to concrete Engineering problems.
	MICROPROCESSOR	BCA 6042 (ELECTIVE-II)	CO-1. Identify the basic element and functions of 8085 microprocessor. CO-2. Describe the general architecture & organization of 8085. CO-3. Analyze and suggest various machine cycles and addressing modes. CO-4. Apply the programming techniques in developing the assembly language program. CO-5. Differentiate various types of interrupts in 8085 microprocessors
	DATA COMPRESSION	BCA 6043 (ELECTIVE-II)	CO-1. Understand the concepts of commonly used lossless and lossy compression techniques. CO-2. Analyze the applications of Huffman coding, loss less image compression, Text compression, Audio Compression. CO-3. Analyze various Image compression and dictionary-based techniques. CO-4. Understand the statistical basis and performance metrics for lossless compression. CO-5. Understand the concept of scalar quantization in data compression techniques.
	CRYPTOGRAPHY	BCA 6044 (ELECTIVE-II)	CO-1. Learn the basic concepts of security threats, mechanisms and symmetric cryptography. CO-2. Understand the conventional encryption algorithms. CO-3. Understand modern block cipher and public key encryption techniques

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			analysis. CO-4. Understand the concept of Hash functions and message authentication.

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PROGRAM OUTCOME (PO) & COURSE OUTCOME (CO) (2023-24)

PROGRAM NAME	BCOM

PROGRAM OUTCOME
PO1: After completing BCOM students will gain expertise in accounting practices, financial system, taxation and its laws, business analysis and business management. **PO2:** The program will impart knowledge about applicability of financial techniques, project tools, forecasting of business and managing variations of businesses. **PO3:** The program is designed to develop entrepreneurial and strategic approach in students that will help the students to integrate at social level **PO4:** The program will develop the managing capabilities in students which will be enhanced by means of understanding global scenario of marketing and human resources management as well.

COURSE OUTCOME			
SEMESTER	**COURSE NAME**	**COURSE CODE**	**COURSE OUTCOME**
SEM I	Financial Accounting	P1	Acquire knowledge of the basic concepts and conventions of accounting. • Prepare accounts of a partnership firm. • Prepare accounts of special kinds such as Royalty accounts, Voyage accounts and Branch accounts. • Prepare accounts as per norms in case of Hire-Purchase & Installment Purchase as well as Insolvency of the business units. • Gain insight into the Indian & International accounting standards as well as IFRS. • Develop skills in understanding the process of insolvency and their books of accounts.
	Business Organization	P2	• Understand basics about a business organization and its various forms. • Understand the social responsibility of business towards the various stakeholders. • Get knowledge about computation and fixation of remuneration of labour and incentive plans. • Gain insight about features of stock exchanges and commodity exchanges and their working as well as regulation. • Gain knowledge of the new patterns of business operations and organisations i.e., Ebusiness, LLP, OPC. • Understand the various elements and principles of organisation.
	Micro Economics	P3	• Explain the role of scarcity,

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			specialization, opportunity cost and cost/benefit analysis in economic decision-making. • Identify the determinants of supply and demand; demonstrate the impact of shifts in both market supply and demand curves on equilibrium price and output. • Summarize the law of diminishing marginal utility; describe the process of utility maximization. • Calculate supply and demand elasticities, identify the determinants of price elasticity of demand and supply, and demonstrate the relationship between elasticity and total revenue. • Describe the production function and the Law of Diminishing Marginal Productivity; calculate and graph short-run and long-run costs of production. • Relate to real world business scenario through study of various market forms. • Study the factors affecting distribution of income through an analysis of various factor payments. • Gain indepth insight and equip them to analyze the real economic situations more effectively with the help of practical problems using elementary mathematics.
	Currency Banking and Exchange	P4	• Have a sound theoretical base in various areas of banking and exchange. • Understand the channel for flow of money in the economy. • Analyse the role and importance of credit in the economy. • Get the insight knowledge about exchange rate and exchange control.
	Essentials of Management	P5	• Map the evolution of 'Management' as a discipline and as a process that helps in the analysis of internal and external environment. • Understand of the various aspects of Planning and decision making, and of Authority and Responsibility in a formal organization • Organise, motivate and lead in an organization • Understand Control functions and make simple applications
	Co-curricular Course I	P6	
SEM II	Corporate Accounting	P7	• Understand the features and accounting treatment of Shares and Debentures. • Knowledge about Accounting entries related to Redemption of Shares and Debentures. • Prepare of Company's Final Accounts. • Acquire knowledge of accounting

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			procedure adopted during Amalgamation and Absorption of companies. • Acquire conceptual knowledge of Internal and External reconstruction of companies and their accounting treatment. • Knowledge regarding accounting treatment and procedure adopted at the time of winding up of companies.
	Business Regulatory Framework	P8	• Understand the nature and meaning of contracts, forms of contracts and essentials of a valid contract. • Gain insight into various kinds of contract. • Gain in-depth knowledge of Sales of Goods Act and Negotiable Instruments Act • Have knowledge of the fundamentals of Consumer Protection Act. • Keep updated about the amendments in these laws and regulations.
	Public Finance	P9	1. To introduce students to the public sector reform agenda with a focus on public finance issues; 2. To demonstrate administrative, political, and economic constraints to public finance reforms; 3. To develop analytical skills of the students in three major areas of public finance reforms (performance-based budgeting, mid-term financial planning, budget decentralization); 4. To train students how to develop budgeting and performance evaluation systems for public sector institutions; 5. To develop students' skills on how to write a public policy paper and make a presentation on public policy issue.
	Business Communication	P10	• Apply principles of effective communication in their verbal and non-verbal communication. • Write effective e-mails, memos, and business correspondence. • Illustrate presentation skills • Plan effective business meetings • Identify communication barriers
	Selling and Advertising	P11	Upon successful completion of this course the students will be able to demonstrate strong conceptual knowledge in the selling and advertising, students will be able to

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			demonstrate its application for resolution of problems pertaining selling and advertising.
	Vocational Course I	P12	
SEM III	Business Finance	P13.	• Demonstrate an understanding of the overall role and importance of the finance function. • Understand the role and responsibilities of a Finance Manager in an organisation. • Gain knowledge of the concept of cost of capital, capitalisation; over and under capitalization. • Have knowledge about the short & long term sources of finance. • Apply ratio analysis as a tool of managing and controlling finances of a business entity. • Analyse the complexities associated with working capital management, and the financing approaches to working capital.
	Statistical Methods	P14.	• The course content of this paper has been designed with the assumption that students have no knowledge or rudimentary knowledge of Business Statistics. • The purpose is to enhance student's understanding of the fundamentals of statistics. • In this paper the students will be imparted the knowledge about the measures of descriptive as well analytical statistics and their application in different fields. These fields may include business, trade, industry, macroeconomic indicators, social phenomenon, day to day activities etc. • Through the study of this paper, students will become acquainted with specific skills of data collection, processing, presentation and application of statistical tools on these data. This is how they will know the characteristics of data and learn analysis, interpretation and prediction of unknown data.
	Banking Operations	P15	• Understand the core concepts of banking. • Acquainted with the knowledge of the functioning of the banking industry, especially that of India. • Understand the structure of banking

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			system in India • Understand the operational aspect of commercial banks in India. • Learn and gain insights about negotiable instruments • Help understand various concepts like ATM, e-banking, Basel Norms, etc.
	Managing Human Resources	P16	• Develop the basic understanding about the importance of HR function • Learn the various concepts of Human Resource Management processes required to Induct and Recruit the employees • Develop the basic knowledge of Training and Performance Appraisal of employees • Learn important issues related to Compensation and Wage Administration
	Information Systems and E-Business	P17.	• Develop the functional knowledge of Computer Systems • Develop the thorough understanding of various Information Systems with particular focus on DSS, MIS, TP, EIS and, CRM Systems • Understand the basic knowledge of the applications of Database Management Systems and their development • Understand the concepts of E-Commerce with an application orientation
	Co-curricular Course II	P18.	
SEM IV	Cost Accounting	P19.	• Understand the nature and scope of Cost Accounting. • Gain knowledge about the advantages of cost accounting and classifications of various costs. • Acquire knowledge about accounting and control of material cost and labour cost. • Know overhead costing as well as and Apportionment and Absorption of Overheads. • Understand the methods of costing, marginal costing and budgetary control system. • Gain knowledge of Unit or Output costing as well as standard costing.
	Contemporary Audit	P20.	• Understand the concept, types & techniques of audit. • Gain knowledge of audit documentation, vouching and verification of assets and liabilities. • Understand provisions regarding appointment of a company auditor and learn about his powers and duties.

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			• Have knowledge of special provisions for Government audit. • Gain insight into audit of special entities and emerging concepts in auditing as well as standards on auditing.
	Foreign Trade of India	P21.	1. Understand the underlying motives of international trade. 2. Know the composition, direction and volume of trade over a period of time. 3. Analyse with the current status and changing dynamics of India's foreign trade as well as the impact of policy changes on it. 4. Well-equipped when employed, whether in the field of industry or trade (export-import).
	Macro Economics	P22.	• The meaning and components of the National Income Accounts, especially GDP; the concept and working of multipliers; • The meaning of the business cycle and its phases and to manipulate the basic Aggregate Supply, Aggregate Demand model of the macro economy; • The meaning of unemployment and inflation data and how that data is collected and computed; • How fiscal policy operates, its tools, and its advantages and drawbacks; • How monetary policy operates, its tools, and its advantages and drawbacks.
	Institutional Framework for Business	P23.	Upon successful completion of this course the students will be able understand how the institutional framework for business will empower them to better locate and employ the opportunities available during the course of fulfilling their duties in various managerial roles. They would be able to take better decisions and design and provide better value to both their respective organizations and the various stakeholders involved. The knowledge of the institutional mechanisms will stand in good stead for the budding entrepreneurs of tomorrow.
	Vocational Course II	P24.	
SEM V	Goods and Service Tax (GST)	P25	• Learn the concept of Indirect tax from Pre-GST period to Post-GST period. • Understand the difference between forward charge, reverse charge mechanism and the difference between composite and

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			mixed supply. • Know the contents and format for various documents like tax invoice, bill of supply, debit note, credit note etc. • Record and analyze the transactions for compliance under GST. • Understand the procedure for registration, payment and refund of GST as well as mechanism to determine it.
	Principles and Practice of Insurance	P26.	• Gain knowledge about the concept & purpose of insurance, Double insurance, Over insurance, Under-insurance and Re-insurance. • Gain insight about the Theories, Principles and Contracts of Insurance. • Learn various policies, Terms & conditions and Types of Life Insurance. • Gain knowledge regarding basic principles of Fire Insurance policy, assignment and claims. • Acquire knowledge on Principles, Types, Conditions and Warranties in Marine Insurance policy as well as marine losses.
	Introduction to Entrepreneurship	P27.	• Develop the concepts of Entrepreneurship and its practical significance • Develop the capability to identify business opportunities and work on them • Learn to develop a Business Plan with sufficient focus on Technology, Human Resource and management of Financial resources • Learn to source the funds and apply them efficiently
	Managing Business Operation	P28	Upon successful completion of this course the students will be able to comprehend the operational activities in any organization - Production based and/or Service Based. They will be able to effectively & efficiently execute different operational functions in any business organization
	Company Law and Practice	P29X	• Understand the nature, types and formation of companies in India • Understand and draft Memorandum of Association and Articles of Association • Plan the management of Share Capital and its Issuance • Understand the legal implications in appointment of company officials and conduct and scope of Company

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			Meetings
	Concepts of Valuation	P29Y	• Develop a thorough understanding of present and future value concepts • Grasp the techniques to estimate and analyze all types of Annuities • Fully understand the concepts of Fixed Income Securities and estimation of present and future values of their cash-flows • Develop a thorough knowledge of the concepts of Variable income securities (Shares) along with the knowledge of their Issuance and Trading in Capital Markets
SEM VI	Income tax Law and Accounts	P31.	• Know about the basic concept of Income Tax. • Understand the provisions of Income tax in order to minimize the ultimate tax liability by setting off loss due to agricultural Income. • Understand the provisions relating to residential status and incidence/charge of Tax. • Compute total income under five Heads of Income i.e. Salaries, House Property, Profits & Gains from Business & Profession, Capital Gains and Other Sources. • Acquire knowledge of the provisions and procedure for clubbing & aggregation of incomes and set-off & carry forward of losses. • Understand provisions about appeal & revision, tax penalties, offence and prosecutions.
	Principles and Practice of Marketing	P32.	• Have knowledge about marketing and its functions. • Understand what is a product, its classifications and product life cycle • Gain knowledge about the mechanism of price determination of a product in various markets. • Understand the need and significance of distribution channels. • Gain insight of the concept of advertising and how it affects the buying habits of a consumer. • Understand and trap the psyche of consumer in order to market a product.
	Indian Economy	P33.	1. Understand the fundamentals of Indian economy. 2. Analyze the changing dimensions of Indian economy. 3. Acquaint with changing dimensions of our economy. 4. Provide the knowledge about various

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			policies and programmes run by our government and their impact on our economy.
	Applied Business Statistics	P34.	1. Describe and discuss the key terminology, concepts tools and techniques used in business statistical analysis; 2. Critically evaluate the underlying assumptions of analysis tools; 3. Understand and critically discuss the issues surrounding sampling and significance; Discuss critically the uses and limitations of statistical analysis; 4. Solve a range of problems using the techniques covered; 5. Conduct basic statistical analysis of data.
	Economics of Public Enterprises	P35X.	1. Describe and discuss the key terminology, concepts tools and techniques used in business statistical analysis; 2. Critically evaluate the underlying assumptions of analysis tools; 3. Understand and critically discuss the issues surrounding sampling and significance; Discuss critically the uses and limitations of statistical analysis; 4. Solve a range of problems using the techniques covered; 5. Conduct basic statistical analysis of data.
	Export Import Procedure and Documentation	P35Y	1. Describe and discuss the key terminology, concepts tools and techniques used in business statistical analysis; 2. Critically evaluate the underlying assumptions of analysis tools; 3. Understand and critically discuss the issues surrounding sampling and significance; Discuss critically the uses and limitations of statistical analysis; 4. Solve a range of problems using the techniques covered; 5. Conduct basic statistical analysis of data.
SEM VII	Accounting for Managers	P37	• Ability to understand the concept of Managerial Accounting along with the basic forms and norms of Managerial Accounting. • Ability to understand the terminologies associated with the field of Managerial Accounting and control along with their relevance. • Ability to identify the appropriate method and techniques of Managerial Accounting for

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		solving different problems. • Ability to apply basic Managerial Accounting principles to solve business and industry related issues and problems. • Ability to understand the concept of Budgetary Control, Cash Flow Statement, Fund Flow Statement, Break Even Analysis etc.
Financial Planning	P38.	• Understand the premise of financial planning and identify the financial goals. • Critically evaluate the investment instruments suitable for different financial goals in different time span. • Apply appropriate financial instruments to manage individuals' finances. • Analyse investment in primary market
Rural Marketing	P39.	• Understand issues in rural marketing and characteristics of rural market. • Understand non-conventional methods of reaching rural markets. • Develop marketing strategy for rural markets. • Identify and explain factors which influence consumer behaviour. • Relate internal dynamics such as personality, perception, learning, motivation and attitude to the choices rural consumer make.
Labour Welfare Laws	P40X.	• Interpret the various provisions under the Act and understand how they can be used to improve industrial harmony. • Understand policies related to compensation, insurance, provident funds, gratuity etc. for the benefit of the company and employees. • Understand the role and complexities of trade unions in order to maintain cordial relations between management and labour. • Gain knowledge of the provisions of various acts like Payment of Gratuity Act, Workmen's Compensation Act, Trade Union Act, Employees' Provident Funds, Miscellaneous Provisions Act and its application for labour welfare
Legal Environment of Business	P40Y	• Create premise and clear understanding for legal aspects of transfer of property. • Comprehend and utilize laws relating

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			to Societies and Trusts for start-ups and entrepreneurial ventures, independently. • Comprehend and utilize laws relating to Intellectual Property, Patents, Copyright, Trademark etc. • Learn about the legitimate rights and obligations under The Right to Information Act.
	Financial Institutions and Markets	P41X.	• Understand the working of financial institutions and markets both individually and as an interlinked system. • Understand the organization, role, functioning and need for regulation of different types of financial markets and the implications of the same on society. • Critically analyze the pivotal role of banking in a financial system and the reasons for it being among the most tightly regulated industries in the world. • Understand the impediments to financial inclusion and critically evaluate different ways of developing sustainable financial inclusion. Also critically analyse the working of the micro finance industry.
	Essentials of E-commerce	P41Y	This course is to familiarize the student with the basic of e-commerce and to comprehend its potential.
	Research Methodology	P42.	• Understand Research and identify research problems. • Learn Quantitative and Qualitative Methods of research. • Represent data in tabular as well as graphical manner. • Write Research paper and Preparation of Report
SEM VIII	MAJOR PROJECT	P43	

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PROGRAM OUTCOME (PO) & COURSE OUTCOME (CO) (2023-24)

PROGRAM NAME	B.COM H

PROGRAM OUTCOME
PO1 Analytical thinking, problem solving & Innovation. **PO2** Cross cultural understanding. **PO3** Financial reporting and structuring. **PO4** Business knowledge, managerial decision making. **PO5** Essential skills for corporate.

COURSE OUTCOME			
SEMESTER	**COURSE NAME**	**COURSE CODE**	**COURSE OUTCOME**
I	**FINANCIAL ACCOUNTING**	BCH 101	CO1 Students learns the basic concepts of accounting and presentation of accounts. CO2 Students gains knowledge in the preparation of the profit and non profits organization. CO3 understand the concept of voyage and branch accounting. CO4 Students learns the depreciation calculation on the fixed assets and computation of claim under loss of stock CO5 Gains knowledge on calculation of profit for small traders.
	FINANCIAL MATHEMATICS	BCH 102	CO1.Explain the concepts and use equations, formulae, and mathematical expressions and relationships in a variety of contexts CO2Apply the knowledge in mathematics (algebra, matrices, calculus) in solving business Problems. CO3 Analyse and demonstrate mathematical skills required in mathematically intensive areas in Economics and business. CO4Integrate concept in international business concepts with functioning of global trade. CO5 To Develop proficiency in the application to solve business problems.
	FOREIGN TRADE OF INDIA	BCH 103	1. Students gain knowledge about internal and Foreign Trade 2. Students acquire knowledge on the theories of the International Trade 3. Students learn about composition of India's Foreign Trade before independence and during planning period

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			4. Knowledge is gained by the students on trade policies, EXIM, ECGC,STC,MMTC, SEZ and many export promotion institutions 5. Students understand about the World Trade Organization with special reference to India, GATT, UNCTAD, India's Balance of trade and payments
	PRINCIPLES OF ECONOMICS	BCH 104	CO1 Students understands about the demand analysis and consumer behaviour. CO2 Students gained knowledge about the concepts in economics and Managerial Economics CO3 Students gains complete knowledge about the cost concepts and Production Function CO4 Students has a theoretical knowledge about the Pricing distribution methods CO5 Students acquires knowledge about the concept of Market Structure in detail.
	ESSENTIALS OF MANAGEMENT	BCH 105	CO1 Acquires knowledge in the process and levels of management in the organization. CO2 Students gains knowledge in planning and decision making activities in the organization. CO3It lets students understand types and structure of organization. CO4 Gains knowledge on staffing the employees. CO5 Students understand the do's and dont's of business.
	INDIAN ECONOMY & PUBLIC FINANCE	BCH 106	CO1 Students should know about economy and various sectors of economy and factors affecting the economy. CO2 Having knowledge of planning, and need of reforms in economy. CO3 Students should also have knowledge about role of government and budgets to run economy. CO4 Effect of government planning and expenditure on economy CO5 Students should able to relate themselves with economy
	HUMAN RESOURCE MANAGEMENT	BCH 201	1. To develop the understanding of the concept of human resource management and to understand its relevance in organizations. 2. To develop necessary skill set for application of various HR issues.

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			3. To analyse the strategic issues and strategies required to select and develop manpower resources. 4. To integrate the knowledge of HR concepts to take correct business decisions. 5. To understand the concepts of remuneration plans
	BANKING OPERATIONS MANAGEMENT	BCH 202	CO1 Students gains knowledge about theoretical structures of banking system. CO2Students are trained and equipped with the skills of modern banking. CO3Students gains knowledge about commercial banks and its products. CO4 To develop and inculcate the traits of professionalism amongst the students. CO5Students are able to apply knowledge in order to explain banking service
	MANAGEMENT INFORMATION SYSTEM	BCH 203	1. To understand the basic principles and working of information technology. 2. Describe the role of information technology and information systems in business 3. To contrast and compare how internet and other information technologies support business processes. 4. To give an overall perspective of the importance of application of internet technologies in business administration.
	BUSINESS COMMUNICATION & OFFICE MANAGEMENT	BCH 204	1. To understand and demonstrate writing and speaking processes through invention, editing, and presentation 2. To understand and appropriately apply modes of expression, i.e., in written, and oral Communication. 3. Recognize basic traditional office management practices, emerging management tends. 4. Demonstrate effectiveness in planning, executing, and follow up of meetings 5. Understand how to use office equipments and role of office equipments in managing office.
	STATISTICAL METHODS	BCH 205	1. Understand a broad overview of statistics as a subject and can

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			apply concepts in Business application. 2. Organize, collect and represent data for effective implementation of business process. 3. Understand the importance of summary measures to describe the characteristics of data set. 4. Analyze the relationship between two variables 5. Use various forecasting techniques and predictive techniques for the effective business planning.
	BUSINESS ENVIRONMENT	BCH 206	CO1 Students gains knowledge on business environment and its importance. CO2 Students learns on political and legal issues in business. CO3 They gain knowledge on social beliefs, customs and cultural heritage. CO4 Students have acquired knowledge on micro and macro-economic concepts. CO5 Students acquires knowledge on various financial service institutions
	COST ACCOUNTING	BCH 301	CO1 : Students gained knowledge on Management, financial and cost accounting differences CO2 : Students acquired knowledge on analysis and interpretation of financial Statements. CO3 : Students understand the basic concepts and processes used to determine product costs. CO4 : Students are able to interpret cost accounting statements. CO5 : Students are able to analyze and evaluate information for cost ascertainment, planning, control and decision making.
	BUSINESS LAWS	BCH 302	1. Knowledge and understanding of basic laws related to business 2. To develop the understanding to understand the legal issues of business 3. Exercise of proper professional and ethical responsibilities to the legal system 4. T o have an applicability of these laws.
	OPERATIONS MANAGEMENT	BCH 303	CO1: Identify the elements of operations management and

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			various transformation processes to enhance productivity and competitiveness. CO2: Analyze and evaluate various facility alternatives and their capacity decisions. CO3: Develop aggregate capacity plans and MPS in operation environment. CO4: Plan and implement suitable materials handling principles and practices in the operations. CO5: Plan and implement suitable quality control measures in Quality Circles to TQM.
	MARKETING MANAGEMENT	BCH 304	CO1 : Students understand about the marketing and its various environmental factors CO2 : Gains knowledge on buyer behaviour and market segmentation CO3 : Students learns about various stages in Product Life Cycle CO4 : Gains knowledge in the marketing channels and sales management CO5 : Students gains knowledge on advertising and sales promotion
	INTERNATIONAL FINANCE	BCH 305	CO1: Determination of exchange rates, and their relationship with interest rates and inflation · CO2: Consequences of misalignment of exchange rates, the origins of financial crises · CO3: Different types of foreign exchange risks faced by the MNC · CO4: Identification and measurement of these risks · CO5: Management of foreign exchange risk via initiatives on and off balance sheet. The use of derivative instruments will be considered
	BUSINESS ECONOMICS	BCH 306	CO1 : Analyze the decisions taken by firms and households due to scarcity of resources. CO 2: Calculate the elasticity of demand and supply. CO3: Describe the laws and various concepts in production and costs. CO 4: Evaluate the various microeconomic theories CO5: Examine the causes of scarcity
IV	**MANAGEMENT ACCOUNTING**	BCH 401	1. 1. To enhance the abilities of learners to develop the concept of management accounting and its significance in the business.

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		2. To enhance the abilities of learners to analyze the financial statements. 3. To enable the learners to understand, develop and apply the techniques of management accounting in the financial decision making in the business corporate. 4. . To make the students develop competence with their usage in managerial decision making and control
ORGANIZATIONAL BEHAVIOUR	BCH 402	CO1 Students came to know the need, scope and theories of organisation. CO2 Students gained knowledge on various motivational techniques of employees. CO3 Students learned knowledge on work environment and leadership styles. CO4 Students acquired knowledge on group dynamics in an organization. CO5 Students understood the climate and culture in an organization
COMPANY LAWS & SECRETARIAL PRACTICES	BCH 403	1. Comprehend the concepts, objectives and importance of Companies law. 2. Gain knowledge on companies and its process of incorporation. 3. Understanding of the different types of directors and kinds of company meetings. 4. Secretarial Practice' has been used to include knowledge, skills, procedure and methods of work to be performed by a Private Secretary. 5. Understand the process of winding up of companies.
OPERATIONS MANAGEMENT	BCH 404	1. To gain an understanding and appreciation of the principles and applications manufacturing/service firms. . 2. To develop skills necessary to effectively analyze and synthesize the many inter-relationships inherent in productive systems. 3. To reinforce analytical skills already learned, and build on these skills to further increase your of useful analytical tools for operations tasks. 4. To gain some ability to recognize situations in a production system

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			environment to assist in decision making on operations management and strategy. 5. To understand how Enterprise Resource Planning and MRPII systems are used in managing operations
	INCOME TAX LAW AND ACCOUNTS	BCH 405	CO1 : Students have acquired knowledge on tax system in India. CO2 : Students have gained knowledge on Central Excise Duty. CO3 : Students have acquired knowledge on customs duty. CO4 : Students have learnt knowledge on sales tax. CO5 Students have learnt knowledge on VAT and Service Tax.
	INTERNATIONAL BUSINESS	BCH 406	1. It aims to provide students with practical tools and theoretical knowledge related to international trade . 2. the exploration of practical issues faced by business managers in international business situations. 3. Students will study international business at the nation-state level and at the level of the company. 4. It aims to help the students to understand and implement strategies to negotiate effectively within various cultural 5. It aims to help the students to understand the current conditions in developing emerging markets, and evaluate present and future opportunities and risks for international business activities.
V	**EXPORT IMPORT PROCEDURE AND DOCUMENTATION**	BCH 501	1. To develop the understanding of foreign trade. 2. To understand various terms and agreements associated with foreign trade. 3. To have an overview of various methods and schemes of export. 4. To make him understand and capable of take the advantage of export promotion schemes of government. 5. Role of banks in export promotion and documentation.

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INDUSTRIAL LAWS	BCH 502	CO1 Students should able to elaborate the concept of Industrial Relations. CO2 The students should able to illustrate the role of trade union in the industrial setup. CO3 Students should able to outline the important causes & impact of industrial disputes. CO4 Students should able to elaborate Industrial Dispute settlement procedures.. CO5 Student should be able to summarize the important provisions of Wage Legislations, in reference to Payment of Wages Act 1936.
CONSUMER BEHAVIOUR & ADVERTISEMENT MANAGEMENT	BCH 503	1. Remember the key terms, definitions and concepts used in the study of consumer behavior 2. Understand and demonstrate how as a marketer you can use your knowledge of consumer behavior concepts to develop better marketing program and strategies to influence those behavior 3. Critically evaluate the effectiveness of various advertisements and promotions and their attempt to influence the behavior of individuals 4. Analyse the trends in consumer behavior and apply them to the marketing of an actual product or service
BUSINESS FINANCE	BCH 504	5. To develop an understanding of the conceptual framework of Business Finance. 6. To understand the concepts of Business finance with their environment. 7. To develop the understanding of the concepts of capital structure and application. 8. To develop the understanding of the concepts of working capital . 9. To understand the concept of cost of capital.
FINANCIAL MARKET OPERATIONS	BCH 505(FOS)	1. To develop the understanding of Indian financial system. 2. To understand the concept of primary and secondary markets. 3. Develop the knowledge the functions of primary and secondary markets. 4. To develop the understanding of acts related to primary and

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			secondary markets. 5. Should have the knowledge of various stock markets in india.
	INSURANCE AND RISK MANAGEMENT	BCH 506(FOS)	1. Understand the meaning, need and types of insurance. 2. Understand the risk and types of risk which can be insured. 3. To have an understanding of types of insurance. 4. Claims and procedure of claim 5. To have the knowledge of various acts related with insurance.
VI	**GOODS AND SERVICES TAX IN INDIA**	BCH 601	6.
	BUSINESS POLICY	BCH 602	1. To understand and to be able to formulate organizational vision, mission, goals, and objectives. 2. To understand, develop and apply strategies and action plans to achieve an organization's vision, mission, and goals. 3. To develop skills for assessing business environment determining risks and to make sound business decisions and achieves effective outcomes. 4. To evaluate and rectify plans, programs and procedures in order to achieve organizational goals.
	GOVERNANCE & BUSINESS ETHICS	BCH 603	1. Understand about the concept of business ethics. 2. Acquired knowledge about corporate social responsiveness and corporate citizenship. 3. Describe about different concepts in understanding corporate governance. 4. Acquaint with the various concepts and aspects of corporate social responsibility
	CONTEMPRARY AUDIT	BCH 604	1. Described about the concept, types & methods of auditing. 2. Acquired knowledge about vouching of cash and credit transactions. 3. Verification of assets and liabilities. 4. Comprehend the knowledge about appointment, rights, duties and responsibility of auditor. 5. Acquired knowledge of audit documentation and audit evidence.
	FINANCIAL SERVICES	BCH 605(FOS)	CO1 Students gained knowledge on role of financial service sector.

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			CO2 Acquired knowledge on functions of NIM, SEBI. CO3 Students understood the concepts of leasing, factoring and hire purchase. CO4 Gained knowledge on project investment. CO5 Learns the concept of role of UTI and mutual funds
	SECURITY ANALYSIS & PORTFOLIO MANAGEMENT	BCH 606(FOS)	CO1: To provide a theoretical and practical background in the field of investments. CO2: Designing and managing the bond as well as CO3: equity portfolios in the real word. Valuing equity and debt instruments. CO4: Measuring the portfolio performances CO5: Evaluating the portfolio performances

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PROGRAMME OUTCOME (PO) & COURSE OUTCOME (CO) (2023-24)

PROGRMME NAME	BBA

PROGRAMME OUTCOME

- Ensure and understand professional augmentation taking place in the global as well as domestic business arena.
- To reduce the gap between industry and academia, with the right blend of theory and practice.
- To nurture their talent for becoming good leaders and assets for an organization.
- To gain an in-depth knowledge and analytical skills which will enable them to effectively and efficiently carry out various Trade and Marketing operations of an organization in the emerging globalized environment.
- Develop Critical attitude necessary for "life-long learning" through this course

COURSE OUTCOME

SEMESTER	COURSE NAME	COURSE CODE	COURSE OUTCOME
SEM I	Principals of Management	P1	**Course Outcome:** The objective for this course to provide an understanding of the task and functions of management and to acquaint the participants with the developments in concept. Theories and practices in the overall field of management
	Business Organisations	P2	**Course outcomes:** The objective of this course is to develop an understanding on several important aspects of an organization, not just from an economic point of view but also considering organizations as part of society. It also includes analysis of the source of wealth creation, with a brief description of the environment and the key internal factors of an organization. The course introduces the students with the most important concepts of the dynamic framework of an organization.
	Financial & Management Accounting - I	P1'	**Course outcomes:** The aim of the course is to build knowledge and understanding of Financial and Management accounting among the student. The basic objective of this course is to enable the students to learn, explain and integrate the fundamental concepts, principles and techniques of accounting. Along with successfully applying the techniques and methods practically in order to analyze business performance, planning , decisions making and controlling the

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			outcomes
	Business Communication	P2'	**Course Outcome:** This course aims to develop communication skills in equip students with a broad based knowledge business communication.
	Computer & IT Applications - I	P1"	**Course outcomes:** The course aims to familiarize the students with computers & its applications in the field of business.
	PERSONALITY DEVELOPMENT AND GROOMING	**CC1**	**Course outcomes:** The objective of this course is to familiarize the students with the conceptual background, theories and techniques of Personality and teaches the basic techniques of how an organization manages and develops its people .
SEM II	Organizational Behaviour	P3	**Course Outcome:** To provide knowledge about Organizational Behavior, individual and group behavior and give an overview about change in organization and QWL.
	Managerial Economics	P4	**Course Outcome:** To impart basic knowledge of the concepts and tools of Economic Analysis as relevant for Business Decision-Making.
	Financial & Management Accounting - II	P3'	**Course Outcome** The aim of the course is to extend and enhance the knowledge and understanding of Financial and Management accounting among the student. The basic objective of this course is to enable the students to learn and explain advanced concepts, principles and techniques of accounting. The practical application of the knowledge will help them in developing the skill of using these advanced methods in effective decision making.
	Business Environment	P4'	**Course outcomes**: The objective of this paper is to give the basic knowledge about the business environment in industry.
	Quantitative Techniques - I	P2"	**Course outcome:** The Course aims at providing students insight about the mathematical terms and their appropriate usage in business problems.
	RESUME WRITING AND CORPORATE COMMUNICATION	**CV1**	**Course outcomes:** The course is designed to empower students to carry out day to day communication at work place by adequate understanding of various types of communication and use of technology to facilitate efficient interpersonal communication. The course will also equip with effective writing skills necessary for resume building and other forms of written corporate communication.
SEM III	Financial Management	P5	**Course outcomes:** The aim of the course is to build knowledge and understanding of Financial

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			Management among the student. The course seeks to give detailed knowledge about the subject matter by instilling them basic ideas about Financial Management. The outcome of the course will be as follows – To provide knowledge about business finance and investment decisions. To provide knowledge about financing and dividend decision. To give an overview about working capital.
	Operations Management	P6	**Course outcome**: The purpose of this course is to develop an understanding of issues and challenges involved in the area of Operation Management among under graduate students. The course aims to equip the students with basic management decisions regarding production & operation, designing decisions and designing of a production system.
	Marketing Management	P5'	**Course outcome:** The purpose of this course is to develop an understanding of the underlying concepts, strategies and the issues involved in the exchange of products and services.
	Human Resource Management	P6'	**Course outcomes:** The objective of this course is to familiarize the students with the conceptual background, theories and techniques of Human Resource Management and teaches the basic techniques of how an organization acquires, rewards, motivates, and manages its people effectively.
	Computer & IT Applications - II	P3"	**Course outcomes:** Students acquire skills of using end-user software for communication, data transformation and presentation.
	Interview Preparation & Planning	**CC2**	
SEM IV	Taxation & Laws	P7	**Course outcomes:** The aim of the course is to build knowledge, understanding about taxation among the student. The course seeks to give detailed knowledge about the subject matter by imparting them basic ideas about Income Tax.
	Logistic & Supply Chain Management	P8	Course outcomes: The objective of this paper is to give the basic knowledge about the Supply Chain Management for goods and services.
	Customer Relationship Management	P7'	**Course outcomes:** Customer Relationship Management, also known as CRM, helps businesses successfully implement strategies, practices and technologies aimed at winning and retaining customers profitably. The objective of this course is to equip the students with a sound foundation of CRM concepts and best practices in

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			Industry.
	Industrial Relations Management	P8'	**Course Outcome**: The objective of the course is to make the students aware and understand about the dynamics of the industrial relations in the rapidly changing environment and also, they will have knowledge about the disciplinary procedure and grievance management process along with their implementation aspect.
	Quantitative Techniques - II	P4"	**Course outcomes:** The course aims to build skills for statistical and mathematical inferences of business data and acquaint the students with various quantitative tools and techniques used in business decision making
	Role Play and Simulation	**CV2**	**Course Outcome:** To learn about industry working and daily facing situations in various departments. The subject provide command and knowledge to deal the situation in various hierarchy of management. Student will learn situation handling at various levels through simulation.
SEM V	Entrepreneurship and Family Business - I	P9	Course outcomes: This course provides students with a solid introduction to the entrepreneurial process of creating new businesses, role of Creativity and innovation in Entrepreneurial start-ups, manage family-owned companies, context of social innovation and social entrepreneurship and issues and practices of financing entrepreneurial businesses.
	Business Policy & Strategic Management – I	P10	**Course outcomes:** The purpose of this course is to develop an understanding of underlying concepts, tools, frameworks, issues and challenges involved in the area of Business Policy & Strategic Management - I for Under-graduates. The course aims to achieve development of an understanding of the increasing competition as well as not for profit business policies, strategies and the practice in organizations to be aware of the different circumstances and situations arising from ever changing strategic situation.
	Consumer Behavior	P11Y	**Course outcomes**: The course of Consumer Behaviour aims at enabling students to understand the process of consumer behaviour, issues and dimensions, various internal and external factors that influence consumer behaviour and to apply this understanding to the development of marketing strategy.

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	Business Ethics	P9'	**Course outcomes:** The aim of the course is to develop basic understanding about Business Ethics among the students. It also seeks to establish the importance of adopting ethical practices in business organizations.
	Business Laws	P10'	**Course outcomes:** The objective of the course is to familiarize the participants with legal perspective of the business and to give the basic knowledge about the rules and regulation of execution of Business.
	Internship		
SEM VI	Entrepreneurship and Family Business - II	P12	**Course outcomes:** The course is designed as a broad overview of entrepreneurship, including identifying a winning business opportunity, gathering funding for and launching a business, growing the organization and harvesting the rewards. It is an integrative course—one that combines material introduced to the students in core courses and applies it to the design and implementation of new ventures. The students are expected to have completed courses in Management Principles, Marketing, HRM, Productions & Operations, Economics, Accounting & Finance.
	Business Policy & Strategic Management - II	P13	**Course outcome:** The purpose of this course is to develop an understanding of issues and challenges involved in the area of Business Policy & Strategic Management – II for Under-graduates. To comprehend strategic management process, understand interrelationship between formulation and implementation and apply administrative and leadership skills for successful implementation of strategies.
	E - Commerce	P14X	**Course outcomes:** Understand the fundamental principles of e-Business and e- Commerce; Learn the technologies enabling e-commerce.
	Talent Management & HRIS	P14Y	**Course outcomes:** Students will be able to understand and articulate advanced concepts of human resource placements within organization. Apply talent positioning within the subsidiaries and business units.
	Corporate Governance and Corporate Social Responsibility	P11'	**Course outcomes:** The objective of this course is to familiarize the students with the conceptual background, theories and techniques of Corporate Governance and teaches the basic techniques of how an organization manages its people to contribute for the

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			society through Corporate Social Responsibility
	Management Information System	P12'	**Course outcomes:** Students will be able to understand and articulate fundamental concepts of information systems management. Apply IT to solve common business problems. Plan and implement effective IT solutions to business problems. Apply the ethical aspects of information technology use in the organization.
	Minor Project		
SEM VII	Decision Sciences	P15	**Course outcomes:** The basic objectives of this course is to impart knowledge of different quantitative models & operations research techniques used in business decisions and management
	Project Management	P16	**Course outcomes:** Students will be able to understand the characteristics of Project and Project Management Knowledge. The students will understand the managerial process along with tools and techniques used in Project management Knowledge. Students will understand the scheduling and monitoring process in Project.
	Business Analytics	P17	**Course Outcomes:** Understand the fundamentals of business analytical, data handling and related research issues.
	Banking Operations Management	P18X	**Course Outcome:** The objective for this course to provide an understanding of the functions and role of banking institutions. It will also help in understanding the important rights and duties of bankers and their operations
	Retail & Rural Marketing	P18Y	**Course Objective:** To equip students with the necessary skills required for handing the various functions connected with retail operations. To familiarise the students with the concepts, tools & techniques useful to a manager in the field of rural marketing
	Insurance & Risk Management	P19X	**Objective:** The objective of this course is to familiarize students with the concept of risk, its principles and practices being followed in the insurance sector to manage risk. The students will also learn risk management process and applications
	Service and Industrial Marketing	P19Y	**Course outcome:** To provide in- depth understanding of nature, peculiarities and demands on service provider for effective design of marketing strategies for a service business. To developing an understanding of issues involved in marketing of industrial products.
	Research Methodology		**Course Outcomes:** Develop understanding on various kinds of

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			research, objectives of doing research, research process, research designs and sampling. Have basic knowledge on qualitative research techniques, and adequate knowledge on measurement & scaling techniques as well as the quantitative data analysis. Basic awareness of data analysis-and hypothesis testing procedures
SEM VIII	**MAJOR PROJECT**		

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PROGRAM OUTCOME (PO) & COURSE OUTCOME (CO) (2023-24)

PROGRAM NAME	BVOC –SOFTWARE DEVELOPMENT

PROGRAM OUTCOME

- PO1: Improve their computer literacy, their basic understanding of operative systems and a working knowledge of software commonly used in academic and professional environments.
- PO2: Do Academic and Professional Presentations - Designing and delivering an effective presentation and developing the various IT skills to the electronic databases.
- PO3: Use the Systems Analysis Design paradigm to critically analyse a problem. Solve the problems (programming, networking, and database and Web design) in the Information Technology environment. Function effectively on teams to accomplish a common goal and demonstrate professional behavior.
- PO4: Develop IT-oriented security issues and protocols. Design and implement a web page.

COURSE OUTCOME			
SEMESTER	**COURSE NAME**	**COURSE CODE**	**COURSE OUTCOME**
	Fundamentals of Computers and Information Technology	BVNSD 1.1	**CO1:** Analyse the fundamental concepts of computers with the present level of knowledge of the students. **CO2:** Understand the operating systems, programming languages, peripheral devices, networking, multimedia and internet **CO3:** Understand binary, hexadecimal and octal number systems and their arithmetic. **CO4:** Visualize how computer network work.
	Problem Solving Techniques and C Programming	BVNSD 1.2	**CO1:** Understand the syntax and semantics of the C language **CO2:** Recognize how to develop and implement a program in the C language **CO3:** Demonstrate an understanding of basic building block of programming. **CO4:** Design and develop Computer programs, analyzes, and interprets the concept of pointers, declarations, initialization, operations on pointers and their usage.
	Web Designing	BVNSD 1.3	**CO 1:** Understand principle of Web page design and about types of websites.

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			CO 2: Visualize and Recognize the basic concept of HTML and application in web designing. **CO 3:** Recognize and apply the elements of Creating Style Sheet (CSS). **CO 4:** Understand the basic concepts of responsive web page. **CO 5:** Apply the basic concepts of Java Script.
	Introduction to Database management System	BVNSD 1.4	**CO1:** Design SQL queries to create database tables and make structural modifications. **CO2:** Design SQL queries to add data to the database, edit existing data, and to delete data from the database. **CO3:** Implement basic and advanced SQL queries to retrieve data from the database. **CO4:** Understand and applies indexing mechanisms in databases.
	Fundamental of Mathematics	BVNSD 1.5	**CO1:** Understand the Matrices and operations. **CO2:** Analyse the basic principles of sets and operations in sets, demonstrate an understanding of relations and functions and be able to determine their properties. **CO3:** Demonstrate different traversal methods for trees and graphs, Model problems in Computer Science using graphs and trees. **CO4:** Understand the Lattices, Boolean Algebra and Theory of Logic.
	CC1	BVNSD 1.6	
	Data Structures Using C	BVNSD 2.1	**CO1:** Analyze algorithms and algorithm correctness. **CO2:** Implement searching and sorting techniques. **CO3:** Demonstrate stack, queue and linked list operation.

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			CO4: Understand the concepts of tree and graphs.
	Lab on Data Structures and C Programming (Practical Paper)	BVNSD 2.2	**CO1:** Analyze and write code linked list programs. **CO2:** Implement code searching and sorting techniques. **CO3:** Demonstrate & code stack, queue and tree list operation. **CO4:** Implement code graphs concepts
	PHP	BVNSD 2.3	**CO1:** Understand about installation, configuration, and administer PHP, web server, and database tools and extensions. **CO2:** Apply Object-Oriented Design principles in PHP. **CO3:** Write code for connection to databases to fetch, store, and update persistent information. **CO4:** Analyse learn to avoid SQL injection attacks using parameter binding and input sanitization. **CO5:** Understand business logic in the database using stored procedures in addition Test and debug object-oriented PHP scripts.
	Computer Graphics and Multimedia	BVNSD 2.4	**CO1:**Understand the basics of computer graphics, different graphics systems and applications of computer graphics **CO2:**Apply the tools of Adobe Photoshop and coral draw. **CO3:**Implement the use of social media effectively for productive use
	Communication Skills	BVNSD 2.5	**CO1:**Understand the parameters of communication for developing practical approach to be implemented further. **CO2:** Understand how to shape their personality with the help of different skills of interactions that can be used at organizational level. **CO3:**Present themselves by means of subjective practical skills that can be used at global level.

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			CO4: Develop their fluency in speaking, reading and writing English language.
	CV1	BVNSD 2.6	
	ASP.NET and C#	BVNSD 3.1	**CO1**: Understand the Microsoft .NET Framework and ASP.NET page structure. **CO2:** Design web application with variety of controls. **CO3:** Access the data using inbuilt data access tools. **CO4:** Implement Microsoft ADO.NET to access data in web Application **CO5:** Configure and deploy Web Application **CO6:** Develop secured web application
	Lab on ASP.NET and C# (Practical Paper)	BVNSD 3.2	**CO1**: Understand the Microsoft .NET Framework and ASP.NET page structure. **CO2:** Design web application with variety of controls. **CO3:** Access the data using inbuilt data access tools. **CO4:** Implement Microsoft ADO.NET to access data in web Application **CO5:** Configure and deploy Web Application **CO6:** Develop secured web application
	Data Communication and Computer Network	BVNSD 3.3	**CO1:**Understand basic computer network technology. **CO2:**Enumerate the layers of the OSI model and TCP/IP. Explain the function(s) of each layer. **CO3:**Analyse the different types of network devices and their functions within a network **CO4:** Implement security of the data over the network. **CO5:**Understand Cryptographic and various Cryptographic Techniques **CO6:**Protect any network from the threats in the world.
	Operating System	BVNSD 3.4	**CO1:** Describe and explain the fundamental components of a computer

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			operating system **CO2:** Define, restate, discuss, and explain the policies for scheduling, deadlocks, memory management, synchronization, system calls, and file systems **CO3:** Analyse and extrapolate the interactions among the various components of computing systems. **CO4:** Design and construct the following OS components: System calls, Schedulers, Memory management systems, Virtual Memory and Paging systems
	Digital Electronics	BVNSD 3.5	**CO1:** Analyse the structure of number systems and perform the conversion among different number systems. **CO2:** Implement logical expressions using Boolean algebra, k-map and tabulation method and implement the functions using logic gates. **CO3:** Realize combinational circuits for given application. **CO4:** Design and analyses synchronous and asynchronous sequential circuits using flip-flops. **CO5:** Implement combinational logic circuits using programmable logic devices.
	CC2	BVNSD 3.6	
	Python Programming	BVNSD 4.1	**CO1:** Implement simple Python programs. **CO2:** Develop Python programs with conditionals and loops. **CO3:** Apply Python functions and to use Python data structures - lists, tuples, dictionaries **CO4:** Apply searching, sorting and merging in Python
	Design and Analysis of Algorithms	BVNSD 4.2	**CO1:** Implement new algorithms, prove them correct, and analyze their

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			asymptotic and absolute runtime and memory demands. **CO2:** Understand the Advanced Data Structures **CO3:** Implement the Divide and Conquer, Greedy Methods and Trees. **CO4:** Apply the Dynamic Programming with examples.
	Software Engineering	BVNSD 4.3	**CO1:** Understand of the analysis and design of complex systems. **CO2:** Apply software engineering principles and techniques. **CO3:** Develop, maintain and evaluate large-scale software systems. **CO4:** Produce efficient, reliable, robust and cost-effective software solutions. **CO5:** Implement independent research and analysis. **CO6:** Understand and meet ethical standards and legal responsibilities.
	E-Commerce and M-commerce	BVNSD 4.4	**CO1:** Analyse the impact of E-commerce & M-commerce on business models and strategy. **CO2:** Understand the major types of E-commerce & M-commerce. **CO3:** Apply the process that should be followed in building an E-commerce & M-commerce presence. **CO4:** Understand the key security threats in the E-commerce & M-commerce environment.
	Cyber Security	BVNSD 4.5	**CO1:**Understand, appreciate, employ, design and implement appropriate security technologies and policies to protect computers and digital information. **CO2:** Evaluate Information Security threats and vulnerabilities in Information Systems and apply security measures to real time scenarios **CO3:** Analyse common trade-offs and compromises that are made in the design and development process of Information Systems.
	VC2	BVNSD 4.6	

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	JAVA Programming	BVNSD 5.1	**CO1:** Understand Java language syntax and semantics to write Java programs and use concepts such as variables, conditional and iterative execution methods etc. **CO2:** Understand the fundamentals of object-oriented programming in Java, including defining classes, objects, invoking methods etc and exception handling mechanisms. **CO3:** Implement the principles of inheritance, packages and interfaces.
	Data warehousing and Mining	BVNSD 5.2	**CO1:**Design a Data warehouse system and perform business analysis with OLAP tools. **CO2:**Apply suitable pre-processing and visualization techniques for data analysis **CO3:**Apply frequent pattern and association rule mining techniques for data analysis **CO4:**Apply appropriate classification and clustering techniques for data analysis
	Software Testing	BVNSD 5.3	**CO1:**Understand the challenges and problems faced, what is testing, types of testing and the models. **CO2:**Understand the different types of testing with their workings. **CO3:**Describe the techniques used in static testing **CO4:**Visualize the methods used to perform dynamic testing and case studies on it. **CO5:** Understand how to manage the testing process by developing the related documents. **CO6:**Analyze why tools are required, how to use them and understand the ethics required.
	Network and Information Security	BVNSD 5.4	**CO1:**Identify some of the factors driving the need for network security **CO2:**Identify and classify particular examples of attacks **CO3:**Understand Distributed Computing techniques, Synchronous and Processes. **CO4:**Apply Shared Data access and Files concepts **CO5:**Develop basic understanding of security, cryptography, system attacks

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			and defenses against them. **CO6:**Analyse message passing, client-server and peer -to-peer models to understand distributed computing paradigms.
	Cryptography.	BVNSD 5.5A	**CO1:** Understand security of the data over the network. **CO2:** Do research in the emerging areas of cryptography and network security. **CO3:** Implement various networking protocols. **CO4:** Protect any network from the threats in the world.
	Relational Database Management System Using Oracle	BVNSD 5.5B	**CO1:** Implement basic concepts of Database Systems in Database design **CO2:**Apply SQL queries to interact with Database **CO3:**Design a Database using normalization. **CO4:**Apply normalization on database design to eliminate anomalies **CO5:**Analyze database transactions and can control them by applying ACID properties.
	Internship/ Term Paper	BVNSD 5.6	
	Artificial Intelligence	BVNSD 6.1	**CO1:** Understand the basic of Artificial Intelligence. **CO2:** Implement the searching techniques of AI and Knowledge Representation & Reasoning. **CO3:** Analyse the Machine Learning and techniques. **CO4:** Analyse the Pattern Recognition and Classification Techniques.
	Internet of Things	BVNSD 6.2	**CO1:** Understand the Components that form part of IoT Architecture. **CO2:** Determine the most appropriate IoT Devices and Sensors based on Case Studies. **CO3:** Setup the connections between the Devices and Sensors.

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			CO4: Evaluate the appropriate protocol for communication between IoT. **CO5:** Analyze the communication protocols for IoT. **CO6:** Design some IOT based project.
	Mobile application development using Android	BVNSD 6.3	**CO1:** Understand various concepts of mobile programming that make it unique from programming for other platforms, **CO2:** Visualize mobile applications on their design pros and cons, **CO3:** Utilize rapid prototyping techniques to design and develop sophisticated mobile interfaces, **CO4:** Program mobile applications for the Android operating system that use basic and advanced phone features, and **CO5:** Deploy applications to the Android marketplace for distribution.
	Digital Marketing	BVNSD 6.4	**CO1:** Understand the concept of Digital Marketing & E-commerce in today's scenario. **CO2:** Create and maintain a good website and blog posts. **CO3:** Understand and apply SEO and Email Marketing in today's modern world **CO4:** Apply Social Media Marketing techniques via various platforms **CO5:** Implement various Analytics tools of online marketing
	Cryptography LAB (Practical Paper)	BVNSD 6.5A	**CO1:** Understand basic cryptographic algorithms, message and web authentication and security issues. **CO2:** Understand information system requirements for both of them such as client and server. **CO3:** Apply the current legal issues towards information security.
	RDBMS LAB(Practical Paper)	BVNSD 6.5B	**CO1:**Understand, appreciate and effectively explain the underlying

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			concepts of database technologies. **CO2:**Design and implement a database schema for a given problem-domain. **CO3:**Normalize a database. **CO4:**Populate and query a database using SQL DML/DDL commands. **CO5:**Declare and enforce integrity constraints on a database using a state-of-the-art RDBMS. **CO6:** Implement programming PL/SQL including stored procedures, stored functions, cursors, packages.
	Minor Project	BVNSD 6.6	
	Advanced JAVA Programming	BVNSD 7.1	**CO1:** Understand graphical User Interface (GUI) networking, and database manipulation. **CO2:** Apply advanced technology in Java such as Internationalization, and Remote method Invocation **CO3:** Understand how to work with JavaBeans. **CO4:** Apply web application using Java Servlet and Java Server Pages technology.
	Machine Learning	BVNSD 7.2	**CO1:** Understand the Machine Learning and Approaches. **CO2:** Understand the Regression and Support Vector Machine. **CO3:** Understand the Decision Tree Learning and Instance-Based Learning. **CO4:** Apply the Reinforcement Learning and Genetic Algorithms
	Data Science	BVNSD 7.3	**CO1:** Understand the basics of Data Science. **CO2:** Implement data analysis using R. **CO3:** Understand statistical foundation for data science.
	Cloud Computing	BVNSD 7.4A	**CO1:** Understand the fundamental principles of distributed computing. **CO2:** Understand how the distributed

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		computing environments known as Grids can be built from lower level services. **CO3:** Analyse the importance of virtualization in distributed computing and how this has enabled the development of Cloud Computing. **CO4:** Analyze the performance of Cloud Computing. **CO5:** Apply the concept of Cloud Security. **CO6:** Understand the Concept of Cloud Infrastructure Model
Linux Server Administration	BVNSD 7.4B	**CO1:** Understand concepts of Linux OS basics **CO2:** Apply various Linux based administration tasks **CO3:** Implement Linux OS based server configuration, management and administration
Theory of Computation	BVNSD 7.5A	**CO1:** Understand the Automata and Grammars. **CO2:** Understand the Regular Languages, Regular expression Applications and Limitation of Finite Automata. **CO3:** Analyse the Context free grammar, Context Free Languages Ambiguity in Grammar and Push down automata. **CO4:** Understand the Turing machines, Recursive and recursively enumerable languages.
Compiler Design	BVNSD 7.5B	**CO1:** Acquire knowledge of different phases and passes of the compiler and also able to use the compiler tools like LEX, YACC, etc. Students will also be able to design different types of compiler tools to meet the requirements of the realistic constraints of compilers. **CO2:** Understand the parser and its types i.e. Top-Down and Bottom-up parsers and construction of LL, SLR,

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			CLR, and LALR parsing table. **CO3:** Implement the compiler using syntax-directed translation method and get knowledge about the synthesized and inherited attributes. **CO4:**Understand about run time data structure like symbol table organization and different techniques used in that.
	Research Methodology	BVNSD 7.6	**CO1:**Develop understanding on various kinds of research, objectives of doing research, research process, research designs and sampling. **CO2:**Understand the qualitative research techniques **CO3:**Apply measurement & scaling techniques as well as the quantitative data analysis **CO4:**Understand data analysis-and hypothesis testing procedures
	MAJOR PROJECT	BVNSD 8	

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PROGRAMME OUTCOME (PO), PROGRAMME SPECIFIC OUTCOME (PSO), COURSE OUTCOME (CO) (2023-24)

PROGRMME NAME	BSC

PROGRAMME OUTCOME

Mathematics:

PO1: Ability to communicate mathematical ideas clearly using correct mathematical terminology and proper mathematical notation and use their mathematical knowledge to solve problems.

PO2: Develop appreciation and competency for application of mathematical approaches and techniques to variety of problems and applications to problems in other disciplines such as engineering, business and other decisional sciences.

PO3: Prepare sound mathematical base for enhancing understanding in interdisciplinary subjects such as physics, engineering, computer science etc. and for pursuing Master's Degree in Mathematics or Engineering/Computer science/ Business/Economics.

PO4: Utilize mathematical skills to coach school and college students or enhance their own career prospects through pursuit of advanced degree in mathematics or full-fill prerequisites of eligibility for various national and international competitive examinations. B.Sc. Research.

PO5: Comprehend, analyze and apply knowledge gained to formulate research objectives, adopt appropriate methodology in identified research area to provide plausible mathematical solutions in chosen research project.

PO6: Build solid foundation to pursue Masters degree in Mathematics with research orientation as a prerequisite for Ph.D. in Mathematics.

Physics:

PO1: The program well demonstrate an acute understanding of the major thematic concepts underlying the discipline of Physics, both individually as well as in group, via written assignment and viva.

PO2: It will develop in the student scientific understanding of the subject , that he is able to design, conduct, record and analyze the result of Physics experiments.

PO3: It will prepare students for the upcoming employment challenges including pursuing higher records with an emphasis on encouraging entrepreneurial instinct.

PO4: It would generate new scientific insight and their application towards enhancement of innovation in the national economy.

PO5: It would encourage publication of innovative research in the leading publications across the word.

PO6: The student will develop scientific temper and innovative analytical mindset that sets them apart from students in other comparable programmes across India.

Chemistry:

PO1: The program well demonstrate an acute understanding of the major thematic concepts underlying the discipline of chemistry, both individually as well as in group, via written assignment and viva.

PO2: It will develop in the student scientific understanding of the subject , that he is able to design, conduct, record and analyze the result of chemistry experiments.

PO3: It will prepare students for the upcoming employment challenges including pursuing higher records with an emphasis on encouraging entrepreneurial instinct.

PO4: It would generate new scientific insight and their application towards enhancement of innovation in the national economy.

PO5: It would encourage publication of innovative research in the leading publications across the word.

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MATHS DEPARTMENT

COURSE OUTCOME			
SEMESTER	**COURSE NAME**	**COURSE CODE**	**COURSE OUTCOME**
SEM I	Differential Calculus	P-1	1. Know the concepts of calculus, namely, limits, continuity, differentiability of functions of one and two variables and their applications in the form of mean value theorem and Taylor's theorem. 2. Sketch curves in a plane using its mathematical properties in the different coordinate systems of reference. 3. Apply derivatives in Optimization, Social sciences, Physics and Life sciences etc. 4. Get knowledge of curvature, asymptotes, envelopes and evolutes
	Matrices and Algebra	P-2	1. Find the rank and eigen values of matrices. 2. Study the system of linear homogeneous and non-homogeneous equations. 3. Recognize the mathematical objects that are groups, and classify them as abelian, cyclic and permutation groups, etc. 4. Link the fundamental concepts of Groups and symmetrical figures. 5. Analyze the subgroups of cyclic groups. 6. Explain the significance of the notion of cosets, normal subgroups, and factor group. 7. Understand the concepts of rings, subrings and fields.
SEM II	Integral Calculus	P-3	1. Some of the families and properties of Riemann integrable functions, and the applications of the fundamental theorems of integration. 2. Beta and Gamma functions and their properties. 3. The valid situations for the inter-changeability of differentiability and integrability with infinite sum, and approximation of transcendental functions in terms of power series. 4. Compute area of surfaces of revolution and the volume of solids by integrating over cross-sectional areas.
	Geometry	P-4	1. To learn and visualize the fundamental ideas of coordinate geometry. 2. To describe some surfaces by using analytical geometry.

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			3. To gain knowledge about regular geometrical figures and their properties.
SEM III	Ordinary Differential Equations	P-5	1. Formulate Differential Equations for various Mathematical models. 2. Solve first order non-linear differential equation and linear differential equations of higher order using various techniques. 3. Apply these techniques to solve and analyze various mathematical models.
	Mechanics	P-6	1. The significance of mathematics involved in physical quantities and their uses. 2. To understanding the various concepts of basic mechanics like simple harmonic motion, motion under other laws and forces. 3. To study and to learn the cause-effect related to these. 4. The applications in observing and relating real situations/structures.
SEM IV	Mathematical Methods	P-7	1. To develop mathematical skills in calculus and analysis. 2. To get knowledge of Laplace Transforms and Fourier series. 3. To get acquainted with the essentials of calculus of variations.
	Linear & Abstract Algebra	P-8	1. The fundamental concept of Rings, Fields, subrings, integral domains and the corresponding morphisms. 2. The concept of linear independence of vectors over a field, the idea of basis and the dimension of a vector space. 3. Basic concepts of linear transformations, the Rank-Nullity Theorem, matrix of a linear transformation and the change of basis. 4. Automorphisms for constructing new groups from the given group. 5. Group actions, Sylow theorems and their applications to check nonsimplicity. 6. Compute inner products and determine orthogonality on vector spaces.
SEM V	Numerical Analysis	P-9	1. Some numerical methods to find the zeroes of nonlinear functions of a single variable and solution of a system of linear equations, up to a certain given level of precision. 2. Interpolation techniques to compute the values for a tabulated function at points not in the table.

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			3. Applications of numerical differentiation and integration to convert differential equations into difference equations for numerical solutions.
	Analysis	P-10	1. Understand the basic concepts of metric spaces. 2. Know the concepts such as open balls, closed balls, compactness, connectedness etc. 3. Understand the significance of differentiability of complex valued functions leading to the understanding of Cauchy-Riemann equations. 4. Evaluate the contour integrals and understand the role of Cauchy-Goursat theorem and the Cauchy integral formula. 5. Expand some simple functions as their Taylor and Laurent series, classify the nature of singularities, find residues and apply Cauchy Residue theorem to evaluate integrals.
	Integral & Partial Differential Equations	P-11A	1. Describe different types of Linear integral equations and partial differential equations for the impart knowledge of formulation of practical problems of applied mathematics. 2. Understand the theoretical basic behavior of different types of arising problems such as Fredholm, Volterra, Singular, Hilbert and Cauchy integral equations. 3. Explain the foundations of various problems related to Wave, Laplace and Diffusion equations by the method of separation of variables. 4. Deal with problems in applied mathematics, theoretical mechanics and mathematical physics and engineering.
	Discrete Mathematics	P-11B	1. Lattices and their types. 2. Boolean algebra, switching circuits and their applications. 3. Graphs, their types and its applications in study of shortest path algorithms. 4. Display familiarity with the mathematical models which are the integral part of the hardware and software of computer science. 5. Elaborate and expand their understanding of the tools helpful in the implementation of circuit design, AI algorithms and compiler construction.

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	Number Theory	P-11C	1. To have knowledge of primes, congruences, quadratic residues and primitive roots. 2. Solving Diophantine equations. 3. Derive generating functions and recurrence relations.
SEM VI	Advanced Algebra	P-12	1. Give the structure of an abelian group of a given order. 2. Construct the splitting field extension of a given polynomial. 3. Understand the interplay of group theory and field theory. 4. Determine the minimal polynomial of an algebraic element
	Differential Geometry & Tensor Analysis	P-13	1. Explain the concept of differentiable geometry. 2. Understand the concepts of tensors in differentiable geometry. 3. Apply various concept of differential calculus in tensors.
	Advanced Differential Equations	P-14A -	1. Solve the system of 1st order differential equations, 2nd order differential equations, nth order differential equations, oscillatory equation, stability and unstability of linear and non-linear system of equations. 2. Conceptualize Green's functions and nature of critical points. 3. Prove advanced understanding of topics in applied mathematics, computational physics etc
	Operations Research	P-14B	1. Be able to understand the application of OR and frame a LP Problem with solution 2. Be able to build and solve Transportation and Assignment problems using appropriate method. 3. Be able to design and solve simple models of CPM and queuing to improve decision making and develop critical thinking and objective analysis of decision problems. 4. to take best course of action out of several alternative courses for the purpose of achieving objectives by applying game theory and sequencing models.
SEM VII	Topology	P-15	Course Outcomes: 1. Define and illustrate the concept of topological spaces and continuous functions, 2. Illustrate the concept of limit point, dense sets, interior, exterior, boundary points. 3. Identify and understand bases, sub-bases and different type of spaces

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			like Lindelof, Separable, and their properties.
	Fluid Mechanics	P-16	Course Outcomes: 1. understand the concept of fluid and their classification, models and approaches to study the fluid flow. 2. formulate mass and momentum conservation principle and obtain solution for non viscous flow. 3. know potential theorems, minimum energy theorem and circulation theorem. 4. understand two dimensional motion, circle theorem and Blasius theorem.
	Geometry of Manifolds	P-17	1. Elaborate the concept of differentiable manifolds and their examples. 2. Clarify the concepts of vector fields, tangent vectors & tangent spaces in a manifold. 3. Apply various concepts of differential calculus to the settings of abstract set called manifold. 4. Use Riemannian metric on a given manifold to find the various types of curvatures with emphasis on the surface/ types of manifold. 5. Bring out different connections on Riemannian manifold and its properties. 6. Calculate curvature tensor & tensors of respective connections.
	Complex Analysis	P-18	1. Understand the topics of Complex Analysis needed to pursue research in pure mathematics. 2. Understand the properties of maximum modulus of a Complex valued function and the results based on that property. 3. Develop manipulation skills in the use of Rouche's theorem and Argument Principle. 4. Show knowledge of Gamma and Zeta functions with their properties and relationships. 5. Understand the Harmonic functions defined on a disc and concerned results. 6. Make factorization of entire functions having infinite number of zeros.
	Module Theory	P-19A	1. Identify cyclic modules, simple modules, finitely generated modules etc. 2. Find a basis of a free module. 3. Use the basis to describe module

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			homomorphisms. 4. Describe the structure of a finitely generated module over a PID.
	Measure Theory & Integration	P-19B	1. Display understanding of the essential foundations of important aspect of mathematical analysis. 2. Explain the measurability of a set of real numbers and measurable functions. 3. Differentiate between the Riemann integral and the Lebesgue integral. 4. Apply the Measure theory and theory of the integral in other branches of pure and applied mathematics.
SEM VIII		MAJOR PROJECT	

PHYSICS DEPARTMENT

COURSE OUTCOME			
SEMESTER	**COURSE NAME**	**COURSE CODE**	**COURSE OUTCOME**
SEM I	Mechanics and Wave motion	P-1	1. The students would clearly understand the conflict between Newtonian mechanics and Special Relativity and thus would know how the progress of the revolutionary scientific ideas is made through logical evidences and observations. 2. They would be able to understand the differences between inertial and noninertial frames and see how pseudo-forces arise in non-inertial frames. 3. They would have a clear understanding of the dynamics of conservative and non-conservative forces in real life such as in gravitational fields or mechanical systems having friction etc. 4. They would feel the thrill to know that the same set of laws that work for planetary and galactic motions also work in our daily life. Further, they would be able to do mathematical calculations with application of these laws to various objects and artificial satellites. 5. They would be able to understand and calculate various macroscopic elastic properties as the response of the widely used materials through the

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			application of simple classical laws. 6. The students would be able to understand and apply the properties of oscillations (natural, damped and forced), and waves and appreciate their omnipresence in various phenomena around us.
	Optics	P-2	1. The student will get an introduction to the discipline of optics and its role in daily life. 2. The optics course will give the student a basic knowledge of interference, diffraction and polarization. 3. The student will be able to analyze and calculate interference between light waves and application of the theory to various interferometers along with their practical applications. 4. The student would know the conditions for near and far-field diffraction and be able to calculate the far-field diffraction from gratings and simple aperture functions. 5. The student would understand how the polarization of light changes at reflection and transmission at interfaces.
SEM II	Electricity and Magnetism	P-3	1. Understand the basic mathematical concepts related to Electromagnetic fields, and use the understanding of calculus along with basic principles to solve problems encountered in science. 2. Comprehend and apply the understanding of fundamental laws and concepts in electricity and magnetism, primarily with regard to Maxwell's laws, to explain natural physical processes and related technological advancements. 3. Learn about the origin and basic properties of static as well as dynamic Electric and Magnetic fields, and the kinds of physical phenomena they generate - Electromagnetic waves and their properties. 4. Account for the importance of electricity and magnetism in society, especially with regard to technological applications. 5. Visualize and design experiments based on the basic concepts of electricity and magnetism, and obtain information in order to explore physical principles.

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	Mechanics/ EM & Optics Lab	P-4	Experimental physics has the most striking impact on the industry wherever the instruments are used to determine the thermal and electronic properties. The following outcomes are expected by this laboratory course: 1. Students will achieve measurement precision. 2. Students will verify the conceptual learning through experiments in these areas. 3. Students will better appreciate the theoretical concepts in mechanics, electricity and magnetism, and optics through experiments. 4. Online Virtual Lab Experiments are expected to give insight in the simulation techniques, and provide basis for modeling.
SEM III	Heat and Thermodynamics	P-5	Course outcomes 1. The students will understand the fundamental principles of thermodynamics, including the first and second laws. 2. They would learn the idea of entropy and associated theorems, and the thermodynamic potentials and their physical meanings. 3. Students will have an understanding of Maxwell's thermodynamic relations. 4. They will acquire the knowledge about the fundamentals of gas kinetic theory and transport phenomenon.
	Perspectives of Quantum Physics	P-6	1. It will help students understand the basics concepts of Quantum Physics. 2. It will make students understand the development of quantum mechanics as a continuity of classical concepts and also as a leap jump from classical to quantum world of Physics. 3. A student will be able to understand as to how the inadequacies of classical Physics were overcome by various concepts and theoretical developments of modern Physics i.e. Understand how major concepts developed and changed over time. 4. A study of the Heisenberg's Uncertainty principle and its applications will make students understand the most modern concept of wave particle duality as to how a wave could behave like a particle and how a particle

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			could behave like a wave. 5. An appreciation of the Schrödinger Wave Equation and its application to various problems in quantum mechanics will make students more analytical. This will give them the needed tool to solve problems across science subjects as Schrödinger equation appears in multidisciplinary subjects. 6. It will make students capable of analyzing and solving problems using reasoning skills based on the concepts of modern physics.
SEM IV	Electronics	P-7	1. Utility of resonant circuits and AC bridges. 2. The basic electronic devices and their applications. 3. Transistor biasing. 4. Concept of frequency response, bandwidth and audio amplifiers. 5. Feedback circuits 6. The importance of amplitude modulation and demodulation 7. Applications of various electronic instruments.
	Heat and Electronics Lab	P-8	1. Experimental physics has the most striking impact on the industry wherever the instruments are used to determine the thermal and electronic properties. 2. Measurement precision and perfection is achieved through Lab Experiments. 3. Online Virtual Lab Experiments give an insight in simulation techniques and provide a basis for modeling.
SEM V	Solid State Physics	P-9	1. The crystal geometry with respect to symmetry operations 2. The power of X-ray diffraction and the concept of reciprocal lattice 3. The various properties based on crystal bindings 4. Lattice dynamics and its influence on the properties of materials, 5. Physics of electrons in solids and 6. Magnetic, dielectric and superconducting properties of solids along with recent published results by various researchers. 7. Such study would provide a foundation for research in condensed matter physics, material science and nanotechnology.
	Nuclear Physics	P-10	1. Grasp the knowledge about basic nuclear properties and nuclear models for a better understanding of nuclear

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			reaction dynamics. 2. Analyze quantum mechanical phenomena in nuclear physics and develop an understanding of quantum mechanics also. 3. Comprehend the general understanding of phenomena like nuclear fusion and fission and develop the skills required for solving basic problems in nuclear physics at different nuclear energy ranges. 4. Develop the basic understanding of accelerator physics and particle detectors. 5. Acquire and apply basic nuclear physics knowledge in subjects such as medicinal, archaeology, geology, and other multidisciplinary fields of Physics and Chemistry.
	Lasers and Optoelectronics I	P-11X	1. Opting for this course will give the students an opportunity to know and understand applications of fiber optics and laser technology. 2. Students will be able to appreciate the importance of lasers, fiber optical methods and sensors in all spheres of life i.e. various communication requirements, medical, travel etc. 3. Students will learn about optical fibers in detail and will be able to appreciate the current communication system existing globally. 4. They will also gain the knowledge of basic concepts of optical communication and of different types of optical fibers thereby getting enabled to appreciate the huge advantage of such systems. 5. Students will be able to know about various types of fiber optic sensors and their use in the areas of security, safety, medical and space ventures. 6. Finally, students may emerge with an idea for new sensor or a new application of the existing ones.
	The Second Quantum Revolution	P-11Y	1. To understand the main ideas of quantum computation. 2. To develop an understanding of the fundamental concepts of the field. 3. To equip the student with enough technical expertise to may be take up a career in this new, exciting and rich field of research. 4. To introduce some experimental developments pertaining to quantum computers.
SEM VI	Advanced Lab	P-12	1. Measurement precision and perfection is achieved through Lab

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			Experiments. 2. The experiments in advance laboratory will enable students to be industry ready in the field of electronics. 3. The exposure to this laboratory will enable students to do research in applied optics and optoelectronics. 4. The students will be able to appreciate the concept of electronic communication. 5. Online Virtual Lab Experiments give an insight in simulation techniques and provide a basis for modeling.
	Atomic & Molecular Spectroscopy	P-13	1. After completion of the course students will be able to understand the spectra produced by one and two valence electron systems, intensity of spectral lines and effect of magnetic field on one electron systems as well as origin of hyperfine structure. 2. Students will acquire knowledge of rotational, vibrational and electronic spectra of molecules in addition to acquaintance with the principle of electron spin and nuclear magnetic resonance, nuclear quadrupole spectroscopy and their applications. 3. They will also learn the Laser principle, basic Lasers and its applications
	History of Science in India	P-14X	1. Students will realize and sense the excitement how deeply the mysteries of the starry sky and several socio-cultural aspects of human coexistence with nature have puzzled the great minds of all times in India and motivated them into extensive enquiry. 2. Students will learn about the long tradition of the monumental ancient-to-modern wisdom in science contributed by Indian scientists with their sheer dedication and intellect despite the obvious lack of adequate resources and experimental facilities. 3. They would clearly understand how the scientific ideas progress through the application of mathematics built on reason and logical methods and ultimately lead to scientific revolutions. 4. Thus, students will appreciate the role of human observations in verification of the scientific principles and necessity of the technological tools to add to or

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			modify or overturn the already acquired knowledge along the line of history.
	Plasma Physics and Space Science	P-14Y	1. After completing the course the students will understand the basic concepts of plasma physics and will have very good knowledge of mathematical models for plasma and will be able to distinguish the dynamics of plasmas and neutral fluid media. 2. They will be able to describe the propagation of waves in plasmas and will have good insight into plasma instabilities. 3. Students will be able to know about the atmospheric structures, the Sun-Earth system and space weather. 4. The students will feel a great deal of excitement with our current understanding into the mysteries of the stars and universe, especially with the modern state-of-the-art technology like "Hubble Space Telescope" and "Planck" spacecraft..
SEM VII	Classical and Statistical Mechanics	P-15	1. Understand the concepts of generalized coordinates and D'Alembert's principle. 2. Understand the Lagrangian dynamics and the importance of cyclic coordinates. 3. Comprehend the difference between Lagrangian and Hamiltonian dynamics. 4. Recognize the difference between macro-state and microstate. 5. Comprehend the concept of ensembles and partition function. 6. Applications of Bose-Einstein and Fermi-Dirac distribution laws. 7. Understand the White Dwarf Stars, Chandrasekhar Mass Limit
	Mathematical Physics	P-16	1. The primary objective is to teach the students basic mathematical methods that will be used in solving physical problems. 2. Students will learn the required mathematical techniques which will be useful in many other courses in higher education. 3. The emphasis will be to teach Mathematical Physics as a tool to create and develop new knowledge. 4. Understanding the mathematical Physics will enable students to solve advanced problems in various fields

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			of Physics.
	Classical Field Theory of Electrodynamics and General Relativity	P-17	1. The primary focus of this course lies at the stimulating understanding of classical field theories and their applications in the modern research. 2. The students will learn to design and use the mathematical apparatus for building Lagrangian and Hamilitonian formulations of Electrodynamics and General relativity as the two fundamental force fields of nature. 3. They will appreciate how electromagnetic fields behave in the presence of gravity, as quite a realistic situation. 4. The students will grasp and appreciate the amazing insights into the equivalence principle and the whole edifice of Einstein's General Relativity applicable up to Planckian scales. 5. They will feel the excitement and learn about the recently observed messengers of gravitational waves, in addition to the already existing electromagnetic signals. 6. Students will learn about the monumental contributions of Indian scientists like A. K. Raychaudhuri, P.C. Vaidya and C.V. Vishveshwara in the field of gravitation and gravitational waves. 7. The students will eventually learn how to formulate a field theory on their own by considering the key conditions as constraints on the action principle and viability with observations.
	Lasers and Optoelectronics II	P-18X	1. Using their knowledge of optical fibers students will learn optical communication, required coding, bandwidth budget, waveguides and optical couplers. 2. Students will learn about fabrication of integrated optical devices, various optic effects and various types of sensors using optical fibers. 3. Students will learn the fundamental mechanism in Lasers like Mode selection, Mode Locking and Q-switching. 4. Students will know about various types of lasers available and their applications.

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			5. Students will learn how the optical fibers are used in sensor applications. 6. Students will learn concepts of fiber optic communication.
	Advanced Electronics	P-18Y	1. Knowledge of Network theorems, 2. Study the drift and diffusion of charge carriers in a semiconductor. 2. Study of special diodes 3. Study of the working, properties and uses of FETs and MOSFET 4. Comprehend the design and operations of SCRs and UJTs. 5. Understand various number systems and binary codes. 6. Familiarize with binary arithmetic. 7. Study the working and properties of various logic gates.
	X-rays	P-19X	1. Students learn about the various methods of X-rays generation, safety concerns in the X-ray generation. 2. Students will be able to learn the theoretical background of the X-rays diffraction. 3. Students will get knowledge about the X-ray Films and their processing. 4. They will also understand the Diffraction of X-rays via several methods to obtained photograph pattern of various crystals and their studies. 5. Students will learn about the X-ray absorption and spectroscopic techniques.
	Mathematical Methods & Numerical Techniques	P-19BY	1. Understand numerical techniques to find the roots of equations and solution of system of linear equations. 2. Understand the difference operator, use of interpolation and matrices. 3. Understand numerical differentiation and integration and numerical solutions of ordinary and partial differential equations. 4. Applying numerical techniques to solve physics problems.
SEM VIII	Advanced Quantum Mechanics	P-20	1. Students will learn the basic concepts of Quantum mechanics which applies to all the physical systems irrespective of their size and can be beautifully perceived at atomic and subatomic level. 2. Students will be able to understand the various operators used to represent dynamic variables. 3. The eigen values and eigen functions of linear harmonic oscillator and Hydrogen atom will help students to understand the behaviour of

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			microscopic systems. 4. The students shall have a good exposure to the approximation methods.
	Material Science and Nanotechnology	P-21	1. Develop the basic concept of materials science and acquire an understanding of various characterization techniques and potential applications of Nanomaterials as well. 2. Understand about the structure of materials and classification of nanostructures and effects of quantum confinement on the electronic structure of nanomaterials. 3. Comprehend the behavior of nanostructures in quantum mechanical approach. 4. Identify the different ways of nanomaterials synthesis and their characterization techniques. 5. Gain knowledge of basic theories of thin films, their deposition techniques and applications
	MAJOR PROJECT		

CHEMISTRY DEPARTMENT

COURSE OUTCOME			
SEMESTER	**COURSE NAME**	**COURSE CODE**	**COURSE OUTCOME**
SEM I	Inorganic Chemistry 1	P1	CO-1 Structure of atoms and associated important rules, importance of chemistry of elements. CO-2 Ionic, covalent and non-covalent bonding which always play pivotal role in deciding the chemistry and properties of any compound/material. CO-3 Periodic properties of elements and several parameters associated with elements CO-4 Solid state chemistry which forms the basis of the development of targeted crystalline solids inculcating varied defects which induces variety of materials properties viz. piezoelectricity. CO-5 Chemistry of elements belonging to s-block, noble gases and main group.
	Organic Chemistry 1	P2	CO-1 Understand different organic compounds with respect to the functional group and thus capable to name the

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			organic compounds as per IUPAC nomenclature. CO-2 Understand the basics of chemical reactions i.e. Substrate and Reagent, types of Reagents, Electrophilic and Nucleophilic Homolytic and heterolytic fission. Electron mobility, Inductive effect etc. CO-3 Recognize and draw constitutional isomers, stereoisomers, including enantiomers and diasteromers, racemic mixture and meso compounds. CO-4. Understand fundamental principles of organic chemistry and predict outcomes and derive mechanism of various types of organic reactions. CO-5 Understand various types of reactive intermediates and factors affecting their stability CO-6 Understand the nomenclature, synthesis, isomerism and physical properties of alkanes and cycloalkanes. CO-7 Understand the concept of Aromaticity of benzenoids & nonbenzenoids, the preparation, reactivity & structure of aromatic compounds. CO-8 Learn the preprations, reactivity & stereochemistry of SN1 &SN2 reactions of Halogen compounds.
SEM II	Physical Chemistry 1	P3	CO-1- Students would gain knowledge regarding the basic of computers and mathematical concepts of log, permutation and combination, differential and integration of some relevant functions. CO-2- Student would gain understanding of gaseous state, critical phenomenon, liquid state, solid state, colloidal state and liquid crystals. CO-3- It would help students recognize the importance of chemical kinetics and catalysis.
	Chemistry Practical 1	P4	CO-1. the student will be able to analyse the given mixture and identify anions and cations present. CO-2. achieve knowledge about different types of reaction. CO-3. understand various tests to identify the radicals. CO-4. able to write reactions and

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			structure. CO-5. acquire the skill to perform the experiment in the real lab once they understand different steps in the procedure. CO-6. Having expertise in making solutions accurately. CO-7. To acquired enough knowledge to answer questions based on experiments.
SEM III	Physical Chemistry 2	P5	CO-1- After the completion of the semester, student will acquire knowledge of first law and second law of thermodynamics, thermochemistry, entropy enthalpy etc. CO-2- It will also make them familiar with conductance, equivalent conductance, Kohlrausch's law, Ostwald dilution law, Deby-Huckel Onsagar equation, e.m.f. of cell, types of cell, liquid junction potential, pH and pka, Henderson- Hazel equation etc.
	Chemistry Practical 2	P6	CO-1. By interpreting the real gases, the student will be able to solve the problems. CO-2. Describes the ideal and real gases. CO-3. By interpreting some properties of liquids and solids, the student will be able to solve the problems. CO-4. Interpreting the phase equilibrium in simple systems, the student will be able to answer the questions. CO-5. Adopt distribution law to explain various phases. CO-6. By describing the ideal solution, the student will be able to recognize, use and compare the colligative properties. CO-7. Explain various reactions based on kinetics. CO-8. describe the kinds of solutions.
SEM IV	Inorganic Chemistry 2	P7	CO-1 Chemistry of transition and inner-transition elements. These insights are important as they help in the rational selection of the cations of these elements for tailor-made syntheses of newer complexes CO-2 Concepts of coordination chemistry and their applications CO-3 Importance of different acid-base concepts which forms the basis of

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			rational ligand designing and coordination complex formation for specific bioinorganic, materials and optoelectronic applications. CO-4 Importance and different chemical aspects of non-aqueous solvents which now-a-days are gaining importance in varied targeted syntheses of drugs and materials for technological applications
	Organic Chemistry 2	P8	CO-1 The preparation and chemical reactions of Alcohols and Epoxides - Alcohols Dihydric alcohols: (Ethylene Glycol) CO-2 Understanding the order of reactivity of different carboxylic acid derivatives and the reactivity of different carboxylic acid derivatives. CO-3 Able to recognize structures of acid halides, esters, amides, acid anhydrides. CO-4 Able to write down structure of phenol and phenoxide ion and chemical reactions of phenols. CO-5 Know the mechanism of named reactions of carbonyl compounds and condensation reactions as well as their use in food and pharmaceuticals
SEM V	Organic Chemistry 3	P9	CO-1 The organometallic compounds such as Grignard reagent which have been widely used on both laboratory and commercial scale and is one of the most common organometallic reagents used for the formation of carbon–carbon bonds. Organosulphur compounds which have therapeutic use and pharmacology CO-2 Carbohydrate, its classification and use in the food industry etc. CO-3 Protein, aminoacid and peptides. Chemical structure of RNA and DNA. CO-4 Various polymers, their method of polymerization and their use in industry
	Chemistry Practical 3	P10	CO-1 Having acquired knowledge to handle instruments and its calibration. CO-2 Explain the structure and bonding in molecules / ions and predict the structure of molecules / ions. – CO-3 Explain selected crystal structures, explain and perform

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			calculations of the lattice enthalpy of ionic compounds. – CO-4 Having knowledge of Beer Lamberts law CO-5 To separate compounds chromatographically. CO-6 Able to make solutions accurately to perform conductance experiments. CO-7 To understand making circuit connections and taking observations.
	Analytical Chemistry	P 11X	CO 1. Understand the basic of this course and think & develop new ideas and concepts in analytical chemistry. CO 2 . Know about electroanayltical, thermoanalytical, radiochemical, chromatographic and spectral techniques. CO 3. To study concepts and theories behind basic methods and techniques used in analytical chemistry. This theory can be used to solve many rigorous problems of universe. CO 4. To prepare the students for further research in analytical methods of chemistry.
	Chemical Energetic and Radiochemistry	P 11Y	CO 1. Understand the introductory quantum mechanics and concept of third law of thermodynamics, distribution law and phase rule. CO 2. Get introduced to the law of photochemistry and photosensitized reactions energy transfer processes. CO 3. Study about the dilute solutions and colligative properties. CO 4. Get familiar with radiopharmaceuticals and radiochemistry.
SEM VI	Inorganic Chemistry 3	P12	CO-1 Semi-modern concepts of metal ligand bonding in coordination complexes CO-2 Inorganic polymers viz. silicones which find applications in materials pharmaceutical industries and surgery too. Phosphazenes which in last couple of years had witnessed significant development as emerging smart materials. CO-3 Class-a and class-b donor-acceptors, symbiotic relationship
	Quantum Mechanics and Spectroscopy	P13	CO-1 Infrared spectroscopy in which characteristic absorptions of various functional groups. CO-2 Ultraviolet absorption spectroscopy, Beer Lambert Law,

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			types of electronic transitions and the effect of conjugation and concept of chromophore and auxochrome. CO-3 Nuclear magnetic resonance, interpretation of NMR spectra of simple organic molecule. CO-4 Quantum mechanics as well as of spectroscopy. They will have comprehensive understanding of valence bond model and molecular orbital model.
	Polymer Chemistry	P14X	CO-1. define related concepts of polymers. CO-2. summarize historical evolution of the polymers. CO-3. recognize monomers and polymers. CO-4. evaluate the structure of polymers. CO-5. recognize bonds between polymer chains. CO-6. debate thermal character and affecting factors of thermal behaviours. CO-7. use determining method of molecular weights. CO-8. categorize polymers. CO-9. explain polymers production processes.
	Chemistry of Natural Products	P14Y	CO1 Learn the different types of alkaloids, steroids, vitamins & terpenes etc and their chemistry and medicinal importance. CO2 Explain the importance of natural compounds as lead molecules for new drug discovery. CO3 Explain vitamins Chemistry and Physiological significance of Vitamin CO4 Elaborate general methods of structural elucidation of compounds of natural origin. CO5 Learn advanced methods of structural elucidation of compounds of natural origin.
SEM VII	Inorganic, Organic and Physical Chemistry	P15	CO 1. Cover wide area of studies of interdisciplinary area of the three branches of chemistry CO 2. Have ideas of catalysis, kinetics and free energy relationship. CO 3. Study stereochemical aspects of molecules and understand the spatial arrangements and its importance.

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	Bioinorganic, Bioorganic and Biophysical Chemistry	P16	CO 1. Have ideas of metalloenzymes, bioenergetics, transport and storage of dioxygen, electron transfer, metal storage and metals in medicine. CO 2. Cover wide area of studies of interdisciplinary area of biology and chemistry. CO 3. It includes the study of both natural phenomena such as the behaviour of metalloproteins as well as artificially introduced metals.
	Chemistry Practical 4	P17	CO-1. Qualitative analysis of inorganic mixtures of 8 radicals CO-2. Qualitative analysis and determination of two metal ions volumetrically and gravimetrically. CO-3. The preparation of selected inorganic compounds and their characterization. CO-4. Qualitative analysis of three component organic mixtures. CO-5. students should be able to check the purity of organic molecules by the use of TLC and how to calculate their Rf values. CO-6. Two steps synthesis involving different name reactions. CO-7. The basic knowledge of conductance, electrochemistry, potentiometry and the kinetics of decomposition of the complexes spectrophotometrically
	Supramolecular Chemistry	P18X	CO 1. Have understanding of theories behind supramolecular interaction and various classes of host-guest chemistry and its applications. CO 2. Develop ideas for further research in the field of supramolecular chemistry. CO 3. Molecular recognition, complex formation and host design, templates and self-assembly through various examples and applications.
	Chemistry of Analgesics and Antipyretics	P18Y	CO-1. The structural activity relationship of different class of drugs. CO-2. The synthesis of drug molecules using the reactions of synthetic organic chemistry. CO-3. Well acquainted with the synthesis of some important class of drugs. CO-4. The mechanism pathways of certain class of medicinal compounds

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			and their modes of action with receptors. CO-5. The chemistry of drugs with respect to their pharmacological activity.
	Science and Technology of Cosmetics	P19X	CO-1. This course allows students to understand and learn about the chemistry of cosmetics. CO-2. More specifically, this course aims to introduce the scientific aspects such as chemical, physical and biological functions of different ingredients present in the cosmetics. CO-3. This course also gives information about the formulation and technology of cosmetics
	Research Methodology	RM	CO-1. Minimize the risk of injury or illness to laboratory workers by ensuring that they have the training, information, support and equipment needed to work safely in the laboratory. CO-2. Have understanding of different purification criteria at separation and be able to account for fundamental separation processes and their connection to molecular properties. CO-3. IUPAC awareness on the world authority on chemical nomenclature, terminology, standardized methods for measurement, atomic weights and many other critically-evaluated data. CO-4. Developing skill for systematic, articulate and orderly presentation of research work in a written form containing relevant information on the research work carried out.
SEM VIII	MAJOR PROJECT		

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PROGRAM OUTCOME (PO) (2023-24)

PROGRMME NAME	MBA

PROGRAMME OUTCOME
PO1: Business Environment and Domain Knowledge (BEDK) Students are expected to have the understanding of environment in which business operates and that includes economic, socio-cultural, political, legal, technological, and competitive environment. Further, the students are expected to have deep knowledge and understanding about the managerial functions and the specific domain of business that the student specializes in. Such knowledge would help in identifying potential business opportunities, evolvement of business enterprises and exploring the entrepreneurial opportunities. PO2: Critical thinking, Business Analysis, Problem Solving and Innovative Solutions (CBPI) Students are expected to develop competencies in critical thinking for business decision making, capabilities, and skills to analyze and solve business problems across functional areas and more so by coming out with innovative solutions. PO3: Global Exposure and Cross-Cultural Understanding (GECCU) Students are expected to have a global outlook, they are also expected to demonstrate the ability to identify the various aspects of the global businesses and gain a Cross Cultural Understanding. PO4: Social Responsiveness and Ethics (SRE) The students of MBA are expected to understand the professional, ethical, legal, financial, marketing, logistical, security and social issues and their responsibilities in the social arena. They are expected to identify the contemporary social problems, explore the opportunities for social entrepreneurship, design business solutions and demonstrate ethical standards in organizational decision making. PO5: Effective Communication (EC) Students are expected to develop effective oral and written communication skills especially in business applications with the use of appropriate technology wherever necessary. PO6: Leadership and Teamwork (LT) Students are expected to have leadership skills and ability to collaborate effectively with organizational members having diverse capabilities and skills to achieve organizational goals. They should be able to function in teams, overcome conflicts and prove their abilities to carry the teams to success.

COURSE OUTCOME			
SEMESTER	COURSE NAME	COURSE CODE	COURSE OUTCOME
I	MANAGEMENT CONCEPTS AND ORGANISATIONAL BEHAVIOUR	KMBN101	CO 1: Developing understanding of managerial practices and their perspectives. CO2: Understanding and Applying the concepts of organizational behavior. CO 3: Applying the concepts of management and analyze organizational behaviors in real world situations. CO 4: Comprehend and practice contemporary issues in management. CO 5: Applying managerial and leadership skills among students
	MANAGERIAL ECONOMICS	KMBN102	CO1: Students will be able to remember the concepts of micro economics and also able to understand the various micro economic principles to make effective economic decisions under conditions of risk and uncertainty. • Knowledge (K 2) • Remembering (k1) CO2: The students would be able to understand the law of demand &

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		supply & their elasticities , evaluate & analyse these concepts and apply them in various changing situations in industry . Students would be able to apply various techniques to forecast demand for better utilization of resources. • Knowledge (K 2) • Applying (K 4) • Synthesizing (K6) • Evaluating (K7) CO3: The students would be able to understand the production concept and how the production output changes with the change in inputs and able to analyse the effect of cost to business and their relation to analyze the volatility in the business world • Comprehending (K 3) • Applying (K 4) • Analyzing (K 5) • Evaluating (K7) CO4: The students would be able to understand & evaluate the different market structure and their different equilibriums for industry as well as for consumers for the survival in the industry by the application of various pricing strategic • Applying (K 4) • Analyzing (K 5) • Synthesizing (K6) CO5: The students would be able to analyse the macroeconomic concepts & their relation to micro economic concept & how they affect the business & economy
FINANCIAL ACCOUNTING & ANALYSIS	KMBN103	CO1.Understand and apply accounting concepts, principles and conventions for their routine monetary transaction. CO2. Understand about IFRS, Ind AS and IAS for preparation and reporting of financial statements. CO3. Create and prepare financial statements and Cash flow in accordance with Generally Accepted Accounting Principles CO4. Analyse, interpret and communicate the information contained in basic financial statements and explain the limitations of such statements. CO5. Recognising various types of accounting and utilize the technology and social responsibility in facilitating and enhancing accounting and financial reporting processes.
BUSINESS STATISTICS & ANALYTICS	KMBN104	CO1. Gaining Knowledge of basic concept / fundamentals of business statistics. CO2. To compute various measures of central tendency, Measures of Dispersion, Time Series Analysis, Index Number, Correlation and

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		Regression analysis and their implication on Business performance. CO3. Evaluating basic concepts of probability and perform probability theoretical distributions CO4. To apply Hypothesis Testing concepts and able to apply inferential statistics- t, F, Z Test and Chi Square Test CO5. To perform practical application by taking managerial decision and evaluating the Concept of Business Analytics.
MARKETING MANAGEMENT	KMBN105	CO1. Remember and Comprehend basic marketing concepts. CO2. Understand marketing Insights on application of basic marketing concepts. CO3. Able to Apply and develop Marketing Strategies and Plans. CO4. Understand and Analyzing Business/ Consumer Markets and ability Identify & evaluate Market Segments and Targeting. CO5. Develop skills to understand the current global and digital aspect of marketing.
DESIGN THINKING	KMBN106	CO1. Gain in depth knowledge about creative thinking and design thinking in every stage of problem. CO2. Applying design thinking to your real life. problems / situations in order to evolve an innovative and workable solutions. CO3. Understand and implement design thinking to your real life problems / situations in order to evolve an innovative and workable solutions.
BUSINESS COMMUNICATION	KMBN107	CO1. Apply business communication strategies and principles to prepare effective communication for domestic and international business situations. CO2. Analyse ethical, legal, cultural, and global issues affecting business Communication. CO3. Develop an understanding of appropriate organizational formats and channels used in business communications CO4. Gaining an understanding of emerging electronic modes of communication.

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			CO5. Developing effective verbal and non verbal communication skills.
	IT SKILLS LAB-1	KMBN151	CO1. Gain in depth knowledge about the functioning of computers and its uses for managers CO2. Learn to use Internet and its applications. CO3. Understand and implement Word processing Software. CO4. Learn applications on Spread sheet softwares. CO5. Analyse and learn Presentation software.
	MINI PROJECT -1	KMBN152	CO1. Gain in depth knowledge on innovative idea for product or services in form of a project report. CO2. To apply innovative idea, its feasibilities and detail descriptions.
II	BUSINESS ENVIRONMENT & LEGAL ASPECT OF BUSINESS	KMBN201	CO1) Develop understanding and fundamental knowledge about business environment. CO2) Develop understanding on the concepts of Business Environment and international business environment. CO3) Develop basic understanding of law of contract. CO4) understanding of provisions of Companies Act concerning incorporation and regulation of business organizations. CO5) Able to analyze case laws in arriving at conclusions facilitating business decisions.
	HUMAN RESOURCE MANAGEMENT	KMBN202	CO1. Synthesize the role of human resources management as it supports the success of the organization including the effective development of human capital as an agent for organizational change. CO2. Demonstrate knowledge of laws that impact behaviour in relationships between employers and employees that ultimately impact the goals and strategies of the organization. CO3. Understand the role of employee benefits and compensation as a critical component of employee performance, productivity and organizational effectiveness. CO4.Show evidence of the ability to analyze, manage and problem solve to deal with the challenges and complexities of the practice of collective bargaining. CO5. Demonstrate knowledge of practical application of training and employee development as it impacts organizational strategy and competitive advantage.
	BUSINESS RESEARCH METHODS	KMBN203	CO1. Knowledge of concept /

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		fundamentals for different types of research. CO2. Applying relevant research techniques. CO3. Understanding relevant scaling & measurement techniques and should use appropriate sampling techniques. CO4.Synthesizing different techniques of coding, editing, tabulation and analysis in doing research. CO5.Evaluating statistical analysis which includes ANOVA technique and prepare research report.
FINANCIAL MANAGEMENT & CORPORATE FINANCE	KMBN204	CO1 Understand the different basic concept / Models of Corporate Finance and Governance CO2 Understand the practical application of time value of money and evaluating long term investment Decisions. CO3 Develop analytical skills to select the best source of capital, structure and leverage. CO4 Understand the use and application of different models for firm's optimum dividend pay-out. CO5 Understand the recent trends of mergers and acquisition and its valuation.
OPERATIONS MANAGEMENT	KMBN205	CO1. Understand the role of Operations in overall Business Strategy of the firm - the application of OM policies and techniques to the service sector as well as manufacturing firms. CO2. Understand and apply the concepts of Material Management, Supply Chain Management and TQM perspectives. CO3. Identify and evaluate the key factors and their interdependence of these factors in the design of effective operating systems. CO4. Analyze / understand the trends and challenges of Operations Management in the current business environment. CO5. Apply techniques for effective utilization of operational resources and managing the processes to produce good quality products and services at competitive prices
QUANTITATIVE TECHNIQUES FOR MANAGERS	KMBN206	CO1. Be able to understand the characteristics of different types of decision-making environments and the appropriate decision making approaches and tools to be used in each type. CO2. To formulate linear programming problem and to find optimal solution by

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			graphical simplex method. CO3. Be able to build and solve Transportation Models and Assignment Models also to solve game theory problems by understanding pure and mix strategies. CO4. To assign optimal sequence of difference jobs on different machines and develop understanding of queuing theory concepts. CO5. To implement replacement of equipments at right time and able to implement project management concepts like CPM, PERT to reduce cost and time.
	DIGITAL MARKETING & E COMMERCE	KMBN207	CO1. Be able to understand the concept of Digital Marketing & E-commerce in today's scenario. CO2. To able to create and maintain a good website and blog posts. CO3. Be able to understand and apply SEO and Email Marketing in today's modern world. CO4. To apply the Social Media Marketing techniques via various platforms. CO5. To implement various Analytics tools of online marketing.
	MANAGEMENT INFORMATION SYSTEMS	KMBN208	CO1. Be able to understand the importance of information management in business and management. CO2. To understand and formulate different types of information systems in business. CO3. Be able to apply the theory and concepts in practical with help of software. CO4. To apply various security and ethical issues with Information Systems. CO5. To synthesize applications on Spread sheet and database software.
	IT SKILLS LAB-2	KMBN251	CO1. To gain knowledge of pivot table and understand the validating & auditing techniques. CO2. Learn to use different charting techniques in MS Excel. CO3. Learn to use different formatting techniques in MS Excel.
	MINI PROJECT -2	KMBN252	CO1. To gain knowledge of issues challenge of the industry. CO2. Learn to prepare report on the application of emerging technologies in the selected industry.
III	STRATEGIC MANAGEMENT	KMBN301	CO 1: Formulate organizational vision, mission, goals, and values CO2. Develop strategies and action plans to achieve an organization's vision, mission, and goals.

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			CO3. Develop powers of managerial judgment, how to assess business risk, and improve ability to make sound decisions and achieve effective outcomes. CO4. Evaluate and revise programs and procedures in order to achieve organizational goals; CO5. Consider the ethical dimensions of the strategic management process;
	INNOVATION AND ENTREPRENEURSHIP	KMBN302	CO 1: Remember and comprehend basic concepts of entrepreneurship CO2: Develop knowledge on Entrepreneurial Finance, Assistance and role of Entrepreneurial Development Agencies CO3: Develop understanding of converting an Idea to an opportunity and develop understanding of various funding sources CO4: Gain in depth knowledge of innovation and its various sources CO5: Develop understanding of various dimensions of innovation along with current trends and general awareness of innovation and startup
	UNIVERSAL HUMAN VALUES AND PROFESSIONAL ETHICS	KVE301	1. Understand the significance of value inputs in a classroom, distinguish between values and skills, understand the need, basic guidelines, content and process of value education, explore the meaning of happiness and prosperity and do a correct appraisal of the current scenario in the society 2. Distinguish between the Self and the Body, understand the meaning of Harmony in the Self the Co-existence of Self and Body. 3. Understand the value of harmonious relationship based on trust, respect and other naturally acceptable feelings in human-human relationships and explore their role in ensuring a harmonious society 4. Understand the harmony in nature and existence, and work out their mutually fulfilling participation in the nature.

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		5. Distinguish between ethical and unethical practices, and start working out the strategy to actualize a harmonious environment wherever they work.
TALENT MANAGEMENT	KMBNHR01	CO 1: Knowledge of Talent Management Processes CO 2: Understanding for analysis of the impacts of Talent management in the organization CO 3: Competency to implement Talent Management practices CO 4: Competency to develop leadership qualities among subordinate CO 5: Knowledge about the reward system to support Talent management
EMPLOYEE RELATIONS AND LABOUR LAWS	KMBNHR02	CO1: Knowledge of Industrial Relation framework CO2: Competency to understand the importance of Employee Relation within the perspective of Industrial Relation CO3: Knowledge about relevant Laws of HR management CO4: Competency to interpreted and implement the Labor Laws within organization CO5: Competency to use Collective Bargaining and Grievance redressal Mechanism
CONSUMER BEHAVIOUR AND MARKETING COMMUNICATION	KMBNMK01	CO1. Understand the three major influences on customer choice: the process of human decision making in a marketing context; the individual customers make up; the environment in which the customer is embedded. CO2. Develop the cognitive skills to enable the application of the above knowledge to marketing decision making and activities CO3. Be able to demonstrate how concepts may be applied to marketing strategy. CO4. Apply an IMC approach in the development of an overall advertising and promotional plan. CO5. Enhance creativity, critical thinking and analytical ability through developing an

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			integrated marketing communication campaign
	MARKETING ANALYTICS	KMBNMK02	1 CO1. Students will develop the skill in marketing analytics 2 CO2. Students will be acquainted with better understanding of real life marketing data and its analysis 3 CO3.Students will develop analytical skill for effective market decision making in real life environment
	INVESTMENT ANALYSIS & PORTFOLIO MANAGEMENT	KMBNFM01	CO 1: Understand about various investment avenues. CO 2: Understand the value of assets and manage investment portfolio. C0 3 : Understand various Models of Investment and its application CO 4: Understand and create various investment strategies on the basis of various market conditions. CO 5: Measure riskiness of a stock or a portfolio position.
	FINANCIAL PLANNING AND TAX MANAGEMENT	KMBNFM02	CO1: Understand about various tax provision and planning K1 (Remember) CO2: Understand the scope tax planning concerning various business and managerial and strategic activities can be explored CO3: Have Know about various Tax Dates Rates and Forms CO4: Have Knowledge of Financial Planning and its Process K3(Apply) CO5: Have knowledge about asset allocation and retirement planning process
	SUMMER TRAINING PROJECT REPORT & VIVA VOCE	KMBN308	
IV	EMERGING TECHNOLOGIES IN GLOBAL BUSINESS ENVIRONMENT	KMBN401	CO1: To get an overview of the changing context of International Business in the wake of Industry 4.0 CO 2 : Conceptual understanding of the new technologies that are driving change in business operations and strategy CO 3: Understand shifts in economic thought and its impact on business decisions. CO 4 : Understand changing geo politics

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		and analyses its impact on international Business CO 5 : Critically think about issues and challenges in the Global World and find sustainable solutions
HR ANALYTICS	KMBNHR03	CO 1: Apply HR Analytical techniques in the areas of HRP, recruitment and selection, Compensation and Benefits and Training etc. CO2: Demonstrate HR function in adding value in business terms. CO3: Utilise soft factors in a people management context and convert them into measurable variables. CO4: Design a Metrics and Analysis index for recruitment, performance and or a training and development context CO5: Predict the issues using the available HR data and formulate the best strategies.
PERFORMANCE AND REWARD MANAGEMENT	KMBNHR04	CO 1: Knowledge of Performance Management and Performance Appraisal CO 2: Competency to understand the importance of importance of Performance Management K2(Understand) CO 3: Knowledge about the Compensation and Reward Systems CO 4: Competency to implement the effective reward systems in the organization CO 5: Ability to explain the relevance of competency mapping and understanding its linkage with career development
INTERNATIONAL HRM	KMBNHR05	CO 1: Understanding the Contexts of International HRM CO 2: Knowledge about the HR Processes in International Context CO 3: Able to evaluate the impacts of Globalization on HRM CO 4: Desired level of expertise on organizational CO 5: Understanding the International culture in SHR
B2B AND SERVICES MARKETING	KMBNMK03	CO1.Understand and nature of B2B marketing Understand(K2) CO2. Ability to create an integrated

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		marketing communications plan which includes promotional strategies CO3.Define and apply knowledge of various aspects of managerial decision making related to pricing strategy and tactics. CO4. Be able to identify critical issues related to service design, such as identifying and managing customer service experience, expectations, perceptions and outcomes. CO5. Use critical analysis to perceive service shortcomings in reference to ingredients to create service excellence.
SALES AND RETAIL MANAGEMENT	KMBNMK04	CO1: Students will develop knowledge, understanding and skills in Sales force management. CO2: Acquainted with better understanding of implementation of sales management strategies. CO3:Develop analytical skills for effective decision alternatives in sales management problems CO4: Develop the knowledge, understanding and skills in retail management. CO5: Acquainted with better understanding of implementation of retail management strategies and develop analytical skills for effective decision alternatives in retail operations.
SOCIAL MEDIA AND WEB ANALYTICS	KMBNMK05	CO1: Students will develop knowledge, understanding and skills in analysis of Social Media CO2: Acquainted with better understanding of implementation Web Analytics tool 3. CO3:Develop analytical skills for effective decision alternatives in social media problems 4. CO4: Develop the knowledge, understanding and skills in Facebook and google analytics.

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		5. CO5: Acquainted with better understanding of implementation of web analytics strategies and develop analytical skills for effective decision alternatives in social media operations.
FINANCIAL DERIVATIVES	KMBNFM03	CO1: Understand about various derivatives instruments and derivative Market structure CO2 Understand the forward and future pricing mechanism and strategies for hedging using various futures products CO3 Understand the option pricing mechanism and using options strategies for mitigating risk CO4 Understand the Commodity derivative market CO5 Understand the Swaps derivatives and their mechanism
FOREIGN EXCHANGE AND RISK MANAGEMENT	KMBNFM04	CO1 Understand the BOP and evaluation various exchange rate system CO2 Understand the theories of exchange rate determination CO3 Understand the foreign exchange transactions mechanism CO4 Understand the exchange dealings CO5 Understanding the various foreign exchange risk and its management
FINANCIAL AND CREDIT RISK ANALYTICS	KMBNFM05	CO 1: Understand about various types of financial credit. CO 2: Understand the credit risk and its rating. C0 3 : Understanding of management and corporate governance. CO 4: Measure riskiness of a stock or a portfolio position.
RESEARCH PROJECT REPORT AND VIVA VOCE	KMBN408	

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PROGRAM OUTCOME (PO), PROGRAM SPECIFIC OUTCOME (PSO) (2023-24)

B.TECH CIVIL ENGGINERING

PROGRAMME OUTCOME

1) PO1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2) PO2: Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3) PO3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4) PO4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5) PO5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6) PO6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7) PO7: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8) PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9) PO9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10) PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11) PO11: Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12) PO12: Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES

PSO-1: The graduates of this program will be able to design the structure manually and with the help of software.
PSO-2: The graduates of this program will be able to perform surveying, quantity and estimation.

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COURSE OUTCOME

SEMESTER	COURSE NAME	COURSE CODE	COURSE OUTCOME
	ENGINEERING PHYSICS	BAS101 / BAS201	CO1:To explain the distribution of energy in black body radiation and to understand the difference in particle and wave nature with explanation of Compton effect and Schrodinger wave equation. CO2:To understand the concept of displacement current and consistency of Ampere's law and also the properties of electromagnetic waves in different medium with the use of Maxwell's equations. CO3:To understand the behavior of waves through various examples/applications of interference and diffraction phenomenon and the concept of grating and resolving power. CO4 To know the functioning of optical fiber and its properties and applications. To understand the concept, properties and applications of Laser. CO5 To know the properties and applications of superconducting materials and nano materials.
	ENGINEERING CHEMISTRY	BAS102 / BAS202	CO-1 Get an understanding of the theoretical principles of chemistry of molecular structure, bonding and properties, Chemistry of advanced materials (liquid crystals, Nanomaterials, Graphite & Fullerene) as well as the Principles of Green Chemistry. CO-2 Apply the fundamental concepts of determination of structure with various spectral techniques and stereochemistry. CO-3 Utilize the theory of construction of electrodes, batteries and fuel cells in redesigning new engineering products and categorize the reasons for corrosion and study methods to control corrosion and develop understanding of Chemistry of Engineering materials (Cement). CO-4 Develop understanding of the sources, impurities and hardness of water, apply the concepts of determination of calorific values and analyze the coal. CO-5 Develop the understanding of Chemical structure of polymers and its effect on their various properties when used as engineering materials. Understanding the applications of specific polymers and Chemistry applicable in industrial process.

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ENGINEERING MATHEMATICS-	**BAS103**	CO 1 Understand the concept of complex matrices, Eigen values, Eigen vectors and apply the concept of rank to evaluate linear simultaneous equations CO 2 Remember the concept of differentiation to find successive differentiation, Leibnitz Theorem, and create curve tracing, and find partial and total derivatives CO 3 Applying the concept of partial differentiation to evaluate extrema, series expansion, error approximation of functions and Jacobians CO 4 Remember the concept of Beta and Gamma function; analyze area and volume and Dirichlet's theorem in multiple integral CO 5 Apply the concept of Vector Calculus to analyze and evaluate directional derivative, line, surface and volume integrals.
: ENGINEERING MATHEMATICS-II	**BAS203**	CO 1 Remember the concept differentiation to evaluate LDE of nth order with constant coefficient and LDE with variable coefficient of 2nd order. CO 2 Understand and apply the concept of Laplace Transform to evaluate differential equations CO 3 Understand the concept of convergence to analyze the convergence of series and expansion of the function for Fourier series. CO 4 Apply the concept of analyticity, Harmonic function and create the image of function applying conformal transformation CO 5 Apply the concept of Cauchy Integral theorem, Cauchy Integralformula, singularity and calculus of residue to evaluate integrals
: FUNDAMENTALS OF ELECTRICAL ENGINEERING	**BEE101 / BEE201**	CO 1 Apply the concepts of KVL/KCL and network theorems in solving DC circuits. CO 2 Analyze the steady state behavior of single phase and three phase AC electrical circuits. CO 3Identify the application areas of a single phase two winding transformer as well as an auto transformer and calculate their efficiency. Also identify the connections of a three phase transformer. CO 4 Illustrate the working principles of induction motor, synchronous machine as well as DC machine and employ them in different area of applications. CO 5 Describe the components of low voltage electrical installations and perform elementary calculations for energy consumption.

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SEM I & SEM II	FUNDAMENTALS OF ELECTRONICS ENGINEERING	BEC101 / BEC201 :	1. Describe the concept of PN Junction and devices. 2. Explain the concept of BJT, FET and MOFET. 3. Apply the concept of Operational amplifier to design linear and non-linear applications. 4. Perform number systems conversions, binary arithmetic and minimize logic functions. 5. Describe the fundamentals of communication technologies.
	PROGRAMMING FOR PROBLEM SOLVIN	BCS101 / BCS201	CO 1 To Develop Simple Algorithms for Arithmetic and Logical Problems. K2, K3 CO 2 To Translate the Algorithms to Programs & Execution (in C Language). K3 CO 3 To Implement Conditional Branching, Iteration and Recursion. K3 CO 4 To Decompose a Problem into Functions and Synthesize a Complete Program Using Divide and Conquer Approach. K4 CO 5 To Use Arrays, Pointers and Structures to Develop Algorithms and Programs. K2, K
	MENTALS OF MECHANICAL ENGINI	BME101 / BME201:	CO1 Apply the concept of force resolution and stress and strain to solve basic problems K3 CO2 Understand the construction details and working of internal combustion engines, electric vehicle and hybrid vehicles. K2 CO3 Explain the construction detail and working of refrigerator, heat pump and airconditioner. K2 CO4 Understand fluid properties, conservation laws and hydraulic machinery used in real life. K2 CO5 Understand the working principle of different measuring instrument and mechatronics with their advantages, scope and Industrial application. K2
	ENVIRONMENT AND ECOLOGY	BAS104 / BAS204:	CO-1 Gain in-depth knowledge on natural processes that sustain life, and govern economy.CO-2 Estimate and Predict the consequences of human actions on the web of life, global economy and quality of human life. CO-3 Develop critical thinking for shaping strategies (scientific, social, economic and legal) for environmental protection and conservation of biodiversity, social equity and sustainable development. CO-4 Acquire values and attitudes towards understanding complex environmentaleconomic social challenges, and participate actively in solving current environmental problems and preventing the future ones.
	: SOFT SKILLS	BAS105 / BAS205	2. Demonstrate active listening with comprehension, and the ability to write clear and wellstructured emails and proposals. 3. Learn the use of correct body language and tone of voice to enhance communication. 4. Acquire the skills necessary to communicate effectively and deliver presentations with clarity and impact 5. Understand and apply some important aspects of core skills, like Leadership and stress management.

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: ENGINEERING PHYSICS LAB	BAS151 / BAS251	CO-1 Apply the principle of interference and diffraction to find the wavelength of monochromatic and polychromatic light. Apply CO-2 Compute and analyze various electrical and electronic properties of a given material by using various experiments. Analyze CO-3 Verify different established laws with the help of optical and electrical experiments. Apply CO-4 Determine and calculate various physical properties of a given material by using various experiments. Apply CO-5 Study and estimate the performance and parameter of given equipment by using graphical and computational analysis.
ENGINEERING CHEMISTRY LAB	BAS152 / BAS252	CO-1 Get an understanding of the use of different analytical instruments. CO-2 Measure the molecular / system properties such as surface tension, viscosity, conductance of solution, chloride and iron content in the water. CO-3 Measure the hardness and alkalinity of the water. CO-4 Know the fundamental concepts of the preparation of phenol formaldehyde & urea formaldehyde resin, adipic acid and Paracetamol. CO-5 Estimate the rate constant of reaction.
BASIC ELECTRICAL ENGINEERING I	BEE151 / BEE251	CO 1 Conduct experiments illustrating the application of KVL/KCL and network theorems to DC electrical circuits. K3 CO 2 Demonstrate the behavior of AC circuits connected to single phase AC supply and measure power in single phase as well as three phase electrical circuits. K4 CO 3 Perform experiment illustrating BH curve of magnetic materials. K3 CO 4 Calculate efficiency of a single phase transformer and DC machine. K4 CO 5Perform experiments on speed measurement and reversal of direction of three phase induction motor and Identify the type of DC and AC machines based on their construction

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: PROGRAMMING FOR PROBLEM S	BCS151 / BCS251	CO 1 Able to implement the algorithms and draw flowcharts for solving Mathematical and Engineering problems. CO 2 Demonstrate an understanding of computer programming language concepts. K3, K2 CO 3Ability to design and develop Computer programs, analyzes, and interprets the concept of pointers, declarations, initialization, operations on pointers and their usage. CO 4 Able to define data types and use them in simple data processing applications he/she must be able to use the concept of array of structures. CO 5 Develop confidence for self-education and ability for life-long learning needed for Computer language
ENGLISH LANGUAGE LAB	BAS155 / BAS255	1. Students will be enabled to understand the basic objective of the course by being acquainted with specific dimensions of communication skills i.e. Reading, Writing, Listening, Thinking and Speaking. 2. Students would be able to create substantial base by the formation of strong professional vocabulary for its application at different platforms and through numerous modes as Comprehension, reading, writing and speaking etc. 3. Students will apply it at their work place for writing purposes such as Presentation/official drafting/administrative communication and use it for document/project/report/research paper writing. 4. Students will be made to evaluate the correct and error-free writing by being well-versed in rules of English grammar and cultivate relevant technical style of communication &presentation at their work place and also for academic uses. 5. Students will apply it for practical and oral presentation purposes by being honed up in presentation skills and voice-dynamics. They will apply techniques for developing interpersonal communication skills and positive attitude leading to their professional competence.
ENGINEERING GRAPHICS & DESIGN LAB	BCE151/ BCE251:	CO 1: Use scales and draw projections of objects. CO 2: Explain views of solids and their sectional surfaces. CO 3: Analyze and draw isometric projections of objects. CO 4: Demonstrate orthographic representation of perspective views using modern tools. CO 5: Apply AutoCAD software for creation of engineering drawing and models
WORKSHOP PRACTICE LAB	WS151/ BWS251	CO1 Use various engineering materials, tools, machines and measuring equipments. K3 CO2 Perform machine operations in lathe and CNC machine. K3 CO3 Perform manufacturing operations on components in fitting and carpentry shop. K3 CO4 Perform operations in welding, moulding, casting and gas cutting. K3 CO5 Fabricate a job by 3D printing manufacturing technique

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SEM III	ENGINEERING MECHANICS	BCE30	1. Use scalar and vector analytical techniques for analyzing forces in statically determinate structures 2. Apply fundamental concepts of kinematics and kinetics of particles to the analysis of simple, practical problems. 3. Apply basic knowledge of mathematics and physics to solve real-world problems. 4. Apply basic dynamics concepts – force, momentum, work and energy. 5. Apply Newton's laws of motion for solving the problems.
	SURVEYING & GEOMATICS	BCE302	1. Apply concepts of survey to prepare plan, profile, and cross-section for computations. 2. Calculate, design and layout horizontal and vertical curves. 3. Operate modern survey instrument for recording of data for scientific uses. 4. Apply principles of photogrammetry for surveying. 5. Apply principles of Remote Sensing and Digital Image Processing for Civil Engineering problems.
	FLUID MECHANICS	BCE303	1. Explain principles of fluid statics, kinematics and dynamics. 2. Explain the terms used in fluid mechanics to describe fluid and flow properties. 3. Explain classifications of fluid flow. 4. Apply the continuity, momentum and energy principles 5. Apply dimensional analysis
SEM IV	MATERIALS, TESTING & CONSTRUCTION PRACTICES	BCE401	1. Explain various building materials based on their properties. 2. Explain use of non-conventional civil engineering materials. 3. Select suitable type of flooring and roofing in the construction process. 4. Characterize the concept of plastering, pointing and various other building services. 5. Exemplify the various building services and modern construction practices.
	INTRODUCTION TO SOLID MECHANICS	BCE402	1. Describe the concepts and principles of stresses and strains. 2. Calculate the deflections at any point on a beam subjected to a combination of loads 3. Analyze the given beam section for stresses. 4. Analyze structural members subjected to axial loading and combined stresses 5. Analyze the behavior of shafts, and cylinders against loads.
	HYDRAULIC ENGINEERING & MACHINES	BCE403	1. Apply their knowledge of fluid mechanics in addressing problems in open channels. 2. Solve problems in uniform, gradually and rapidly varied flows in steady state conditions. 3. Apply impulse momentum equation for estimating thr performance of pumps. 4. Draw performance curve for the turbines.

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SEM V	**Geotechnical Engineering**	**KCE 501**	CO-1 Classify the soil and determine its Index properties. CO-2 Evaluate permeability and seepage properties of soil. CO-3 Interpret the compaction and consolidation characteristics & effective stress concept of soil. CO-4 Determine the vertical and shear stress under different loading conditions and explain the phenomenon of soil liquefaction.
	Structural Analysis	**KCE 502**	• CO-1 Explain type of structures and method for their analysis. • CO-2 Analyze different types of trusses for member forces. • CO-3 Compute slope and deflection in determinate structures using different methods. • CO-4 Apply the concept of influence lines and moving loads to compute bending moment and shear force at different sections • CO-5 Analyze determinate arches for different loading conditions
	Quantity Estimation and Construction Management	**KCE 503**	CO-1 Understand the importance of units of measurement and preliminary estimate for administrative approval of projects. CO-2 Understand the contracts and tender documents in construction projects. CO-3 Analyze and assess the quantity of materials required for civil engineering works as per specifications. CO 4 Evaluate and estimate the cost of expenditure and prepare a detailed rate analysis report.
	Concrete Technology	**KCE 051**	CO-1 Understand the properties of constituent material of concrete. CO-2 Apply admixtures to enhance the properties of concrete. CO-3 Evaluate the strength and durability parameters of concrete. CO-4 Design the concrete mix for various strengths using difference methods. CO-5 Use advanced concrete types in construction industry.
	Modern Construction Materials	**KCE 052**	CO-1 Understand the use of modern construction materials. CO-2 Use geosynthetics and bituminous materials in constructions. CO-3 Apply knowledge of modern materials in production of variety of concrete. CO-4 Apply knowledge of composites and chemicals in production of modern concrete. CO-5 Use modern water proofing and insulating materials in constructions
	Open Channel Flow	**KCE 053**	CO-1 Apply knowledge of fluid flow for designing of channel sections. CO-2 Analyze the gradually varied flow in channel section. \CO-3 Analyze the rapidly varied flow in channel sections. CO-4 Apply numerical methods for profile computation in channels. CO-5 Design channels for sub critical and super critical flows.
	Engineering Geology	**KCE 054**	CO-1 Understand the scope of geological studies. CO-2 Understand the rocks and its engineering properties. CO-3 Understand the minerals and constituents of rocks. CO-4 Understand the rock deformations, their causes effects and preventive measures. CO-5 Understand the ground water reserves, Geophysical exploration methods and site selection for mega projects.

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Engineering Hydrology	**KCE 055**	CO-1 Understand the basic concept of hydrological cycle and its various phases. CO-2 Understand the concept of runoff and apply the knowledge to construct the hydrograph. CO-3 Apply the various methods to assess the flood. CO-4 Assess the quality of various forms of water and their aquifer properties. CO-5 Understand the well hydraulics and apply ground water modelling techniques
Sensor and Instrumentation Technologies for Civil Engineering Applications	**KCE 056**	CO-1 Analyze the errors during measurements CO-2 Describe the measurement of electrical variables CO-3 Describe the requirements during the transmission of measured signals CO-4 Construct Instrumentation/Computer Networks CO-5 Suggest proper sensor technologies for specific applications CO-6 Design and set up measurement systems and do the studies
Air and Noise Pollution Control	**KCE 057**	CO-1 Understand air pollutants and their impacts. CO-2 Explain air pollution chemistry and meteorological aspects of air pollutants. CO-3 Demonstrate methods for controlling particulate air pollutants. CO-4 Demonstrate methods for controlling gaseous air pollutants. CO-5 Understand automotive emission standards. CO-6 Apply methods for controlling noise pollution.
GIS and Advance Remote Sensing	**KCE 058**	CO-1 Understand the concepts of Photogrametry and compute the heights of objects CO-2 Understand the principles of aerial and satellite remote sensing, Able to comprehend the energy interactions with earth surface features, spectral properties of water bodies . CO-3 Understand the basic concept of GIS and its applications, know different types of data representation in GIS CO-4 Understand and Develop models for GIS spatial Analysis and will be able to know what the questions that GIS can answer are CO-5 Illustrate spatial and non-spatial data features in GIS and understand the map projections and coordinates
Design of Concrete Structures	**KCE 601**	CO-1 Analyse and Design RCC beams for flexure by IS methods. CO-2 Analyse and Design RCC beams for shear by IS methods. CO-3 Analyse and Design RCC slabs and staircase by IS methods. CO-4 Design the RCC compression members by IS methods. CO-5 Design various types of footings and cantilever retaining wall
Transportation Engineering	**KCE 602**	CO-1 Understand the history of road development , their alignment & Survey. CO-2 Design the various geometric parameters of road. CO-3 Study the traffic characteristics & design of road intersections & signals. CO-4 Examine the properties of highway materials & their implementation in design of pavements. CO-5 Learn methods to construct various types of roads.

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SEM VI	**Environmental Engineering**	**KCE 603**	CO-1 Assess water demand and optimal size of water mains. CO-2 Layout the distribution system & assess the capacity of reservoir. CO-3 Investigate physical, chemical & biological parameter of water. CO-4 Design treatment units for water and waste water.
	Advance Structural Analysis	**KCE 061**	CO-1 Analyze indeterminate structure to calculate unknown forces, slope and deflections by different methods. CO-2 Apply principle of influence lines to analyze indeterminate beams and arches. CO-3 Analyze and design cable structure with their influence line diagram. CO-4 Apply basics of force and stiffness methods of matrix analysis for beams, frames and trusses.
	River Engineering	**KCE 062**	CO-1 Explain river morphology and its classification. CO-2 Explain hydraulic geometry and behavior of river. CO-3 Explain socio-cultural influences and ethics of stream restorations. CO-4 Analyze flow and sediment transport in rivers and channels. CO-5 Design guide band, embankments and flood protection systems
	Repair and Rehabilitation of Structures	**KCE 063**	CO-1 Understand the fundamentals of maintenance and repair strategies. CO-2 Identify for serviceability and durability aspects of concrete. CO-3 Know the materials and techniques used for repair of structures. CO-4 Decide the appropriate repair and retrofitting techniques. CO-5 Use appropriate health monitoring technique and demolition methods
	Foundation Design	**KCE 064**	CO-1 Understand various methods of Soil Exploration and its importance. CO-2 Analyze bearing capacity and settlement of soil for shallow foundation. CO-3 Design the various types of shallow foundation and understand the basics of deep foundation. CO-4 Understand the characteristics of well foundations and retaining wall.
	Railway, Waterway and Airway Engineering	**KCE070**	1. Explain the importance of railway infrastructure. 2. Identify the factors governing design of railway infrastructures. 3. Analysis and design the railway track system. 4. Understand the concepts of airport engineering and design components of airport. 5. Associate with the concepts of water transport system
	Sustainable Construction Methods	**KCE071**	1. Classify the sustainable construction materials. 2. Apply cutting-edge construction technologies. 3. Evaluate different sustainable construction methods. 4. Apply different rating systems of construction/buildings as a professional. 5. Apply life cycle approach to optimize the performance of green construction materials
	Probability Methods in Civil Engineering	**KCE072**	1. Apply probabilistic techniques for the analysis of complex Civil Engineering structures using advanced techniques. 2. Demonstrate mathematical and statistical knowledge and skills to be applied in various civil engineering structures. 3. Apply the laws of logic to mathematical statements. 4. Develop mathematical thinking in the conduct of different experiments and presentation of results precisely.

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SEM VII	**Design of Steel Structures**	**KCE075**	1. Understand properties of steel and types of loads acting on steel structures. 2. Design welded and bolted type of connections for elementary steel structures. 3. Design tension members for elementary steel structures. 4. Design compression members such as simple columns, braced and latticed columns and column bases. 5. Design flexural members such as beams, purlins and girders
	Solid Waste Management	**KCE074**	1. Understand the concept of solid waste management. 2. Explain handling and processing of solid waste. 3. Apply the concept of landfilling for disposal of solid waste. 4. Design composting and other solid waste conversion units. 5. Understand the various hazardous waste, risk assessment and legislation
	Geo-synthetics and Reinforced Soil Structures	**KCE077**	1. Identify the type of Geosynthetic and their relevance. 2. Analyze &compute different properties of Geosynthetics. 3. Understand the emerging trends of Geosynthetic in geotechnical applications. 4. Design the Reinforced Earth Walls using Geosynthetic material. 5. Design the Reinforced Foundation using Geosynthetic materials
	Urban Transportation Planning	**KCE076**	1. Understand the basic concepts of planning at urban and regional levels. 2. Distinguish between the Conventional and current approaches for travel demand estimation. 3. Implement various types of models and trip generation. 4. Analyze the urban travel markets. 5. Evaluate the transport planning proposals
	Irrigation and Water Resource Engineering	**KCE078**	1. Describe the components of hydrological cycle, evaporation process and consumptive use. 2. Apply the knowledge of stream flow measurement techniques and hydrograph theory for computation of run-off. 3. Design different types of irrigation channels and water logging preventive measures. 4. Design the regulatory and control systems of canal and irrigation outlets. 5. Apply the knowledge of ground water hydrology and determination of discharge through wells.
	Disaster Preparedness and Management	**KCE079**	1. Understand the basic concepts of disasters and hazards 2. Classify the natural disasters. 3. Analyze the impacts of disaster on various societal components 4. Understand the components of disaster management cycle and roles of various agencies its risk reduction 5. Understand the process of recovery, reconstruction and development methods

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	Advance Concrete Design	**KCE073**	1. Understand the design criteria as well as design concept of circular and rectangular tanks. 2. Design the Intz tank, RC domes and beams, cylindrical and rectangular tanks. 3. Understand the concept of pre tensioning and post tensioning and different systems used in pre tensioning. 4. Analysis and design the simple prestressed beams . 5. Design deep beams and corbel as per IS 456.
SEM VIII	**HSMC-1* / HSMC-2***	**KHU801/ KHU802**	Mentioned in university syllabus
	Project	**KCE851**	
	Open Elective-III	**KOE08X**	
	Open Elective -IV	**KOE08X**	

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PROGRAM OUTCOME (PO), PROGRAM SPECIFIC OUTCOME (PSO) (2023-24)

B.TECH COMPUTER SCIENCE ENGGINERING

PROGRAMME OUTCOME

1) PO1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
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3) PO3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4) PO4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5) PO5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6) PO6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7) PO7: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8) PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9) PO9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10) PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11) PO11: Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12) PO12: Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES

PSO1: Ability to learn and adapt quickly in the rapidly changing and ever evolving field of computer science.
PSO2: Exhibit attitude for continuous learning and deliver efficient solutions for emerging challenges in the computation domain.

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COURSE OUTCOME

SEMESTER	COURSE NAME	COURSE CODE	COURSE OUTCOME
	ENGINEERING PHYSICS	BAS101 / BAS201	CO1:To explain the distribution of energy in black body radiation and to understand the difference in particle and wave nature with explanation of Compton effect and Schrodinger wave equation. CO2:To understand the concept of displacement current and consistency of Ampere's law and also the properties of electromagnetic waves in different medium with the use of Maxwell's equations. CO3:To understand the behavior of waves through various examples/applications of interference and diffraction phenomenon and the concept of grating and resolving power. CO4 To know the functioning of optical fiber and its properties and applications. To understand the concept, properties and applications of Laser. CO5 To know the properties and applications of superconducting materials and nano materials.
	ENGINEERING CHEMISTRY	BAS102 / BAS202	CO-1 Get an understanding of the theoretical principles of chemistry of molecular structure, bonding and properties, Chemistry of advanced materials (liquid crystals, Nanomaterials, Graphite & Fullerene) as well as the Principles of Green Chemistry. CO-2 Apply the fundamental concepts of determination of structure with various spectral techniques and stereochemistry. CO-3 Utilize the theory of construction of electrodes, batteries and fuel cells in redesigning new engineering products and categorize the reasons for corrosion and study methods to control corrosion and develop understanding of Chemistry of Engineering materials (Cement). CO-4 Develop understanding of the sources, impurities and hardness of water, apply the concepts of determination of calorific values and analyze the coal. CO-5 Develop the understanding of Chemical structure of polymers and its effect on their various properties when used as engineering materials. Understanding the applications of specific polymers and Chemistry applicable in industrial process.

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ENGINEERING MATHEMATICS-	**BAS103**	CO 1 Understand the concept of complex matrices, Eigen values, Eigen vectors and apply the concept of rank to evaluate linear simultaneous equations CO 2 Remember the concept of differentiation to find successive differentiation, Leibnitz Theorem, and create curve tracing, and find partial and total derivatives CO 3 Applying the concept of partial differentiation to evaluate extrema, series expansion, error approximation of functions and Jacobians CO 4 Remember the concept of Beta and Gamma function; analyze area and volume and Dirichlet's theorem in multiple integral CO 5 Apply the concept of Vector Calculus to analyze and evaluate directional derivative, line, surface and volume integrals.
: ENGINEERING MATHEMATICS-II	**BAS203**	CO 1 Remember the concept differentiation to evaluate LDE of nth order with constant coefficient and LDE with variable coefficient of 2nd order. CO 2 Understand and apply the concept of Laplace Transform to evaluate differential equations CO 3 Understand the concept of convergence to analyze the convergence of series and expansion of the function for Fourier series. CO 4 Apply the concept of analyticity, Harmonic function and create the image of function applying conformal transformation CO 5 Apply the concept of Cauchy Integral theorem, Cauchy Integralformula, singularity and calculus of residue to evaluate integrals
: FUNDAMENTALS OF ELECTRICAL ENGINEERING	**BEE101 / BEE201**	CO 1 Apply the concepts of KVL/KCL and network theorems in solving DC circuits. CO 2 Analyze the steady state behavior of single phase and three phase AC electrical circuits. CO 3Identify the application areas of a single phase two winding transformer as well as an auto transformer and calculate their efficiency. Also identify the connections of a three phase transformer. CO 4 Illustrate the working principles of induction motor, synchronous machine as well as DC machine and employ them in different area of applications. CO 5 Describe the components of low voltage electrical installations and perform elementary calculations for energy consumption.

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SEM I & SEM II	FUNDAMENTALS OF ELECTRONICS ENGINEERING	BEC101 / BEC201 :	1. Describe the concept of PN Junction and devices. 2. Explain the concept of BJT, FET and MOFET. 3. Apply the concept of Operational amplifier to design linear and non-linear applications. 4. Perform number systems conversions, binary arithmetic and minimize logic functions. 5. Describe the fundamentals of communication technologies.
	PROGRAMMING FOR PROBLEM SOLVIN	BCS101 / BCS201	CO 1 To Develop Simple Algorithms for Arithmetic and Logical Problems. K2, K3 CO 2 To Translate the Algorithms to Programs & Execution (in C Language). K3 CO 3 To Implement Conditional Branching, Iteration and Recursion. K3 CO 4 To Decompose a Problem into Functions and Synthesize a Complete Program Using Divide and Conquer Approach. K4 CO 5 To Use Arrays, Pointers and Structures to Develop Algorithms and Programs. K2, K
	MENTALS OF MECHANICAL ENGIN	BME101 / BME201:	CO1 Apply the concept of force resolution and stress and strain to solve basic problems K3 CO2 Understand the construction details and working of internal combustion engines, electric vehicle and hybrid vehicles. K2 CO3 Explain the construction detail and working of refrigerator, heat pump and airconditioner. K2 CO4 Understand fluid properties, conservation laws and hydraulic machinery used in real life. K2 CO5 Understand the working principle of different measuring instrument and mechatronics with their advantages, scope and Industrial application. K2
	ENVIRONMENT AND ECOLOGY	BAS104 / BAS204:	CO-1 Gain in-depth knowledge on natural processes that sustain life, and govern economy.CO-2 Estimate and Predict the consequences of human actions on the web of life, global economy and quality of human life. CO-3 Develop critical thinking for shaping strategies (scientific, social, economic and legal) for environmental protection and conservation of biodiversity, social equity and sustainable development. CO-4 Acquire values and attitudes towards understanding complex environmentaleconomic social challenges, and participate actively in solving current environmental problems and preventing the future ones.
	: SOFT SKILLS	BAS105 / BAS205	2. Demonstrate active listening with comprehension, and the ability to write clear and wellstructured emails and proposals. 3. Learn the use of correct body language and tone of voice to enhance communication. 4. Acquire the skills necessary to communicate effectively and deliver presentations with clarity and impact

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: ENGINEERING PHYSICS LAB	BAS151 / BAS251	CO-1 Apply the principle of interference and diffraction to find the wavelength of monochromatic and polychromatic light. Apply CO-2 Compute and analyze various electrical and electronic properties of a given material by using various experiments. Analyze CO-3 Verify different established laws with the help of optical and electrical experiments. Apply CO-4 Determine and calculate various physical properties of a given material by using various experiments. Apply CO-5 Study and estimate the performance and parameter of given equipment by using graphical and computational analysis.
ENGINEERING CHEMISTRY LAB	BAS152 / BAS252	CO-1 Get an understanding of the use of different analytical instruments. CO-2 Measure the molecular / system properties such as surface tension, viscosity, conductance of solution, chloride and iron content in the water. CO-3 Measure the hardness and alkalinity of the water. CO-4 Know the fundamental concepts of the preparation of phenol formaldehyde & urea formaldehyde resin, adipic acid and Paracetamol. CO-5 Estimate the rate constant of reaction.
BASIC ELECTRICAL ENGINEERING	BEE151 / BEE251	CO 1 Conduct experiments illustrating the application of KVL/KCL and network theorems to DC electrical circuits. K3 CO 2 Demonstrate the behavior of AC circuits connected to single phase AC supply and measure power in single phase as well as three phase electrical circuits. K4 CO 3 Perform experiment illustrating BH curve of magnetic materials. K3 CO 4 Calculate efficiency of a single phase transformer and DC machine. K4 CO 5Perform experiments on speed measurement and reversal of direction of three phase induction motor and Identify the type of DC and AC machines based on their construction

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: PROGRAMMING FOR PROBLEM	BCS151 / BCS251	CO 1 Able to implement the algorithms and draw flowcharts for solving Mathematical and Engineering problems. CO 2 Demonstrate an understanding of computer programming language concepts. K3, K2 CO 3Ability to design and develop Computer programs, analyzes, and interprets the concept of pointers, declarations, initialization, operations on pointers and their usage. CO 4 Able to define data types and use them in simple data processing applications he/she must be able to use the concept of array of structures. CO 5 Develop confidence for self-education and ability for life-long learning needed for Computer language
ENGLISH LANGUAGE LAB	BAS155 / BAS255	1. Students will be enabled to understand the basic objective of the course by being acquainted with specific dimensions of communication skills i.e. Reading, Writing, Listening, Thinking and Speaking. 2. Students would be able to create substantial base by the formation of strong professional vocabulary for its application at different platforms and through numerous modes as Comprehension, reading, writing and speaking etc. 3. Students will apply it at their work place for writing purposes such as Presentation/official drafting/administrative communication and use it for document/project/report/research paper writing. 4. Students will be made to evaluate the correct and error-free writing by being well-versed in rules of English grammar and cultivate relevant technical style of communication &presentation at their work place and also for academic uses. 5. Students will apply it for practical and oral presentation purposes by being honed up in presentation skills and voice-dynamics. They will apply techniques for developing interpersonal communication skills and positive attitude leading to their professional competence.
ENGINEERING GRAPHICS & DESIGN LAB	BCE151/ BCE251:	CO 1: Use scales and draw projections of objects. CO 2: Explain views of solids and their sectional surfaces. CO 3: Analyze and draw isometric projections of objects. CO 4: Demonstrate orthographic representation of perspective views using modern tools. CO 5: Apply AutoCAD software for creation of engineering drawing and models
WORKSHOP PRACTICE LAB	WS151/ BWS251	CO1 Use various engineering materials, tools, machines and measuring equipments. K3 CO2 Perform machine operations in lathe and CNC machine. K3 CO3 Perform manufacturing operations on components in fitting and carpentry shop. K3 CO4 Perform operations in welding, moulding, casting and gas cutting. K3 CO5 Fabricate a job by 3D printing manufacturing technique

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SEM III	**DATA STRUCTURE**	**BCS301**	CO 1 Describe how arrays, linked lists, stacks, queues, trees, and graphs are represented in memory, used by the algorithms and their common applications. K1, K2 CO 2 Discuss the computational efficiency of the sorting and searching algorithms. K2 CO 3 Implementation of Trees and Graphs and perform various operations on these data structure. K3 CO 4 Understanding the concept of recursion, application of recursion and its implementation and removal of recursion. K4 CO 5 Identify the alternative implementations of data structures with respect to its performance to solve a real world problem. K5, K6
	COMPUTER ORGANIZATION AND ARCHITECTURE	**BCS302**	CO 1 Study of the basic structure and operation of a digital computer system. K1, K2 CO 2 Analysis of the design of arithmetic & logic unit and understanding of the fixed point and floating-point arithmetic operations. K2, K4 CO 3 Implementation of control unit techniques and the concept of Pipelining K3 CO 4 Understanding the hierarchical memory system, cache memories and virtual memory K2 CO 5 Understanding the different ways of communicating with I/O devices and standard I/O interfaces K2, K4
	Discrete Structures & Theory of Logic	**BCS303**	CO 1 Acquire Knowledge of sets and relations for solving the problems of POSET and lattices. K3, K4 CO 2 Apply fundamental concepts of functions and Boolean algebra for solving the problems of logical abilities. K1, K2 CO 3 Employ the rules of propositions and predicate logic to solve the complex and logical problems. K3 CO 4 Explore the concepts of group theory and their applications for solving the advance technological problems. K1, K4 CO 5 Illustrate the principles and concepts of graph theory for solving problems related to computer science. K2, K6
SEM IV	**Operating system**	**BCS401**	CO 1 Understand the structure and functions of OS K1, K2 CO 2 Learn about Processes, Threads and Scheduling algorithms. K1, K2 CO 3 Understand the principles of concurrency and Deadlocks K2 CO 4 Learn various memory management scheme K2 CO 5 Study I/O management and File systems. K2,K4
	Theory of Automata and Formal Languages	**BCS402**	CO 1 Analyse and design finite automata, pushdown automata, Turing machines, formal languages, and grammars K4, K6 CO 2 Analyse and design, Turing machines, formal languages, and grammars K4, K6 CO 3 Demonstrate the understanding of key notions, such as algorithm, computability, decidability, and complexity through problem solving K1, K5 CO 4 Prove the basic results of the Theory of Computation. K2,K3 CO 5 State and explain the relevance of the Church-Turing thesis. K1, K5

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	Object Oriented Programming with Java	**BCS403**	CO 1 Develop the object-oriented programming concepts using Java K3, K4 CO 2 Implement exception handling, file handling, and multi-threading in Java K2,K4 CO 3 Apply new java features to build java programs. K3 CO 4 Analyse java programs with Collection Framework K4 CO 5 Test web and RESTful Web Services with Spring Boot using Spring Framework concepts K5
SEM V	**Database Management System**	**KCS501**	CO 1 Apply knowledge of database for real life applications. K3 CO 2 Apply query processing techniques to automate the real time problems of databases. K3, K4 CO 3 Identify and solve the redundancy problem in database tables using normalization. K2, K3 CO 4 Understand the concepts of transactions, their processing so they will familiar with broad range of database management issues including data integrity, security and recovery. K2, K4 CO 5 Design, develop and implement a small database project using database tools.

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Compiler Design	**KCS502**	CO 1 Acquire knowledge of different phases and passes of the compiler and also able to use the compiler tools like LEX, YACC, etc. Students will also be able to design different types of compiler tools to meet the requirements of the realistic constraints of compilers. K3, K6 CO 2 Understand the parser and its types i.e. Top-Down and Bottom-up parsers and construction of LL, SLR, CLR, and LALR parsing table. K2, K6 CO 3 Implement the compiler using syntax-directed translation method and get knowledge about the synthesized and inherited attributes. K4, K5 CO 4 Acquire knowledge about run time data structure like symbol table organization and different techniques
Design and Analysis of Algorithm	**KCS503**	CO 1 Design new algorithms, prove them correct, and analyze their asymptotic and absolute runtime and memory demands. K4, K6 CO 2 Find an algorithm to solve the problem (create) and prove that the algorithm solves the problem correctly (validate). K5, K6 CO 3 Understand the mathematical criterion for deciding whether an algorithm is efficient, and know many practically important problems that do not admit any efficient algorithms. K2, K5 CO 4 Apply classical sorting, searching, optimization and graph algorithms. K2, K4 CO 5

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Data Analytics	**KCS-051**	CO 1 Describe the life cycle phases of Data Analytics through discovery, planning and building. K1,K2 CO 2 Understand and apply Data Analysis Techniques. K2, K3 CO 3 Implement various Data streams. K3 CO 4 Understand item sets, Clustering, frame works & Visualizations. K2 CO 5 Apply R tool for developing and evaluating real time applications. K3,K5,K6
Web Designing	**KCS-052**	CO 1 Understand principle of Web page design and about types of websites K3, K4 CO 2 Visualize and Recognize the basic concept of HTML and application in web designing. K1, K2 CO 3 Recognize and apply the elements of Creating Style Sheet (CSS). K2, K4 CO 4 Understand the basic concept of Java Script and its application. K2, K3 CO 5 Introduce basics concept of Web Hosting and apply the concept of SEO K2, K3

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Computer Graphics	**KCS-053**	CO 1 Understand the graphics hardware used in field of computer graphics. K2 CO 2 Understand the concept of graphics primitives such as lines and circle based on different algorithms. K2, K4 CO 3 Apply the 2D graphics transformations, composite transformation and Clipping concepts. K4 CO 4 Apply the concepts of and techniques used in 3D computer graphics, including viewing transformations. K2, K3 CO 5 Perform the concept of projections, curve and hidden surfaces in real life. K2, K3
Object Oriented System Design	**KCS-054**	CO 1 Understand the application development and analyze the insights of object oriented programming to implement application K2, K4 CO 2 Understand, analyze and apply the role of overall modeling concepts (i.e. System, structural) K2, K3 CO 3 Understand, analyze and apply oops concepts (i.e. abstraction, inheritance) K2, K3, K4 CO 4 Understand the basic concepts of C++ to implement the object oriented concepts K2, K3 CO 5 To understand the object oriented approach to implement real world problem.

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Machine Learning Techniques	**KCS-055**	CO 1 To understand the need for machine learning for various problem solving K1 , K2 CO 2 To understand a wide variety of learning algorithms and how to evaluate models generated from data K1 , K3 CO 3 To understand the latest trends in machine learning K2 , K3 CO 4 To design appropriate machine learning algorithms and apply the algorithms to a real-world problems K4 , K6 CO 5 To optimize the models learned and report on the expected accuracy that can be achieved by applying the models
Application of Soft Computing	**KCS-056**	CO 1 Recognize the feasibility of applying a soft computing methodology for a particular problem K2, K4 CO 2 Understand the concepts and techniques of soft computing and foster their abilities in designing and implementing soft computing based solutions for real-world and engineering problems. K2,K4, K6 CO 3 Apply neural networks to pattern classification and regression problems and compare solutions by various soft computing approaches for a given problem. K3, K5 CO 4 Apply fuzzy logic and reasoning to handle uncertainty and solve engineering problems K3, K4 CO 5 Apply genetic algorithms to combinatorial optimization problems K3, K5

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Augmented & Virtual Reality	**KCS-057**	CO 1 To make students know the basic concept and understand the framework of virtual reality. K1 , K2 CO 2 To understand principles and multidisciplinary features of virtual reality and apply it in developing applications. K2 , K4 CO 3 To know the technology for multimodal user interaction and perception VR, in particular the visual, audial and haptic interface and behavior. K2 , K3 CO 4 To understand and apply technology for managing large scale VR environment in real time. K2 , K3 CO 5
Human Computer Interface	**KCS-058**	CO 1 Understand and analyze the common methods in the user-centered design process and the appropriateness of individual methods for a given problem. K2, K4 CO 2 Apply , adapt and extend classic design standards, guidelines, and patterns. K3, K5 CO 3 Employ selected design methods and evaluation methods at a basic level of competence. K4, K5 CO 4 Build prototypes at varying levels of fidelity, from paper prototypes to functional, interactive prototypes. K4, K5 CO 5 Demonstrate sufficient theory of human computer interaction, experimental methodology and inferential statistics to engage with the contemporary research literature in interface technology and design.

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SEM VI	**Software Engineering**	**KCS 601**	CO 1 Explain various software characteristics and analyze different software Development Models. K1, K2 CO 2 Demonstrate the contents of a SRS and apply basic software quality assurance practices to ensure that design, development meet or exceed applicable standards. K1, K2 CO 3 Compare and contrast various methods for software design K2, K3 CO 4 Formulate testing strategy for software systems, employ techniques such as unit testing, Test driven development and functional testing. K3 CO 5 Manage software development process independently as well as in teams and make use of Various software
	Web Technology	**KCS 602**	CO 1 Explain web development Strategies and Protocols governing Web. K1, K2 CO 2 Develop Java programs for window/web-based applications. K2, K3 CO 3 Design web pages using HTML, XML, CSS and JavaScript. K2, K3 CO 4 Creation of client-server environment using socket programming K1, K2, CO 5 Building enterprise level applications and manipulate web databases using JDBC K3, K4 CO6 Design interactive web applications using Servlets and JSP K2, K3

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Computer Networks	**KCS 603**	CO1 Explain basic concepts, OSI reference model, services and role of each layer of OSI model and TCP/IP, networks devices and transmission media, Analog and digital data transmission K1,K2 CO2 Apply channel allocation, framing, error and flow control techniques. K3 CO3 Describe the functions of Network Layer i.e. Logical addressing, subnetting & Routing Mechanism. K2,K3 CO4 Explain the different Transport Layer function i.e. Port addressing, Connection Management, Error control and Flow control mechanism. K2,K3 CO5 Explain the functions offered by session and presentation layer and their Implementation. K2,K3 CO6 Explain the different protocols used at application layer i.e. HTTP, SNMP, SMTP, FTP, TELNET and VPN.
Big Data	**KCS-061**	CO 1 Demonstrate knowledge of Big Data Analytics concepts and its applications in business. K1,K2 CO 2 Demonstrate functions and components of Map Reduce Framework and HDFS. K1,K2 CO 3 Discuss Data Management concepts in NoSQL environment. K6 CO 4 Explain process of developing Map Reduce based distributed processing applications. K2,K5 CO 5 Explain process of developing applications using HBASE, Hive, Pig etc. K2,

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Image Processing	**KCS-062**	CO 1 Explain the basic concepts of two-dimensional signal acquisition, sampling, quantization and color model. K1, K2 CO 2 Apply image processing techniques for image enhancement in both the spatial and frequency domains. K2, K3 CO 3 Apply and compare image restoration techniques in both spatial and frequency domain. K2, K3 CO 4 Compare edge based and region based segmentation algorithms for ROI extraction. K3, K4 CO 5 Explain compression techniques and descriptors for image processing. K2, K3
Real Time Systems	**KCS-063**	CO 1 illustrate the need and the challenges in the design of hard and soft real time systems. K3 CO 2 Compare different scheduling algorithms and the schedulable criteria. K4 CO 3 Discuss resource sharing methods in real time environment. K3 CO 4 Compare and contrast different real time communication and medium access control techniques. K4, K5 CO 5 Analyze real time Operating system and Commercial databases K2, K4

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	Data Compression	**KCS-064**	CO 1 Describe the evolution and fundamental concepts of Data Compression and Coding Techniques. K1, K2 CO 2 Apply and compare different static coding techniques (Huffman & Arithmetic coding) for text compression. K2, K3 CO 3 Apply and compare different dynamic coding techniques (Dictionary Technique) for text compression. K2, K3 CO 4 Evaluate the performance of predictive coding technique for Image Compression. K2, K3 CO 5 Apply and compare different Quantization Techniques for Image Compression. K2,K3
SEM VII	**Artificial Intelligence**	**KCS071**	CO 1 Understand the basics of the theory and practice of Artificial Intelligence as a discipline and about intelligent agents. K2 CO 2 Understand search techniques and gaming theory. K2, K3 CO 3 The student will learn to apply knowledge representation techniques and problem solving strategies to common AI applications. K3 , K4 CO 4 Student should be aware of techniques used for classification and clustering. K2 , K3 CO 5 Student should aware of basics of pattern recognition and steps required for it. K2 , K4
	Natural language processing	**KCS072**	CO 1 To learn the fundamentals of natural language processing K1 , K2 CO 2 To understand the use of CFG and PCFG in NLP K1 , K2 CO 3 To understand the role of semantics of sentences and pragmatic K2 CO 4 To Introduce Speech Production And Related Parameters Of Speech. K1 , K2 CO 5 To Show The Computation And Use Of Techniques Such As Short Time Fourier Transform, Linear Predictive Coefficients And Other Coefficients In The Analysis Of Speech. K3, K4
	High Performance Computing	**KCS073**	CO 1 Able to understand the basic concept of Computer architecture and Modern Processor K2 CO 2 Able to understand the basic concepts of access optimization and parallel computers K2, K3 CO 3 Able to describe different parallel processing platforms involved in achieving high performance computing K3 , K4 CO 4 Develop efficient and high performance parallel programming. K2 , K3 CO 5 Able to learn parallel programming using message passing paradigm. K2 , K4

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Cryptography and Network Security	**KCS074**	CO 1 Classify the symmetric encryption techniques and illustrate various Public key cryptographic techniques. K2 , K3 CO 2 Understand security protocols for protecting data on networks and be able to digitally sign emails and files. K1 , K2 CO 3 Understand vulnerability assessments and the weakness of using passwords for authentication K4 CO 4 Be able to perform simple vulnerability assessments and password audits K3 CO 5 Summarize the intrusion detection and its solutions to overcome the attacks. K2
Design & Development of Applications	**KCS075**	CO 1 Be exposed to technology and business trends impacting mobile applications K1 , K2 CO 2 Be competent with the characterization and architecture of mobile applications. K3 CO 3 Be competent with understanding enterprise scale requirements of mobile applications. K1 , K2 CO 4 Be competent with designing and developing mobile applications using one application development framework. K3 CO 5 Be exposed to Android and iOS platforms to develop the mobile applications K1 , K2
Software Testing	**KCS076**	CO 1 Have an ability to apply software testing knowledge and engineering methods. K2 , K3 CO 2 Have an ability to design and conduct a software test process for a software testing project. K3, K4 CO 3 Have an ability to identify the needs of software test automation, and define and develop a test tool to support test automation. K1 , K2 CO 4 Have an ability understand and identify various software testing problems, and solve these problems by designing and selecting software test models, criteria, strategies, and methods. K1 , K2 CO 5 Have basic understanding and knowledge of contemporary issues in software testing, such as component-based software testing problems. K2
Distributed Systems	**KCS077**	CO 1 To provide hardware and software issues in modern distributed systems. K1 , K2 CO 2 To get knowledge in distributed architecture, naming, synchronization, consistency and replication, fault tolerance, security, and distributed file systems. K2 CO 3 To analyze the current popular distributed systems such as peer-to-peer (P2P) systems will also be analyzed. K4 CO 4 To know about Shared Memory Techniques and have Sufficient knowledge about file access K1

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Deep Learning	**KCS078**	CO 1 To present the mathematical, statistical and computational challenges of building neural networks K1 , K2 CO 2 To study the concepts of deep learning K1 , K2 CO 3 To introduce dimensionality reduction techniques K2 CO 4 To enable the students to know deep learning techniques to support real-time applications K2 , K3 CO 5 To examine the case studies of deep learning techniques K3, K6
Service Oriented Architecture	**KCS079**	CO 1 Comprehend the need for SOA and its systematic evolution. K1 , K2 CO 2 Apply SOA technologies to enterprise domain. K3 CO 3 Design and analyze various SOA patterns and techniques. K4 CO 4 Compare and evaluate best strategies and practices of SOA. K2 CO 5 Understand the business case for SOA K1
Quantum Computing	**KCS710**	CO 1 Distinguish problems of different computational complexity and explain why certain problems are rendered tractable by quantum computation with reference to the relevant concepts in quantum theory. K1 , K2 CO 2 Demonstrate an understanding of a quantum computing algorithm by simulating it on a classical computer, and state some of the practical challenges in building a quantum computer. K2 , K3 CO 3 Contribute to a medium-scale application program as part of a co-operative team, making use of appropriate collaborative development tools (such as version control systems). K2 , K3 CO 4 Produce code and documentation that is comprehensible to a group of different programmers and present the theoretical background and results of a project in written and verbal form. K3 , K4 CO 5 Apply knowledge, skills, and understanding in executing a defined project of research, development, or investigation and in identifying and implementing relevant outcomes. K3, K6

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	Mobile Computing	**KCS711**	CO 1 Explain and discuss issues in mobile computing and illustrate overview of wireless telephony and channel allocation in cellular systems. K1, K4 CO 2 Explore the concept of Wireless Networking and Wireless LAN. K1 CO 3 Analyse and comprehend Data management issues like data replication for mobile computers, adaptive clustering for mobile wireless networks and Disconnected operations. K4 CO 4 Identify Mobile computing Agents and state the issues pertaining to security and fault tolerance in mobile computing environment. K1, K2 CO 5 Compare and contrast various routing protocols and will identify and interpret the performance of network systems using Adhoc networks. K2
	Internet of Things	**KCS712**	CO 1 Demonstrate basic concepts, principles and challenges in IoT. K1,K2 CO 2 Illustrate functioning of hardware devices and sensors used for IoT. K2 CO 3 Analyze network communication aspects and protocols used in IoT. K4 CO 4 Apply IoT for developing real life applications using Ardunio programming. K3 CP 5 To develop IoT infrastructure for popular applications K2, K3
	Cloud Computing	**KCS713**	CO 1 Describe architecture and underlying principles of cloud computing. K3 CO 2 Explain need, types and tools of Virtualization for cloud. K3, K4 CO 3 Describe Services Oriented Architecture and various types of cloud services. K2, K3 CO 4 Explain Inter cloud resources management cloud storage services and their providers Assess security services and standards for cloud computing. K2, K4 CO 5 Analyze advanced cloud technologies. K3, K6
	Blockchain Architecture Design	**KCS714**	CO 1 Describe the basic understanding of Blockchain architecture along with its primitive. K1, K2 CO 2 Explain the requirements for basic protocol along with scalability aspects. K2, K3 CO 3 Design and deploy the consensus process using frontend and backend. K3, K4 CO 4 Apply Blockchain techniques for different use cases like Finance, Trade/Supply and Government activities. K4, K5
SEM VIII	**HSMC-1* / HSMC-2***	**KHU801/ KHU802**	Mentioned in university syllabus
	Project	**KCS851**	
	Open Elective-III	**KOE08X**	
	Open Elective -IV	**KOE08X**	

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PROGRAM OUTCOME (PO), PROGRAM SPECIFIC OUTCOME (PSO) (2023-24)

B.TECH ELECTRICAL ENGGINERING

PROGRAMME OUTCOME

1) PO1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2) PO2: Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3) PO3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4) PO4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5) PO5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6) PO6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7) PO7: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8) PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9) PO9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10) PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11) PO11: Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12) PO12: Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes

PSO1:

To work with professional ethics in power system engineering, control system engineering and software industries.

PSO2:

Graduates will be motivated for continuous self learning in engineering practice and pursue research in advanced areas of Electrical Engineering in order to offer engineering services to the society.

COURSE OUTCOME

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SEMESTER	COURSE NAME	COURSE CODE	COURSE OUTCOME
	ENGINEERING PHYSICS	BAS101 / BAS201	CO1:To explain the distribution of energy in black body radiation and to understand the difference in particle and wave nature with explanation of Compton effect and Schrodinger wave equation. CO2:To understand the concept of displacement current and consistency of Ampere's law and also the properties of electromagnetic waves in different medium with the use of Maxwell's equations. CO3:To understand the behavior of waves through various examples/applications of interference and diffraction phenomenon and the concept of grating and resolving power. CO4 To know the functioning of optical fiber and its properties and applications. To understand the concept, properties and applications of Laser. CO5 To know the properties and applications of superconducting materials and nano materials.
	ENGINEERING CHEMISTRY	BAS102 / BAS202	CO-1 Get an understanding of the theoretical principles of chemistry of molecular structure, bonding and properties, Chemistry of advanced materials (liquid crystals, Nanomaterials, Graphite & Fullerene) as well as the Principles of Green Chemistry. CO-2 Apply the fundamental concepts of determination of structure with various spectral techniques and stereochemistry. CO-3 Utilize the theory of construction of electrodes, batteries and fuel cells in redesigning new engineering products and categorize the reasons for corrosion and study methods to control corrosion and develop understanding of Chemistry of Engineering materials (Cement). CO-4 Develop understanding of the sources, impurities and hardness of water, apply the concepts of determination of calorific values and analyze the coal. CO-5 Develop the understanding of Chemical structure of polymers and its effect on their various properties when used as engineering materials. Understanding the applications of specific polymers and Chemistry applicable in industrial process.

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ENGINEERING MATHEMATICS-	BAS103	CO 1 Understand the concept of complex matrices, Eigen values, Eigen vectors and apply the concept of rank to evaluate linear simultaneous equations CO 2 Remember the concept of differentiation to find successive differentiation, Leibnitz Theorem, and create curve tracing, and find partial and total derivatives CO 3 Applying the concept of partial differentiation to evaluate extrema, series expansion, error approximation of functions and Jacobians CO 4 Remember the concept of Beta and Gamma function; analyze area and volume and Dirichlet's theorem in multiple integral CO 5 Apply the concept of Vector Calculus to analyze and evaluate directional derivative, line, surface and volume integrals.
: ENGINEERING MATHEMATICS-II	BAS203	CO 1 Remember the concept differentiation to evaluate LDE of nth order with constant coefficient and LDE with variable coefficient of 2nd order. CO 2 Understand and apply the concept of Laplace Transform to evaluate differential equations CO 3 Understand the concept of convergence to analyze the convergence of series and expansion of the function for Fourier series. CO 4 Apply the concept of analyticity, Harmonic function and create the image of function applying conformal transformation CO 5 Apply the concept of Cauchy Integral theorem, Cauchy Integralformula, singularity and calculus of residue to evaluate integrals
: FUNDAMENTALS OF ELECTRICAL ENGINEERING	BEE101 / BEE201	CO 1 Apply the concepts of KVL/KCL and network theorems in solving DC circuits. CO 2 Analyze the steady state behavior of single phase and three phase AC electrical circuits. CO 3Identify the application areas of a single phase two winding transformer as well as an auto transformer and calculate their efficiency. Also identify the connections of a three phase transformer. CO 4 Illustrate the working principles of induction motor, synchronous machine as well as DC machine and employ them in different area of applications. CO 5 Describe the components of low voltage electrical installations and perform elementary calculations for energy consumption.
FUNDAMENTALS OF ELECTRONICS ENGINEERING	BEC101 / BEC201 :	1. Describe the concept of PN Junction and devices. 2. Explain the concept of BJT, FET and MOFET. 3. Apply the concept of Operational amplifier to design linear and non-linear applications. 4. Perform number systems conversions, binary arithmetic and minimize logic functions. 5. Describe the fundamentals of communication technologies.

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SEM I & SEM II	PROGRAMMING FOR PROBLEM SOLVIN	BCS101 / BCS201	CO 1 To Develop Simple Algorithms for Arithmetic and Logical Problems. K2, K3 CO 2 To Translate the Algorithms to Programs & Execution (in C Language). K3 CO 3 To Implement Conditional Branching, Iteration and Recursion. K3 CO 4 To Decompose a Problem into Functions and Synthesize a Complete Program Using Divide and Conquer Approach. K4 CO 5 To Use Arrays, Pointers and Structures to Develop Algorithms and Programs. K2, K
	FUNDAMENTALS OF MECHANICAL ENGINEERING	BME101 / BME201:	CO1 Apply the concept of force resolution and stress and strain to solve basic problems K3 CO2 Understand the construction details and working of internal combustion engines, electric vehicle and hybrid vehicles. K2 CO3 Explain the construction detail and working of refrigerator, heat pump and airconditioner. K2 CO4 Understand fluid properties, conservation laws and hydraulic machinery used in real life. K2 CO5 Understand the working principle of different measuring instrument and mechatronics with their advantages, scope and Industrial application. K2
	ENVIRONMENT AND ECOLOGY	BAS104 / BAS204:	CO-1 Gain in-depth knowledge on natural processes that sustain life, and govern economy.CO-2 Estimate and Predict the consequences of human actions on the web of life, global economy and quality of human life. CO-3 Develop critical thinking for shaping strategies (scientific, social, economic and legal) for environmental protection and conservation of biodiversity, social equity and sustainable development. CO-4 Acquire values and attitudes towards understanding complex environmentaleconomic social challenges, and participate actively in solving current environmental problems and preventing the future ones. CO-5 Adopt sustainability as a practice in life, society and industry
	: SOFT SKILLS	BAS105 / BAS205	1. Write professionally in simple and correct English. 2. Demonstrate active listening with comprehension, and the ability to write clear and wellstructured emails and proposals. 3. Learn the use of correct body language and tone of voice to enhance communication. 4. Acquire the skills necessary to communicate effectively and deliver presentations with clarity and impact 5. Understand and apply some important aspects of core skills, like Leadership and stress management.

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: ENGINEERING PHYSICS LAB	BAS151 / BAS251	CO-1 Apply the principle of interference and diffraction to find the wavelength of monochromatic and polychromatic light. Apply CO-2 Compute and analyze various electrical and electronic properties of a given material by using various experiments. Analyze CO-3 Verify different established laws with the help of optical and electrical experiments. Apply CO-4 Determine and calculate various physical properties of a given material by using various experiments. Apply CO-5 Study and estimate the performance and parameter of given equipment by using graphical and computational analysis.
ENGINEERING CHEMISTRY LAB	BAS152 / BAS252	CO-1 Get an understanding of the use of different analytical instruments. CO-2 Measure the molecular / system properties such as surface tension, viscosity, conductance of solution, chloride and iron content in the water. CO-3 Measure the hardness and alkalinity of the water. CO-4 Know the fundamental concepts of the preparation of phenol formaldehyde & urea formaldehyde resin, adipic acid and Paracetamol. CO-5 Estimate the rate constant of reaction.
BASIC ELECTRICAL ENGINEERING LAB	BEE151 / BEE251	CO 1 Conduct experiments illustrating the application of KVL/KCL and network theorems to DC electrical circuits. K3 CO 2 Demonstrate the behavior of AC circuits connected to single phase AC supply and measure power in single phase as well as three phase electrical circuits. K4 CO 3 Perform experiment illustrating BH curve of magnetic materials. K3 CO 4 Calculate efficiency of a single phase transformer and DC machine. K4 CO 5Perform experiments on speed measurement and reversal of direction of three phase induction motor and Identify the type of DC and AC machines based on their construction
: PROGRAMMING FOR PROBLEM SOLVING LAB	BCS151 / BCS251	CO 1 Able to implement the algorithms and draw flowcharts for solving Mathematical and Engineering problems. CO 2 Demonstrate an understanding of computer programming language concepts. K3, K2 CO 3Ability to design and develop Computer programs, analyzes, and interprets the concept of pointers, declarations, initialization, operations on pointers and their usage. CO 4 Able to define data types and use them in simple data processing applications he/she must be able to use the concept of array of structures. CO 5 Develop confidence for self-education and ability for life-long learning needed for Computer language

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ENGLISH LANGUAGE LAB	**BAS155 / BAS255**	1. Students will be enabled to understand the basic objective of the course by being acquainted with specific dimensions of communication skills i.e. Reading, Writing, Listening, Thinking and Speaking. 2. Students would be able to create substantial base by the formation of strong professional vocabulary for its application at different platforms and through numerous modes as Comprehension, reading, writing and speaking etc. 3. Students will apply it at their work place for writing purposes such as Presentation/official drafting/administrative communication and use it for document/project/report/research paper writing. 4. Students will be made to evaluate the correct and error-free writing by being well-versed in rules of English grammar and cultivate relevant technical style of communication &presentation at their work place and also for academic uses. 5. Students will apply it for practical and oral presentation purposes by being honed up in presentation skills and voice-dynamics. They will apply techniques for developing interpersonal communication skills and positive attitude leading to their professional competence.
ENGINEERING GRAPHICS & DESIGN LAB	**BCE151/ BCE251:**	CO 1: Use scales and draw projections of objects. CO 2: Explain views of solids and their sectional surfaces. CO 3: Analyze and draw isometric projections of objects. CO 4: Demonstrate orthographic representation of perspective views using modern tools. CO 5: Apply AutoCAD software for creation of engineering drawing and models
WORKSHOP PRACTICE LAB	**WS151/ BWS251**	CO1 Use various engineering materials, tools, machines and measuring equipments. K3 CO2 Perform machine operations in lathe and CNC machine. K3 CO3 Perform manufacturing operations on components in fitting and carpentry shop. K3 CO4 Perform operations in welding, moulding, casting and gas cutting. K3 CO5 Fabricate a job by 3D printing manufacturing technique

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	ELECTROMAGNETIC FIELD THEORY	**BEE301-**	CO1 Apply different coordinate systems and their application in electromagnetic field theory, establish a relation between any two systems and also understand the vector calculus. K3 CO2 Understand the concept of static electric field. Understand the concept of current and properties of conductors. Establish boundary conditions and to calculate capacitances of different types of capacitors K4 CO3 Understand the concept of static magnetic field, magnetic scalar and vector potential K4 CO4 Understand the forces due to magnetic field, magnetization, magnetic boundary conditions and inductors. K4 CO5 Understand displacement current, time varying fields, propagation and reflection of EM waves and transmission lines. K3
SEM III	**ELECTRICAL MEASUREMENTS & INSTRUMENTATION**	**BEE302**	CO 1 Evaluate errors in measurement as well as identify and use different types of instruments for the measurement of voltage, current. K1 CO2 Demonstrate the construction and working of different measuring instruments for Power, energy and frequency measurements. K2 CO3 Demonstrate the construction and working of different AC and DC bridges, along with their applications. K2 CO4 Demonstrate the working of instrument transformers as well as calculate the errors in current and potential transformers, Manifest the working of electronic instruments like voltmeter, multimeter, frequency meter and CRO and ability to measure electrical engineering parameters like voltage, current, power, phase difference and frequency. K2 CO5 Display the knowledge of transducers, their classifications and their applications for the measurement of physical quantities like motion, force, pressure, temperature, flow and liquid level. K3

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	BASIC SIGNAL & SYSTEMS	**BEE303**	CO 1 Represent the various types of signals & systems and can perform mathematical operations on them. K2 CO2 Analyze the response of LTI system to Fourier series and Fourier transform and to evaluate their applications to network analysis. K4 CO3 Analyze the properties of continuous time signals and system using Laplace transform and determine the response of linear system to known inputs. K4 CO4 Implement the concepts of Z transform to solve complex engineering problems using difference equations. K3 CO5 Develop and analyze the concept of state-space models for SISO & MIMO system. K4
SEM IV	**DIGITAL ELECTRONICS**	**BEE401-**	CO 1 Perform number style arithmetic and logic simplification using various methods. K3 CO2 Design and analyze modular combinational circuits with MUX / DEMUX, Decoder & Encoder K4 CO3 Design & analyze synchronous sequential logic circuits K4 CO4 Analyze various logic families and design circuits using PLDs. K3 CO5 Design various ADCs and DACs according to the given specifications. K3
	ELECTRICAL MACHINES – I	**BEE402**	CO 1 Analyze the various principles & concepts involved in Electromechanical Energy conversion. K4 CO2 Demonstrate the constructional details of DC machines as well as transformers, and principle of operation of brushless DC motor, Stepper and DC Servo motors. K2 CO3 Evaluate the performance and characteristics of DC Machine as motor and as well as generator. K4 CO4 Evaluate the performance of transformers, individually and in parallel operation. K4 CO5 Demonstrate and perform various connections of three phase transformers. K3

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NETWORK ANALYSIS & SYNTHESIS	**BEE403-**	CO1Apply the knowledge of basic circuital law, nodal and mesh methods of circuit analysis and simplify the network using Graph Theory approach. K3 CO2 Analyze the AC and DC circuits using Kirchhoff's law and Network simplification theorems. K4 CO3 Analyze steady-state responses and transient response of DC and AC circuits using classical and Laplace transform methods. K4 CO4 Demonstrate the concept of complex frequency and analyze the structure and function of one and two port network. Also evaluate and analysis two-port network parameters. K4 CO5 Synthesize one port network and analyze different filters. K4
Power System - I	**KEE501**	CO1 Describe the working principle and basic components of conventional power plants as well as the other aspects of power generation. K2 CO2 Recognize elements of power system and their functions, as well as compare the different types of supply systems. Illustrate different types of conductors, transmission lines and various performance parameters of transmission line for short, medium and long transmission line. K4 CO3 Calculate sag and tension in overhead lines with and without wind and ice loading. Classify different type of insulators, determine potential distribution over a string of insulator, string efficiency and its improvement. K4 CO4 Compute the inductance and capacitance of single phase, three phase lines with symmetrical and unsymmetrical spacing, Composite conductors-transposition, bundled conductors, and understand the effect of earth on capacitance of transmission lines. K4 CO5 Elucidate different types of cables and assess the Resistance and capacitance parameters of cables, grading of cables and compare overhead lines and cables. K4

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Control System	**KEE502**	CO 1 Obtain transfer functions to predict the correct operation of open loop and closed loop control systems and identify the basic elements, structures and the characteristics of feedback control systems. K3 CO 2 Measure and evaluate the performance of basic control systems in time domain. Design specification for different control action. K4 CO 3 Analyze the stability of linear time-invariant systems in time domain using Routh-Hurwitz criterion and root locus technique. K4 CO 4 Determine the stability of linear time-invariant systems in frequency domain using Nyquist criterion and Bode plot. K4 CO 5 Design different type of compensators to achieve the desired performance of control System by root locus and Bode plot method. Develop and analyze the intermediate states of the system using state space analysis. K5

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	Electrical Machines-II	**KEE503**	CO 1 Demonstrate the constructional details and principle of operation of three phase Induction and Synchronous Machines. K3 CO 2 Analyze the performance of the three phase Induction and Synchronous Machines using the phasor diagrams and equivalent circuits. K4 CO 3 Select appropriate three phase AC machine for any application and appraise its significance. K4 CO 4 Start and observe the various characteristics of three phase Induction & Synchronous Machines K4 CO 5 Explain the principle of operation and performance of Single-Phase Induction Motor & Universal Motor. K3
SEM V	**Robotics**	**KEE051**	CO1 Learn the basic terminology used in robotics. K2 CO2 Conceptualize 3-D translation & orientation of robot arm kinematics. K3 CO3 Understand different robotic actuators and power transmission systems. K3 CO4 Classify the types of robotic grippers used in automation industries. K2 CO5 Realization of robotic sensoric system and their interfacing with robot controller. K3
	Sensors and Transducers	**KEE052**	CO 1 Understand the working of commonly used sensors in industry for measurement of displacement, force and pressure. K3 CO2 Recognize the working of commonly used sensors in industry for measurement of temperature, position, accelerometer, vibration sensor, flow and level. K3 CO3 Identify the application of machine vision. K2 CO4 Conceptualize signal conditioning and data acquisition methods. K2 CO5 Comprehend smart sensors and their applications in automation systems. K4

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Industrial Automation and Control	**KEE053**	CO1 Understand the concept of automation, its terminology and basic communication protocol. K2 CO2 Apply Relay logic for automation. K3 CO3 Learn about PLC, its operation and application in automation. K3 CO4 Analyze the industrial sensors, its terminology and how one can interface with PLC. K3 CO5 Demonstrate Pneumatic system and its application in industry. K3
Electrical Standards and Engineering Practices	**KEE054**	CO1 Interpret different National & International Electrical Standards in practice K2 CO2 Understand Indian standards for cables, lighting and motors. K3 CO3 Understand Indian standards of transformers, LV & HV switchgears K3 CO4 Demonstrate the basic guidelines for National codes and design practices K3 CO5 Select the size and type of transformer, cable & switchgear for electrical applications. K4
Optimization Techniques	**KEE055**	CO 1 Understand the importance of optimization techniques in engineering applications K2 CO2 Learn optimization methods for solving linear programming problems K3 CO3 Learn optimization methods for solving nonlinear programming problems K3 CO4 Be aware of the concept of simulation and modern methods of optimization K3 CO5 Apply optimization techniques to electrical engineering problems K4
Neural Networks & Fuzzy System	**KEE056**	CO 1 Apply the concepts of feed forward neural networks and their learning techniques. K3 CO2 Comprehend the architecture, develop algorithms and apply the concepts of back propagation networks. K5 CO3 Differentiate between the fuzzy and the crisp sets, apply the concepts of fuzziness and the fuzzy set theory. K4 CO4 Select the membership functions, write rules and develop the fuzzy controller for Industrial applications. K5 CO5 Demonstrate the working of fuzzy neural networks and identify its applications. K3

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Digital Signal Processing	**KEE057**	CO 1 Represent discrete sequence and LTI systems, frequency domain of discrete sequence. Compute Fourier transform. Draw structure of systems based on System type-IIR & FIR Systems. K2 CO2 Describe sampling of signal and its reconstruction, processing of continuous time and discrete time signals. Sampling rate variation and application of multirate signal processing. Sampling effect in A/D and D/A conversion. K3 CO3 Evaluate the response of LTI system and rational system function. Drive linear phase systems. Compute discrete Fourier transform (DFT) and calculate linear and circular convolution. K5 CO4 Design IIR & FIR filters with the desired specification with the help of impulse invariant and bilinear transformation method for IIR, with the help of window techniques for FIR. Design Butterworth and Chebyshev filter response. K6 CO5 Compute DFT using efficient algorithm like FFT in decimation in time and decimation in frequency both, using convolution property and Goertzel algorithm. Comparison between wavelet and Fourier transform. Application of WCT & DCT. K5
Analog & Digital Communication	**KEE058**	CO 1 Understand the Amplitude Modulation in communication system. K2 CO2 Comprehend the Frequency & Phase modulation. K2 CO3 Realize the Pulse Modulation Techniques. K2 CO4 Get the Digital Modulation Techniques and their use in communication system. K2 CO5 Apply the concept of Information Theory in Communication Engineering. K3

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	Power System-II	**KEE601**	CO1 Identify power system components on one line diagram of power system and its representation including the behaviour of the constituent components and sub systems and Analyse a network under both balanced and unbalanced fault conditions and design the rating of circuit breakers. K4 CO2 Perform load flow analysis of an electrical power network and interpret the results of the analysis. K4 CO3 Describe the concept of travelling waves in transmission lines and use the travelling wave theory to determine the over voltage caused by surge propagation in transmission networks. K4 CO4 Assess the steady state and transient stability of the power system under various conditions. K4 CO5 Describe Operating Principle of a relay and classify them according to applications. Explain working principle of Circuit breaker and phenomenon of arc production and quenching. K3
	Microprocessor and Microcontroller	**KEE602**	CO 1 Demonstrate the basic architecture of 8085 & 8086 microprocessors K2 CO2 Illustrate the programming model of microprocessors & write program using 8085 microprocessor K3 CO3 Interface different external peripheral devices with 8085 microprocessor K3 CO4 Comprehend the architecture of 8051 microcontroller K2 CO5 Compare advance level microprocessor & microcontroller for different applications K4

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	Power Electronics	**KEE603**	CO 1 Demonstrate the characteristics as well as the operation of BJT, MOSFET, IGBT, SCR, TRIAC and GTO and identify their use in the power switching applications. K4 CO2 Comprehend the non-isolated DC-DC converters and apply their use in different Power electronics applications. K3 CO3 Analyze the phase controlled rectifiers and evaluate their performance parameters. K5 CO4 Apprehend the working of single-phase ac voltage controllers, cyclo-converters and their various applications. K3 CO5 Explain the single-phase and three phase bridge inverters differentiate between CSI and VSI and apply PWM for harmonic reduction. K4
SEM VI	**Special Electrical Machines**	**KEE 061**	CO 1 Describe the working principle, Constructional Features of different types of electrical machines including the fractional kilowatt machines. K2 CO2 Analyse torque- speed characteristics of different electrical machines and interpret their performance and identify the suitable machine for an operation. K4 CO3 Study different types of control techniques for a machine and identify the best control strategy based upon different constraints. K4 CO4 Illustrate the use of stepper, BLDCs, SRM, and other special machines in the area of the various industrial and domestic as well as commercial applications of various fractional kilowatt machines. K3

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Electrical Machine Design	**KEE 062**	CO 1 Classify insulating materials for electrical machines and calculate mmf and magnetizing current. K5 CO2 Design the core, yoke, windings and the cooling system of a transformer. K6 CO3 Illustrate the core and armature design of DC and 3-phase synchronous machine. Design design of three phase induction motors, field system of DC machine and synchronous machines. K6 CO4 Analyse computer aided design approaches and apply the concepts of of optimization for the design of transformer, dc machine, three phase induction and synchronous machines. K6
Digital Control System	**KEE 063**	CO 1 Represent discrete time systems under the form of z-domain transfer functions and state-space models. K3 CO 2 Obtain the model of discrete-time systems by pulse transfer function. K4 CO 3 Analyze stability, transient response and steady state behaviour of linear discretetime systems, analytically and numerically using tools such as MATLAB and Simulink K4 CO 4 Design sampled data control systems. K5 CO 5 Describe Discrete state space model and test controllability and observability of systems. K5
Electrical and Hybrid Vehicles	**KEE 064**	CO1 Choose a suitable drive scheme for developing an electric hybrid vehicle depending on resources K3 CO2 Design and develop basic schemes of electric vehicles and hybrid electric vehicles. K6 CO3 Choose proper energy storage systems for vehicle applications K5 CO4 Identify various communication protocols and technologies used in vehicle networks. K4

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Advanced Micro processors & Micro Controllers	**KEE070**	CO1 Explain the Architecture of 8086, memory segmentation and its mode. K2 CO2 Describe the Instruction set of 8086, and develop various type of programs. K2 CO3 Illustrate memory interfacing diagram , and explain various type of interfacing K3 CO4 Illustrate various modes of processor. K3 CO5 Explain the architecture of MSP430 and Develop GPIO controlling Program. K2
Energy Conservation and Auditing	**KEE071**	CO1 Identify and assess the energy conservation/saving opportunities in different electric system and understand related legislations. K1 CO2 Identify and assess the energy saving behavior of utilities through implementation of DSM and EMIS. K1 CO3 Explain energy audit & management and to prepare energy audit report for different energy conservation instances. K2 CO4 Illustrate the energy audit for Mechanical Utilities. K3 CO5 Describe cost-effective measures towards improving energy efficiency and energy conservation by implementation of energy efficient technologies. K2

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HVDC & AC Transmission	**KEE072**	CO1 Describe the comparison of EHVAC and HVDC transmission while understanding various issues related to transmission. K1 CO2 Calculate and study the corona loss and its impacts. Cite examples of the causes of switching overvoltage, Ferro-resonance. K3 CO3 Explain the generation and measurement circuits for impulse, high DC & AC voltages. While considering the design parameters evaluate the effect on the performance of the EHV lines. K2 CO4 Classify the DC links and choice of converter configuration to investigate the impact of inductance on operation of converters and identify different control schemes as well as starting and stopping methods of DC links. K4 CO5 Describe the converter faults, protections including MTDC types and applications . K2
High Voltage Engineering	**KEE073**	Describe conduction and breakdown phenomenon in gases, liquid dielectrics and solid dielectrics. K1 CO2 Explain generation of high voltages and currents K2 CO3 Explain measurement techniques for high voltages and currents K2 CO4 Describe overvoltage phenomenon and insulation coordination in electric power systems. K2 Describe non-destructive testing of materials and electric apparatus andhigh-voltage testing of electric apparatus K2

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SEM VII

Power Quality and FACTS	**KEE074**	CO1 Classify the power quality issues in electrical distribution network K2 CO2 Describe the sources of voltage sag and protective devices including voltage regulators, active series compensator and UPS. K1 CO3 Describe the different phenomenon causing electrical transients and devices for over voltage protection. K2 CO4 Explain the working and application of different type of FACT devices like SSC, SVC, TSC, SSS, TCSC, UPFC. K2 CO5 Explain the causes of harmonics, its effect on motor ,capacitor, cables and mitigation techniques. K2
Electric drives	**KEE075**	CO1 Describe the operation of electric drives and its classification. K1 CO2 Explain the electric drive stability and selection of motor power rating. K2 CO3 Illustrate electric braking and its dynamics. K3 CO4 Describe the types of DC drives and its control. K2 CO5 Describe the types of AC drives and its control. K2
Power System dynamics and Control	**KEE076**	CO1 Explain the fundamental dynamic behavior and controls of power systems to perform basic stability analysis. K2 CO2 Describe modeling of Synchronous Machine and per unit quantities-Equivalent circuits. K2 CO3 Describe modeling of main power system components, such as synchronous machines, excitation systems and calculation of Initial conditions K2 CO4 Illustrate Small signal analysis, synchronizing and damping torque analysis. K3 CO5 Explain the concept of Power System Stabilizers, Structure & tuning and dynamic compensator analysis. K2

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	Power System Protection	**KEE077**	CO1 Describe the relays and different protective schemes. K1 CO2 Explain Relay types and its application. K2 CO3 Describe types of faults and protection scheme for major components of power system. K2 CO4 Describe the circuit breaker operation, testing and types. K2 CO5 Explain the electronic relay, microprocessor and computer based protection schemes. K2
	Deregulated Power System	**KEE078**	CO1 Describe the deregulation, unbundling of electric utilities and its benefits. K1 CO2 Explain the operational planning activities of independent system operator in pool & bilateral markets and describe competitive bidding. K2 CO3 Explain the open access of transmission line and management of security & congestion in deregulation. K2 CO4 Describe the different types of Electric traction, system of track electrification and its related mechanics K2 CO5 Illustrate the Reliability Analysis of Generation, transmission and distribution and the regulation of the market. K3
	Utilization of Electrical Energy & Electric Traction	**KEE079**	CO1 Describe the methods of electric heating and their advantages. K1 CO2 Explain the types of Electric welding and the principle of Electro-deposition, laws of electrolysis and its applications K2 CO3 Explain the laws of illumination and explain the principle of refrigeration and air-conditioning. K2 CO4 Describe the different types of Electric traction, system of track electrification and its related mechanics K2 CO5 Describe the salient features of traction drive and concept of energy saving using power electronic control of AC and DC drives K2
SEM VIII	**HSMC-1* / HSMC-2***	**KHU801/ KHU802**	Mentioned in university syllabus
	Project	**KEE851**	
	Open Elective-III	**KOE08X**	
	Open Elective -IV	**KOE08X**	

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PROGRAM OUTCOME (PO), PROGRAM SPECIFIC OUTCOME (PSO) (2023-24)

B.TECH MECHANICAL ENGGINERING

PROGRAMME OUTCOME

1) PO1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2) PO2: Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3) PO3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4) PO4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5) PO5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6) PO6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice
7) PO7: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8) PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9) PO9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10) PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11) PO11: Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12) PO12: Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES

PSO1: Capability to identify, analyze and build manufacturing and thermal systems using mechanical engineering principles and techniques.
PSO2: Developing attitude to accept global challenges and apply mechanical engineering knowledge for solving problems related to design, production, and interdisciplinary fields.

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COURSE OUTCOME			
SEMESTER	COURSE NAME	COURSE CODE	COURSE OUTCOME
	ENGINEERING PHYSICS	BAS101 / BAS201	CO1:To explain the distribution of energy in black body radiation and to understand the difference in particle and wave nature with explanation of Compton effect and Schrodinger wave equation. CO2:To understand the concept of displacement current and consistency of Ampere's law and also the properties of electromagnetic waves in different medium with the use of Maxwell's equations. CO3:To understand the behavior of waves through various examples/applications of interference and diffraction phenomenon and the concept of grating and resolving power. CO4 To know the functioning of optical fiber and its properties and applications. To understand the concept, properties and applications of Laser. CO5 To know the properties and applications of superconducting materials and nano materials.
	ENGINEERING CHEMISTRY	BAS102 / BAS202	CO-1 Get an understanding of the theoretical principles of chemistry of molecular structure, bonding and properties, Chemistry of advanced materials (liquid crystals, Nanomaterials, Graphite & Fullerene) as well as the Principles of Green Chemistry. CO-2 Apply the fundamental concepts of determination of structure with various spectral techniques and stereochemistry. CO-3 Utilize the theory of construction of electrodes, batteries and fuel cells in redesigning new engineering products and categorize the reasons for corrosion and study methods to control corrosion and develop understanding of Chemistry of Engineering materials (Cement). CO-4 Develop understanding of the sources, impurities and hardness of water, apply the concepts of determination of calorific values and analyze the coal. CO-5 Develop the understanding of Chemical structure of polymers and its effect on their various properties when used as engineering materials. Understanding the applications of specific polymers and Chemistry applicable in industrial process.

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ENGINEERING MATHEMATICS-	BAS103	CO 1 Understand the concept of complex matrices, Eigen values, Eigen vectors and apply the concept of rank to evaluate linear simultaneous equations CO 2 Remember the concept of differentiation to find successive differentiation, Leibnitz Theorem, and create curve tracing, and find partial and total derivatives CO 3 Applying the concept of partial differentiation to evaluate extrema, series expansion, error approximation of functions and Jacobians CO 4 Remember the concept of Beta and Gamma function; analyze area and volume and Dirichlet's theorem in multiple integral CO 5 Apply the concept of Vector Calculus to analyze and evaluate directional derivative, line, surface and volume integrals.
: ENGINEERING MATHEMATICS-II	BAS203	CO 1 Remember the concept differentiation to evaluate LDE of nth order with constant coefficient and LDE with variable coefficient of 2nd order. CO 2 Understand and apply the concept of Laplace Transform to evaluate differential equations CO 3 Understand the concept of convergence to analyze the convergence of series and expansion of the function for Fourier series. CO 4 Apply the concept of analyticity, Harmonic function and create the image of function applying conformal transformation CO 5 Apply the concept of Cauchy Integral theorem, Cauchy Integralformula, singularity and calculus of residue to evaluate integrals
: FUNDAMENTALS OF ELECTRICAL ENGINEERING	BEE101 / BEE201	CO 1 Apply the concepts of KVL/KCL and network theorems in solving DC circuits. CO 2 Analyze the steady state behavior of single phase and three phase AC electrical circuits. CO 3Identify the application areas of a single phase two winding transformer as well as an auto transformer and calculate their efficiency. Also identify the connections of a three phase transformer. CO 4 Illustrate the working principles of induction motor, synchronous machine as well as DC machine and employ them in different area of applications. CO 5 Describe the components of low voltage electrical installations and perform elementary calculations for energy consumption.

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SEM I & SEM II	FUNDAMENTALS OF ELECTRONICS ENGINEERING	BEC101 / BEC201 :	1. Describe the concept of PN Junction and devices. 2. Explain the concept of BJT, FET and MOFET. 3. Apply the concept of Operational amplifier to design linear and non-linear applications. 4. Perform number systems conversions, binary arithmetic and minimize logic functions. 5. Describe the fundamentals of communication technologies.
	PROGRAMMING FOR PROBLEM SOLVIN	BCS101 / BCS201	CO 1 To Develop Simple Algorithms for Arithmetic and Logical Problems. K2, K3 CO 2 To Translate the Algorithms to Programs & Execution (in C Language). K3 CO 3 To Implement Conditional Branching, Iteration and Recursion. K3 CO 4 To Decompose a Problem into Functions and Synthesize a Complete Program Using Divide and Conquer Approach. K4 CO 5 To Use Arrays, Pointers and Structures to Develop Algorithms and Programs. K2, K
	ENTALS OF MECHANICAL ENGI	BME101 / BME201:	CO1 Apply the concept of force resolution and stress and strain to solve basic problems K3 CO2 Understand the construction details and working of internal combustion engines, electric vehicle and hybrid vehicles. K2 CO3 Explain the construction detail and working of refrigerator, heat pump and airconditioner. K2 CO4 Understand fluid properties, conservation laws and hydraulic machinery used in real life. K2 CO5 Understand the working principle of different measuring instrument and mechatronics with their advantages, scope and Industrial application. K2
	ENVIRONMENT AND ECOLOGY	BAS104 / BAS204:	CO-1 Gain in-depth knowledge on natural processes that sustain life, and govern economy.CO-2 Estimate and Predict the consequences of human actions on the web of life, global economy and quality of human life. CO-3 Develop critical thinking for shaping strategies (scientific, social, economic and legal) for environmental protection and conservation of biodiversity, social equity and sustainable development. CO-4 Acquire values and attitudes towards understanding complex environmentaleconomic social challenges, and participate actively in solving current environmental problems and preventing the future ones. CO-5 Adopt sustainability as a practice in life, society and industry

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: SOFT SKILLS	BAS105 / BAS205	1. Write professionally in simple and correct English. 2. Demonstrate active listening with comprehension, and the ability to write clear and wellstructured emails and proposals. 3. Learn the use of correct body language and tone of voice to enhance communication. 4. Acquire the skills necessary to communicate effectively and deliver presentations with clarity and impact 5. Understand and apply some important aspects of core skills, like Leadership and stress management.
: ENGINEERING PHYSICS LAB	BAS151 / BAS251	CO-1 Apply the principle of interference and diffraction to find the wavelength of monochromatic and polychromatic light. Apply CO-2 Compute and analyze various electrical and electronic properties of a given material by using various experiments. Analyze CO-3 Verify different established laws with the help of optical and electrical experiments. Apply CO-4 Determine and calculate various physical properties of a given material by using various experiments. Apply CO-5 Study and estimate the performance and parameter of given equipment by using graphical and computational analysis.
ENGINEERING CHEMISTRY LAB	BAS152 / BAS252	CO-1 Get an understanding of the use of different analytical instruments. CO-2 Measure the molecular / system properties such as surface tension, viscosity, conductance of solution, chloride and iron content in the water. CO-3 Measure the hardness and alkalinity of the water. CO-4 Know the fundamental concepts of the preparation of phenol formaldehyde & urea formaldehyde resin, adipic acid and Paracetamol. CO-5 Estimate the rate constant of reaction.
BASIC ELECTRICAL ENGINEERIN	BEE151 / BEE251	CO 1 Conduct experiments illustrating the application of KVL/KCL and network theorems to DC electrical circuits. K3 CO 2 Demonstrate the behavior of AC circuits connected to single phase AC supply and measure power in single phase as well as three phase electrical circuits. K4 CO 3 Perform experiment illustrating BH curve of magnetic materials. K3 CO 4 Calculate efficiency of a single phase transformer and DC machine. K4 CO 5Perform experiments on speed measurement and reversal of direction of three phase induction motor and Identify the type of DC and AC machines based on their construction

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: PROGRAMMING FOR PROBLEI	BCS151 / BCS251	CO 1 Able to implement the algorithms and draw flowcharts for solving Mathematical and Engineering problems. CO 2 Demonstrate an understanding of computer programming language concepts. K3, K2 CO 3Ability to design and develop Computer programs, analyzes, and interprets the concept of pointers, declarations, initialization, operations on pointers and their usage. CO 4 Able to define data types and use them in simple data processing applications he/she must be able to use the concept of array of structures. CO 5 Develop confidence for self-education and ability for life-long learning needed for Computer language
ENGLISH LANGUAGE LAB	BAS155 / BAS255	1. Students will be enabled to understand the basic objective of the course by being acquainted with specific dimensions of communication skills i.e. Reading, Writing, Listening, Thinking and Speaking. 2. Students would be able to create substantial base by the formation of strong professional vocabulary for its application at different platforms and through numerous modes as Comprehension, reading, writing and speaking etc. 3. Students will apply it at their work place for writing purposes such as Presentation/official drafting/administrative communication and use it for document/project/report/research paper writing. 4. Students will be made to evaluate the correct and error-free writing by being well-versed in rules of English grammar and cultivate relevant technical style of communication &presentation at their work place and also for academic uses. 5. Students will apply it for practical and oral presentation purposes by being honed up in presentation skills and voice-dynamics. They will apply techniques for developing interpersonal communication skills and positive attitude leading to their professional competence.
ENGINEERING GRAPHICS & DESIGN LAB	BCE151/ BCE251:	CO 1: Use scales and draw projections of objects. CO 2: Explain views of solids and their sectional surfaces. CO 3: Analyze and draw isometric projections of objects. CO 4: Demonstrate orthographic representation of perspective views using modern tools. CO 5: Apply AutoCAD software for creation of engineering drawing and models

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	WORKSHOP PRACTICE LAB	**WS151/ BWS251**	CO1 Use various engineering materials, tools, machines and measuring equipments. K3 CO2 Perform machine operations in lathe and CNC machine. K3 CO3 Perform manufacturing operations on components in fitting and carpentry shop. K3 CO4 Perform operations in welding, moulding, casting and gas cutting. K3 CO5 Fabricate a job by 3D printing manufacturing technique
SEM III	**THERMODYNAMICS**	**BME301**	CO1: To understand the basic terms of thermodynamics: K2 CO2: To apply I law to various energy conversion devices: K3 CO3: To evaluate the changes in properties of substances in various processes: K3 CO4: To understand the difference between high grade and low-grade energies: K2
	FLUID MECHANICS AND FLUID MACHINES	**BME302**	CO 1 Understand the application of mass and momentum conservation laws for fluid flows. K2 CO 2 Understand the importance of dimensional analysis. K2 CO 3 Evaluate the velocity and pressure variations in various types of simple flows. K3 CO 4 Mathematically analyze the flow in water pumps and turbines. K3 CO 5 Understand about the functioning of centrifugal and reciprocating pumps. K2
	MATERIALS ENGINEERING	**BME303**	CO-1: Students will be able to identify the crystal structure and measure the mechanical properties of materials. K3 CO-2: Students will be able to test the various failures of materials. K3 CO-3: Students will be able to identify the mechanical properties based on composition of micro-constituents depicted in the phase-diagram. K3 CO-4: Students will understand the concept of improving the mechanical properties through heat treatment. K2 CO-5: Students will learn the structure and properties of alloys and composites. K2
SEM IV	**APPLIED HERMODYNAMICS**	**BME401**	CO1: To learn about Air Standard Cycle. CO2: To learn about of I law for reacting systems and heating value of fuels. CO3: To learn about gas and vapor cycles CO4: To learn about gas dynamics of air flow and steam through nozzles. CO5: To analyze the performance of steam turbines.
	ENGINEERING MECHANICS & STRENGTH OF MATERIAL	**BME402**	CO1 Understand the force systems and application of force equilibrium to various two-dimensional problems. K3 CO2 Understand the concept of stress and strain under different loading conditions. K3 CO3 Determine the principal stresses and strains in structural members K3 CO4 Understand and determine the stresses, slope, and deflection of the transversely loaded members K3 CO5 Apply the concepts of stresses and strain in solving problems related to springs, buckling of columns and thin and thick cylinders. K3

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MANUFACTURING PROCESSES	**BME403**	CO-1 : Students will learn the various conventional manufacturing processes / casting and forming processes. K2 CO-2 : Students will understand the concepts of metal cutting and CNC machining. K2 CO-3 : Students will comprehend the knowledge of grinding and super finishing processes. K2 CO-4 : Students will understand the concepts of metal joining processes. K2 CO-5 : Students will learn the concepts of unconventional machining processes. K2
Heat and Mass Transfer	**KME 501**	CO-1 Understand the fundamentals of heat and mass transfer. K2 CO-2 Apply the concept of steady and transient heat conduction. K3 CO-3 Apply the concept of thermal behavior of fins. K3 CO-4 Apply the concept of forced and free convection. K3 CO-5 Apply the concept of radiation for black and non-black bodies. K3 CO-6 Conduct thermal analysis of heat exchangers. K4
Strength of Material	**KME 502**	CO 1 Understand the concept of stress and strain under different conditions of loading K2 CO 2 Determine the principal stresses and strains in structural members K3 CO 3 Determine the stresses and strains in the members subjected to axial, bending and torsional loads K3 CO 4 Apply the concepts of stresses and strain in solving problems related to springs, column and pressure vessels K3 CO 5 Calculate the slope, deflection and buckling of loaded members K3 CO 6 Analyze the stresses developed in straight and curved beams of different cross sections K4
Industrial Engineering	**KME 503**	CO1 Understand the concept of production system, productivity, facility and process planning in various industries K2 CO2 Apply the various forecasting and project management techniques K3 CO3 Apply the concept of break-even analysis, inventory control and resource utilization using queuing theory K3 CO4 Apply principles of work study and ergonomics for design of work systems K3 CO5 Formulate mathematical models for optimal solution of industrial problems using linear programming approach K

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SEM V	**Computer Integrated Manufacturing**	**KME 051**	CO 1 Understand the basic concepts of automation, computer numeric control machining K2 CO 2 Understand the algorithms of line generation, circle generation, transformation, curve, surface modeling and solid modeling K2 CO 3 Understand group technology, computer aided process planning, flexible manufacturing, Industry 4.0, robotics K2 CO 4 Understand information system and material handling in CIM environment, rapid prototyping K2 CO 5 Apply the algorithms of line & circle generation and geometric transformations K3 CO6 Develop CNC program for simple operations K3
	Mechatronics Systems	**KME 052**	CO 1 Identify key elements of mechatronics and its representation by block diagram. K 2 CO 2 Understand the concept of sensors and use of interfacing systems. K 2 CO 3 Understand the concept and applications of different actuators K 2 CO 4 Illustrate various applications of mechatronic systems. K 2 CO 5 Develop PLC ladder programming and implementation in real life problem. K 5
	Finite Element Methods	**KME 053**	CO 1 Understand the basic concepts of FEM and its applications. K2 CO 2 Apply the procedure involved to solve a problem using Finite Element Methods. K3 CO 3 Develop the element stiffness matrices using different approach. K3 CO 4 Analyze 1D and 2D problem using different methods. K4 CO 5 Analyze the complex geometric problems through FEM software packages. K4
	I C Engine Fuel and Lubrication	**KME 054**	CO 1 Explain the working principle, performance parameters and testing of IC Engine. K 2 CO 2 Understand the combustion phenomena in SI and CI engines and factors influencing combustion chamber design. K 2 CO 3 Understand the essential systems of IC engine and latest trends and developments in IC Engines. K 2 CO 4 Understand the effect of engine emissions on environment and human health and methods of reducing it. K 2 CO 5 Apply the concepts of thermodynamics to air standard cycle in IC Engines K 3 CO 6 Analyze the effect of various operating parameters on IC engine performance. K 4
	Advance welding	**KME 055**	CO 1 Understand the physics of arc welding process and various operating characteristics of welding power source. K2 CO 2 Analyse various welding processes and their applications. K3 CO 3 Apply the knowledge of welding for repair & maintenance, along with the weldability of different materials. K3 CO 4 Apply the concept of quality control and testing of weldments in industrial environment. K3 CO 5 Evaluate heat flow in welding and physical metallurgy of weldments. K4

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Programming, Data Structures and Algorithms Using Python	**KME 056**	CO 1 Understand the numbers, math's function, strings, list, tuples, and dictionaries in pythons K2 CO 2 Apply conditional statement and functions in python K3 CO 3 Apply file handling techniques in python K3 CO 4 Analyze the graphical demonstration in python K4 CO 5 Apply techniques of Classes and Object Concept in Python K3
Mechanical Vibrations	**KME 057**	CO 1 Understand fundamentals of mechanical vibrations along with their classification. K2 CO 2 Differentiate among single, two and multiple degree of freedom (DOF) systems. K3 CO 3 Analyze, predict and measure the performance of systems undergoing single, two and multiple DOF. K4 CO 4 Design systems with optimized vibration absorption capabilities. K4 CO 5 Apply the fundamentals to the real life problems like whirling of shaft K3 CO 6 Solve complicated mathematical models using Numerical methods and software applications. K4
Fuels and Combustion	**KME 058**	CO1 Understand the properties of different types of fuel with their application. K2 CO2 Classify different types of fuels. K2 CO3 Understand the concept of combustion. K2 CO4 Understand the fundamental concept of air pollution and its control. K2 CO5 Calculate various properties of the fuels. K3 CO6 Analyze the flue gases. K4
Refrigeration and Air Conditioning	**KME 601**	CO1 Understand the properties of different types of fuel with their application. K2 CO2 Classify different types of fuels. K2 CO3 Understand the concept of combustion. K2 CO4 Understand the fundamental concept of air pollution and its control. K2 CO5 Calculate various properties of the fuels. K3 CO6 Analyze the flue gases. K4
Machine Design	**KME 602**	CO 1 Recall the basic concepts of Solid Mechanics to understand the subject. K2 CO 2 Classify various machine elements based on their functions and applications. K2 CO 3 Apply the principles of solid mechanics to machine elements subjected to static and fluctuating loads. K3 CO 4 Analyze forces, bending moments, twisting moments and failure causes in various machine elements to be designed. K4 CO 5 Design the machine elements to meet the required specification. K5

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SEM VI	**Theory of Machines**	**KME 603**	CO1 Understand the principles of kinematics and dynamics of machines. K2 CO2 Calculate the velocity and acceleration for 4-bar and slider crank mechanism K3 CO3 Develop cam profile for followers executing various types of motions K3 CO4 Apply the concept of gear, gear train and flywheel for power transmission K3 CO5 Apply dynamic force analysis for slider crank mechanism and balance rotating & reciprocating masses in machines. K3 CO6 Apply the concepts of gyroscope, governors in fluctuation of load and brake & dynamometer in power transmission K3
	Nondestructive Testing	**KME 061**	CO 1 Understand the concept of destructive and Non-destructive testing methods. K2 CO 2 Explain the working principle and application of die penetrant test and magnetic particle inspection. K2 CO3 Understand the working principle of eddy current inspection. K2 CO 4 Apply radiographic techniques for testing. K3 CO 5 Apply the principle of Ultrasonic testing and applications in medical and engineering areas. K3
	Artificial Intelligence	**KME 062**	CO 1 Understand concepts of Artificial Intelligence K2 CO 2 Solve problem by Search-I & Search-II K3 CO 3 Understand Knowledge representation K2 CO 4 Apply concepts of Learning methods K3 CO 5 Analyse Decision Networks K4 CO 6 Build planning graphs K5
	Tribology	**KME 063**	CO 1 Identify and explain various friction and wear mechanisms. K2 CO 2 Select proper lubricants for different applications. K3 CO 3 Select suitable lubrication methods in different bearings. K3 CO 4 Study the surfaces coating techniques for reduction of wear. K3 CO 5 Analyze the impact of friction in various kinematic pairs. K4
	Gas Dynamics and Jet Propulsion	**KME 064**	CO1 Understand the concept of compressible fluid flow and flow through variable area ducts. K2 CO2 Understand the basic principle and types of jet and rocket propulsion. K2 CO3 Apply the basic laws for the investigation of flow through ducts. K3 CO4 Apply the basic laws for the thermodynamics analysis of jet and rocket propulsion. K3 CO5 Analyze the compressible flow through variable area ducts. K4

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Additive manufacturing	**KME 071**	CO 1 Understanding the basics of additive manufacturing/rapid prototyping and its advantages and disadvantages CO 2Understanding the role of additive manufacturing in the design process and the implications for design.K2 CO 3Understanding the processes used in additive manufacturing for a range of materials and applications CO 4Understand the various software tools, processes and techniques that enable advanced/additive manufacturing and personal fabrication. CO 5Apply knowledge of additive manufacturing for various real-life applications
HVAC systems	**KME 072**	CO1 Understand the basics concepts of HVAC and various HVAC systems. K2 CO2 Understand the use of refrigerants with their respective applications and its future trends. K2 CO3 Understand the use of different auxiliary systems used in HVAC systems. K2 CO4 Apply the basic laws for thermodynamic analysis of different processes involved in HVAC systems. K3 CO5Apply the basic concepts to calculate the HVAC loads for different applications. K3 CO6 Apply the concepts of psychrometry to design HVAC systems for different applications K3
Hybrid Vehicle Propulsion	**KAU 072**	CO-1Understand the basics of the hybrid electric vehicles and it's types. CO-2Understand the types of drive trains used in hybrid vehicles CO-3Understand the propulsion units used in Hybrid Vehicles and their efficiency. CO-4Understand the requirements and devices of energy storage used in hybrid vehicles. CO-5Understand the concept of downsizing of IC engines in case of hybrid vehicles. CO-6Understand the principles of energy management and issues related to these strategies.
Mathematical Modeling of Manufacturing Processes	**KME 073**	CO1Understand the fundamentals of manufacturing processes, mathematical models and their solutions CO2Understand unconventional and conventional machining, their discrete-time linear, non-linear models and solutions CO3Analyze the mechanism of forming and heat transfer in welding CO4Apply the principles of casting, powder metallurgy, coating and additive Manufacturing CO5Understand the fundamental of heat treatment, micro / nano manufacturing and processing of non-metallic materials.

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SEM VII	**Machine Learning**	**KME 074**	CO 1Understand the need of machine learning concepts CO 2To Understand a wide variety of ML Algorithms and how to evaluate models generated from data CO 3Solve prediction based problems CO 4Analyze machine learning algorithms CO 5Apply the Algorithms to real-world problems
	Computer Graphics and product modeling	**KME 075**	CO 1Understand the components of a computer graphics with object representation and to develop algorithm for graphics system components. CO 2Understand the basic principles of 3- dimensional computer graphics and express the 3D model with illumination and shading effects. CO 3Develop a 3D solid model using 3D Solid Modeling Software CO 4Identify the customer needs in order to develop a business model for new product. CO 5Develop strategy for designing and development of a new product
	Power Plant Engineering	**KME 076**	CO-1Understand the different sources of power generation and their impact on environment. CO-2Understand the elements of power generation using conventional and non-conventional energy sources. CO-3Understand the concepts of electrical systems used in power plants. K2 CO-4 Apply the basic concepts of thermodynamics to measure the performance of different power plants. K3 CO-5 Determine the performance of power plants based on load variations. K3

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	Vehicle Body Engineering & safety	**KAU 073**	CO-1 Understand the classification of the vehicles on the basis of body. K2 CO-2 Understand the importance of material selection in designing automotive bodies. K2 CO-3 Understand the concepts of aerodynamics used in designing automobiles. K2 CO-4 Understand the importance of interior and exterior ergonomics while designing the vehicle. K2 CO-5 Identify various sources of noise and methods of noise separation and various safety aspects in a given vehicle. K2 CO-6 Calculate various aerodynamic forces and moments acting on vehicle, load distribution in vehicle body and stability of vehicle. K3
	Measurement & Metrology Lab	**KME751**	CO-1 Understand the basic principles of instrumentation for measurement of surface finish, strain, temperature, pressure and flow. K2 CO-2 Understand the principle and operation of Coordinate Measuring Machine (CMM). K2 CO-3 Apply Sine Bar, Slip Gauges, Bevel Protractor, Stroboscope, Dial Indicator etc. for measurement of different attributes. K3 CO-4 Apply the basic concepts of limits, fits & tolerances for selective assembly. K3
SEM VIII	**HSMC-1* / HSMC-2***	**KHU801/ KHU802**	Mentioned in university syllabus
	Project	**KME851**	
	Open Elective-III	**KOE08X**	
	Open Elective -IV	**KOE08X**	

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PROGRAM OUTCOME (PO), PROGRAM SPECIFIC OUTCOME (PSO) (2023-24)

BTECH COMPUTER SCIENCE ENGGINERING (IOT)

PROGRAMME OUTCOME

1) PO1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2) PO2: Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3) PO3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4) PO4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5) PO5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6) PO6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7) PO7: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8) PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9) PO9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10) PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11) PO11: Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12) PO12: Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES

PSO 1: Ability to learn and adapt quickly in the rapidly changing and ever evolving field of computer science.

PSO 2: Exhibit attitude for continuous learning and deliver efficient solutions for emerging challenges in the computation domain.

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COURSE OUTCOME

SEMESTER	COURSE NAME	COURSE CODE	COURSE OUTCOME
	ENGINEERING PHYSICS	BAS101 / BAS201	CO1:To explain the distribution of energy in black body radiation and to understand the difference in particle and wave nature with explanation of Compton effect and Schrodinger wave equation. CO2:To understand the concept of displacement current and consistency of Ampere's law and also the properties of electromagnetic waves in different medium with the use of Maxwell's equations. CO3:To understand the behavior of waves through various examples/applications of interference and diffraction phenomenon and the concept of grating and resolving power. CO4 To know the functioning of optical fiber and its properties and applications. To understand the concept, properties and applications of Laser. CO5 To know the properties and applications of superconducting materials and nano materials.
	ENGINEERING CHEMISTRY	BAS102 / BAS202	CO-1 Get an understanding of the theoretical principles of chemistry of molecular structure, bonding and properties, Chemistry of advanced materials (liquid crystals, Nanomaterials, Graphite & Fullerene) as well as the Principles of Green Chemistry. CO-2 Apply the fundamental concepts of determination of structure with various spectral techniques and stereochemistry. CO-3 Utilize the theory of construction of electrodes, batteries and fuel cells in redesigning new engineering products and categorize the reasons for corrosion and study methods to control corrosion and develop understanding of Chemistry of Engineering materials (Cement). CO-4 Develop understanding of the sources, impurities and hardness of water, apply the concepts of determination of calorific values and analyze the coal. CO-5 Develop the understanding of Chemical structure of polymers and its effect on their various properties when used as engineering materials. Understanding the applications of specific polymers and Chemistry applicable in industrial process.

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ENGINEERING MATHEMATICS-	BAS103	CO 1 Understand the concept of complex matrices, Eigen values, Eigen vectors and apply the concept of rank to evaluate linear simultaneous equations CO 2 Remember the concept of differentiation to find successive differentiation, Leibnitz Theorem, and create curve tracing, and find partial and total derivatives CO 3 Applying the concept of partial differentiation to evaluate extrema, series expansion, error approximation of functions and Jacobians CO 4 Remember the concept of Beta and Gamma function; analyze area and volume and Dirichlet's theorem in multiple integral CO 5 Apply the concept of Vector Calculus to analyze and evaluate directional derivative, line, surface and volume integrals.
: ENGINEERING MATHEMATICS-II	BAS203	CO 1 Remember the concept differentiation to evaluate LDE of nth order with constant coefficient and LDE with variable coefficient of 2nd order. CO 2 Understand and apply the concept of Laplace Transform to evaluate differential equations CO 3 Understand the concept of convergence to analyze the convergence of series and expansion of the function for Fourier series. CO 4 Apply the concept of analyticity, Harmonic function and create the image of function applying conformal transformation CO 5 Apply the concept of Cauchy Integral theorem, Cauchy Integralformula, singularity and calculus of residue to evaluate integrals
: FUNDAMENTALS OF ELECTRICAL ENGINEERING	BEE101 / BEE201	CO 1 Apply the concepts of KVL/KCL and network theorems in solving DC circuits. CO 2 Analyze the steady state behavior of single phase and three phase AC electrical circuits. CO 3Identify the application areas of a single phase two winding transformer as well as an auto transformer and calculate their efficiency. Also identify the connections of a three phase transformer. CO 4 Illustrate the working principles of induction motor, synchronous machine as well as DC machine and employ them in different area of applications. CO 5 Describe the components of low voltage electrical installations and perform elementary calculations for energy consumption.
FUNDAMENTALS OF ELECTRONICS ENGINEERING	BEC101 / BEC201 :	1. Describe the concept of PN Junction and devices. 2. Explain the concept of BJT, FET and MOFET. 3. Apply the concept of Operational amplifier to design linear and non-linear applications. 4. Perform number systems conversions, binary arithmetic and minimize logic functions. 5. Describe the fundamentals of communication technologies.

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SEM I & SEM II	PROGRAMMING FOR PROBLEM SOLVIN	BCS101 / BCS201	CO 1 To Develop Simple Algorithms for Arithmetic and Logical Problems. K2, K3 CO 2 To Translate the Algorithms to Programs & Execution (in C Language). K3 CO 3 To Implement Conditional Branching, Iteration and Recursion. K3 CO 4 To Decompose a Problem into Functions and Synthesize a Complete Program Using Divide and Conquer Approach. K4 CO 5 To Use Arrays, Pointers and Structures to Develop Algorithms and Programs. K2, K
	FUNDAMENTALS OF MECHANICAL ENGINEERING	BME101 / BME201:	CO1 Apply the concept of force resolution and stress and strain to solve basic problems K3 CO2 Understand the construction details and working of internal combustion engines, electric vehicle and hybrid vehicles. K2 CO3 Explain the construction detail and working of refrigerator, heat pump and airconditioner. K2 CO4 Understand fluid properties, conservation laws and hydraulic machinery used in real life. K2 CO5 Understand the working principle of different measuring instrument and mechatronics with their advantages, scope and Industrial application. K2
	ENVIRONMENT AND ECOLOGY	BAS104 / BAS204:	CO-1 Gain in-depth knowledge on natural processes that sustain life, and govern economy.CO-2 Estimate and Predict the consequences of human actions on the web of life, global economy and quality of human life. CO-3 Develop critical thinking for shaping strategies (scientific, social, economic and legal) for environmental protection and conservation of biodiversity, social equity and sustainable development. CO-4 Acquire values and attitudes towards understanding complex environmentaleconomic social challenges, and participate actively in solving current environmental problems and preventing the future ones.
	: SOFT SKILLS	BAS105 / BAS205	1. Write professionally in simple and correct English. 2. Demonstrate active listening with comprehension, and the ability to write clear and wellstructured emails and proposals. 3. Learn the use of correct body language and tone of voice to enhance communication. 4. Acquire the skills necessary to communicate effectively and deliver presentations with clarity and impact 5. Understand and apply some important aspects of core skills, like Leadership and stress management.

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: ENGINEERING PHYSICS LAB	BAS151 / BAS251	CO-1 Apply the principle of interference and diffraction to find the wavelength of monochromatic and polychromatic light. Apply CO-2 Compute and analyze various electrical and electronic properties of a given material by using various experiments. Analyze CO-3 Verify different established laws with the help of optical and electrical experiments. Apply CO-4 Determine and calculate various physical properties of a given material by using various experiments. Apply CO-5 Study and estimate the performance and parameter of given equipment by using graphical and computational analysis.
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: PROGRAMMING FOR PROBLEM SOLVING LAB	BCS151 / BCS251	CO 1 Able to implement the algorithms and draw flowcharts for solving Mathematical and Engineering problems. CO 2 Demonstrate an understanding of computer programming language concepts. K3, K2 CO 3Ability to design and develop Computer programs, analyzes, and interprets the concept of pointers, declarations, initialization, operations on pointers and their usage. CO 4 Able to define data types and use them in simple data processing applications he/she must be able to use the concept of array of structures. CO 5 Develop confidence for self-education and ability for life-long learning needed for Computer language
ENGLISH LANGUAGE LAB	BAS155 / BAS255	1. Students will be enabled to understand the basic objective of the course by being acquainted with specific dimensions of communication skills i.e. Reading, Writing, Listening, Thinking and Speaking. 2. Students would be able to create substantial base by the formation of strong professional vocabulary for its application at different platforms and through numerous modes as Comprehension, reading, writing and speaking etc. 3. Students will apply it at their work place for writing purposes such as Presentation/official drafting/administrative communication and use it for document/project/report/research paper writing. 4. Students will be made to evaluate the correct and error-free writing by being well-versed in rules of English grammar and cultivate relevant technical style of communication &presentation at their work place and also for academic uses. 5. Students will apply it for practical and oral presentation purposes by being honed up in presentation skills and voice-dynamics. They will apply techniques for developing interpersonal communication skills and positive attitude leading to their professional competence.
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III SEM	**DATA STRUCTURE**	**BCS301**	CO 1 Describe how arrays, linked lists, stacks, queues, trees, and graphs are represented in memory, used by the algorithms and their common applications. K1, K2 CO 2 Discuss the computational efficiency of the sorting and searching algorithms. K2 CO 3 Implementation of Trees and Graphs and perform various operations on these data structure. K3 CO 4 Understanding the concept of recursion, application of recursion and its implementation and removal of recursion. K4 CO 5 Identify the alternative implementations of data structures with respect to its performance to solve a real world problem. K5, K6
	COMPUTER ORGANIZATION AND ARCHITECTURE	**BCS302**	CO 1 Study of the basic structure and operation of a digital computer system. K1, K2 CO 2 Analysis of the design of arithmetic & logic unit and understanding of the fixed point and floating-point arithmetic operations. K2, K4 CO 3 Implementation of control unit techniques and the concept of Pipelining K3 CO 4 Understanding the hierarchical memory system, cache memories and virtual memory K2 CO 5 Understanding the different ways of communicating with I/O devices and standard I/O interfaces K2,
	Discrete Structures & Theory of Logic	**BCS303**	CO 1 Acquire Knowledge of sets and relations for solving the problems of POSET and lattices. K3, K4 CO 2 Apply fundamental concepts of functions and Boolean algebra for solving the problems of logical abilities. K1, K2 CO 3 Employ the rules of propositions and predicate logic to solve the complex and logical problems. K3 CO 4 Explore the concepts of group theory and their applications for solving the advance technological problems. K1, K4 CO 5 Illustrate the principles and concepts of graph theory for solving problems related to computer science. K2, K6
IV SEM	**Operating system**	**BCS401**	CO 1 Understand the structure and functions of OS K1, K2 CO 2 Learn about Processes, Threads and Scheduling algorithms. K1, K2 CO 3 Understand the principles of concurrency and Deadlocks K2 CO 4 Learn various memory management scheme K2 CO 5 Study I/O management and File systems. K2,K4
	Theory of Automata and Formal Languages	**BCS402**	CO 1 Analyse and design finite automata, pushdown automata, Turing machines, formal languages, and grammars K4, K6 CO 2 Analyse and design, Turing machines, formal languages, and grammars K4, K6 CO 3 Demonstrate the understanding of key notions, such as algorithm, computability, decidability, and complexity through problem solving K1, K5 CO 4 Prove the basic results of the Theory of Computation. K2,K3 CO 5 State and explain the relevance of the Church-Turing thesis. K1, K5

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Object Oriented Programming with Java	**BCS403**	CO 1 Develop the object-oriented programming concepts using Java K3, K4 CO 2 Implement exception handling, file handling, and multi-threading in Java K2,K4 CO 3 Apply new java features to build java programs. K3 CO 4 Analyse java programs with Collection Framework K4 CO 5 Test web and RESTful Web Services with Spring Boot using Spring Framework concepts K5
DATABASE MANAGEMENT SYSTEM	**KCS 501**	CO 1 Apply knowledge of database for real life applications. K3 CO 2 Apply query processing techniques to automate the real time problems of databases. K3, K4 CO 3 Identify and solve the redundancy problem in database tables using normalization. K2, K3 CO 4 Understand the concepts of transactions, their processing so they will familiar with broad range of database management issues including data integrity, security and recovery. K2, K4 CO 5 Design, develop and implement a small database project using database tools.
INTRODUCTION TO INTERNET OF THINGS	**KOT501**	CO 1 Demonstrate basic concepts, principles and challenges in IoT. K1,K2 CO 2 Illustrate functioning of hardware devices and sensors used for IoT. K2 CO 3 Analyze network communication aspects and protocols used in IoT. K4 CO 4 Apply IoT for developing real life applications using Ardunio programming. K3 CP 5 To develop IoT infrastructure for popular applications
DESIGN AND ANALYSIS OF ALGORITHM	**KCS 503**	CO 1 Design new algorithms, prove them correct, and analyze their asymptotic and absolute runtime and memory demands. K4, K6 CO 2 Find an algorithm to solve the problem (create) and prove that the algorithm solves the problem correctly (validate). K5, K6 CO 3 Understand the mathematical criterion for deciding whether an algorithm is efficient, and know many practically important problems that do not admit any efficient algorithms. K2, K5 CO 4 Apply classical sorting, searching, optimization and graph algorithms. K2, K4 CO 5 Understand basic techniques for designing algorithms, including the techniques of recursion, divide-and-conquer, and greedy

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MACHINE LEARNING TECHNIQUES	**KCS 055 / KAI 601**	CO 1 To understand the need for machine learning for various problem solving K1 , K2 CO 2 To understand a wide variety of learning algorithms and how to evaluate models generated from data K1 , K3 CO 3 To understand the latest trends in machine learning K2 , K3 CO 4 To design appropriate machine learning algorithms and apply the algorithms to a realworld problems K4 , K6 CO 5 To optimize the models learned and report on the expected accuracy that can be achieved by applying the models
WEB DESIGNING	**KCS 052**	CO 1 Understand principle of Web page design and about types of websites K3, K4 CO 2 Visualize and Recognize the basic concept of HTML and application in web designing. K1, K2 CO 3 Recognize and apply the elements of Creating Style Sheet (CSS). K2, K4 CO 4 Understand the basic concept of Java Script and its application. K2, K3 CO 5 Introduce basics concept of Web Hosting and apply the concept of SEO
SENSORS, ACTUATORS AND SIGNAL PROCESSING	**KOT 051**	CO 1 Understand the concept of Sensors and Transducers K2 CO 2 Application of Sensors, Actuators and Signal Processing K3, K4 CO 3 Understand the concept of Radiation Sensors and smart sensor K2, K3 CO 4 Learn various types of sensors and actuators used. K2, K3 CO 5 Learn fundamentals of signal processors and digital signal processors
OBJECT ORIENTED SYSTEM DESIGN	**KCS 054**	CO 1 Understand the application development and analyze the insights of object oriented programming to implement application K2, K4 CO 2 Understand, analyze and apply the role of overall modeling concepts (i.e. System, structural) K2, K3 CO 3 Understand, analyze and apply oops concepts (i.e. abstraction, inheritance) K2, K3, K4 CO 4 Understand the basic concepts of C++ to implement the object oriented concepts K2, K3 CO 5 To understand the object oriented approach to implement real world problem
DISTRIBUTED SYSTEM	**KDS 052**	CO 1 To provide hardware and software issues in modern distributed systems. K1 , K2 CO 2 To get knowledge in distributed architecture, naming, synchronization, consistency and replication, fault tolerance, security, and distributed file systems. K2 CO 3 To analyze the current popular distributed systems such as peer-to-peer (P2P) systems will also be analyzed. K4 CO 4 To know about Shared Memory Techniques and have Sufficient knowledge about file access K1 CO 5 Have knowledge of Synchronization and Deadlock.

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V SEM	NATURAL LANGUAGE PROCESSING	KAI 052	CO 1 To learn the fundamentals of natural language processing K1 , K2 CO 2 To understand the use of CFG and PCFG in NLP K1 , K2 CO 3 To understand the role of semantics of sentences and pragmatic K2 CO 4 To Introduce Speech Production And Related Parameters Of Speech. K1 , K2 CO 5 To Show The Computation And Use Of Techniques Such As Short Time Fourier Transform, Linear Predictive Coefficients And Other Coefficients In The Analysis Of Speech
	PROGRAMMING AND INTERFACING WITH MICROCONTROLLERS	KOT 052	CO 1 Understand advanced and emerging networking technologies K1, K2 CO 2 Obtain skills to do advanced networking research and programming K3, K4 CO 3 Learn how to use software programs to perform varying and complex networking tasks K1, K2 CO 4 Understand Advanced I/O Interfacing K2, K3 CO 5 Expand upon the knowledge learned and apply it to solve real world problems
	WEARABLE COMPUTING, MIXED REALITY AND INTERNET OF EVERYTHING	KOT 053	CO 1 Understand advanced and emerging technologies K1, K2 CO 2 Obtain skills to do advanced research and programming K1, K2 CO 3 Learn how to use software programs to perform varying andcomplex tasks K1, K2 CO 4 Expand upon the knowledge learned and apply it to solve real worldproblems
	PRIVACY AND SECURITY IN IOT	KOT 054	CO 1 Ability to understand the Security requirements in IoT. K1, K2 CO 2 Understand the cryptographic fundamentals for IoT K1, K2 CO 3 Ability to understand the authentication credentials and access control K1, K2 CO 4 Understand the various types Trust models and Cloud Security.

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EMBEDDED SYSTEMS AND REAL TIME OPERATING SYSTEM	**KOT 055**	CO 1 Acquire knowledge of different phases and passes of the compiler and able to use the compiler tools like LEX, YACC, etc. Students will also be able to design different types of compiler tools to meet the requirements of the realistic constraints of compilers. K3, K6 CO 2 Understand the parser and its types i.e. Top-Down and Bottom-up parsers and construction of LL, SLR, CLR, and LALR parsing table. K2, K6 CO 3 Implement the compiler using syntax-directed translation method and get knowledge about the synthesized and inherited attributes. K4, K5 CO 4 Acquire knowledge about run time data structure like symbol table organization and different techniques used in that. K2, K3 CO 5 Understand the target machine's run time environment, its instruction set for code generation and techniques used for code optimization.
DATABASE MANAGEMENT SYSTEMS LAB	**KCS 551**	CO 1 Understand and apply oracle 11 g products for creating tables, views, indexes, sequences and other database objects. K2, K4 CO 2 Design and implement a database schema for company data base, banking data base, library information system, payroll processing system, student information system. K3, K5, K6 CO 3 Write and execute simple and complex queries using DDL, DML, DCL and TCL K4, K5 CO 4 Write and execute PL/SQL blocks, procedure functions, packages and triggers, cursors. K4, K5 CO 5 Enforce entity integrity, referential integrity, key constraints, and domain constraints on database.
INTERNET OF THINGS LAB	**KOT 551**	CO 1 Understand the concept of Internet of Things K3 CO 2 Implement interfacing of various sensors with Arduino/Raspberry Pi K4, K5 CO 3 Demonstrate the ability to transmit data wirelessly between different devices. K4 CO 4 Show an ability to upload/download sensor data on cloud and server K2 CO 5 Examine various SQL queries from MySQL database

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DESIGN AND ANALYSIS OF ALGORITHM LAB	**KCS 553**	CO 1 Implement algorithm to solve problems by iterative approach. K2, K4 CO 2 Implement algorithm to solve problems by divide and conquer approach K3, K5 CO 3 Implement algorithm to solve problems by Greedy algorithm approach. K4, K5 CO 4 Implement algorithm to solve problems by Dynamic programming, backtracking, branch and bound approach. K4, K5 CO 5 Implement algorithm to solve problems by branch and bound approach.
IOT ARCHITECTURE AND PROTOCOLS	**KOT 601**	CO 1 To Understand the Architectural Overview of IoT K1,K2 CO 2 To Understand the IoT Reference Architecture and RealWorldDesign Constraints K1,K2 CO 3 To Understand the various IoT Protocols (Datalink, Network, Transport, Session, Service) K3 CO 4 Application of various IoT Protocols (Datalink, Network, Transport, Session, Service) K4,K5 CO 5 To Understand the various Real-World Design Constraints
WEB TECHNOLOGY	**KCS 602**	CO 1 Explain web development Strategies and Protocols governing Web. K1, K2 CO 2 Develop Java programs for window/web-based applications. K2, K3 CO 3 Design web pages using HTML, XML, CSS and JavaScript. K2, K3 CO 4 Creation of client-server environment using socket programming K1, K2, CO 5 Building enterprise level applications and manipulate web databases using JDBC K3, K4 CO6 Design interactive web applications using Servlets and JSP
COMPUTER NETWORKS	**KCS 603**	CO1 Explain basic concepts, OSI reference model, services and role of each layer of OSI model and TCP/IP, networks devices and transmission media, Analog and digital data transmission K1,K2 CO2 Apply channel allocation, framing, error and flow control techniques. K3 CO3 Describe the functions of Network Layer i.e. Logical addressing, subnetting& Routing Mechanism. K2,K3 CO4 Explain the different Transport Layer function i.e. Port addressing, Connection Management, Error control and Flow control mechanism. K2,K3 CO5 Explain the functions offered by session and presentation layer and their Implementation. K2,K3 CO6 Explain the different protocols used at application layer i.e. HTTP, SNMP, SMTP, FTP, TELNET and VPN
CYBER FORENSIC ANALYTICS	**KAI 061**	CO 1 Outline the Cyber crime and its types. K1, K2 CO 2 Explore the Cyber Forensics Techniques K1, K2 CO 3 Use the Cyber Investigation Techniques K3, K4 CO 4 Explore the Cyber Evidence Management Techniques K3, K4 CO 5 Outline the Cyber Laws in India

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VI sem	BIG DATA ANALYTICS FOR IOT	KOT 061	CO 1 Understand the Concepts of big data analytics K1, K2 CO 2 Understand the concepts about Internet of things K1, K2 CO 3 understand and implement smart systems K1, K2 CO 4 Understand the Concept of FOG Computing K1, K2 CO 5 Understand the Sustainability Data and Analytics
	ARTIFICIAL INTELLIGENCE	KAI 501/KOT 063	CO 1 Understand the basics of the theory and practice of Artificial Intelligence as a discipline and about intelligent agents. K2 CO 2 Understand search techniques and gaming theory. K2, K3 CO 3 The student will learn to apply knowledge representation techniques and problem solving strategies to common AI applications. K3 , K4 CO 4 Student should be aware of techniques used for classification and clustering. K2 , K3 CO 5 Student should aware of basics of pattern recognition and steps required for it.
	ENERGY HARVESTING TECHNOLOGIES AND POWERMANAGEMENT FOR IOT DEVICES	KOT 062	CO 1 Understand the various energy sources and energy harvesting based sensor networks K1, K2 CO 2 Learn about the various Piezoelectric materials and Non-linear techniques K1, K2 CO 3 Understand the various Power sources for WSN K1, K2 CO 4 Learn about the applications of Energy harvesting systems.
	SOFTWARE ENGINEERING	KDS 063	CO 1 Explain various software characteristics and analyze different software Development Models. K1, K2 CO 2 Demonstrate the contents of a SRS and apply basic software quality assurance practices to ensure that design, development meet or exceed applicable standards. K1, K2 CO 3 Compare and contrast various methods for software design K2, K3 CO 4 Formulate testing strategy for software systems, employ techniques such as unit testing, Test driven development and functional testing. K3 CO 5 Manage software development process independently as well as in teams and make use of Various software management tools for development, maintenance and analysis.
	ADVANCE INTERNET OF THINGS LAB	KOT 651	CO 1 Understanding the implementation of IOT K5, K6 CO 2 Solving Societal problems with the help of IOT K5, K6 CO 3 Problem Analysis and Designing a Solution K5, K6 CO 4 Understanding the importance of Technology in the life of common men.
	WEB TECHNOLOGY LAB	KCS 652	CO 1 Develop static web pages using HTML K2, K3 CO 2 Develop Java programs for window/web-based applications. K2, K3 CO 3 Design dynamic web pages using Javascript and XML. K3, K4 CO 4 Design dynamic web page using server site programming Ex. ASP/JSP/PHP K3, K4 CO 5 Design server site applications using JDDC,ODBC and secti

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COMPUTER NETWORKS LAB	KCS 653	CO 1 Simulate different network topologies. K3, K4 CO 2 Implement various framing methods of Data Link Layer. K3, K4 CO 3 Implement various Error and flow control techniques. K3, K4 CO 4 Implement network routing and addressing techniques. K3, K4 CO 5 Implement transport and security mechanisms
IOT Security	KOT071	CO 1 Identify the Components that forms part of IoT Architectur CO 2 Determine the most appropriate IoT Devices and Sensors based on Case Studies CO 3 Setup the connections between the Devices and Sensors CO 4 Evaluate the appropriate protocol for communication between IoT CO 5 Analyse the communication protocols for IoT
Natural Language Processing	KCS072	CO 1 To learn the fundamentals of natural language processing K1 , K2 CO 2 To understand the use of CFG and PCFG in NLP K1 , K2 CO 3 To understand the role of semantics of sentences and pragmatic K2 CO 4 To Introduce Speech Production And Related Parameters Of Speech. K1 , K2 CO 5 To Show The Computation And Use Of Techniques Such As Short Time Fourier Transform, Linear Predictive Coefficients And Other Coefficients In The Analysis Of Speech. K3, K4
Text Analytics and Natural Language Processing	KAI073	CO 1 To understand the fundamentals of text analytics and natural language processing K2 CO 2 To learn understand the use of Natural Language Processing K2, K3 CO 3 To understand the role of semantics of sentences and pragmatic K3 , K4 CO 4 To Introduce Speech Production And Related Parameters Of Speech. K2 , K3 CO 5 To Show The Computation And Use Of Techniques Such As Short Time Fourier Transform, Linear Predictive Coefficients And Other Coefficients In The Analysis Of Speec
Cryptography & Network Secu	KCS074	CO 1 Classify the symmetric encryption techniques and Illustrate various Public key cryptographic techniques.K2 , K3 CO 2Understand security protocols for protecting data on networks and be able to digitally sign emails and files.K1 , K2 CO 3 Understand vulnerability assessments and the weakness of using passwords for authentication K4 CO 4 Be able to perform simple vulnerability assessments and password audits K3 CO 5 Summarize the intrusion detection and its solutions to overcome the attacks. K2

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Real Time Operating System	**KOT075**	CO 1 Will be able to control access to a computer and the files that may be shared K1 , K2 CO 2 Demonstrate the knowledge of the components of computers and their respective roles in computing. K3 CO 3 Ability to recognize and resolve user problems with standard operating environments. K1 , K2 CO 4 Gain practical knowledge of how programming languages, operating systems, and architectures interact and how to use each effectively. K3
Deep Learning	**KOT076**	CO 1 To present the mathematical, statistical and computational challenges of building neural networks K1 , K2 CO 2 To study the concepts of deep learning K1 , K2 CO 3 To introduce dimensionality reduction techniques K2 CO 4 To enable the students to know deep learning techniques to support real-time applications K2 , K3
DATA ANALYTICS FOR IOT	**KOT077**	CO 1 Understand the fundamentals of IoT Analytics and Challenges K2 CO 2 Understand and analyze IoT Devices and Networking Protocols K2 CO 3 To Analyze the IoT data to infer the protocol and device characteristics K2, K3 CO 4 Apply IoT Analytics for the Cloud K2 ,K4 CO 5 Understand exploring and visualizing data K2
Architecting Smart IoT Devices	**KOT078**	CO 1 Understand how the IoT is different from traditional systems. K1 , K2 CO 2 Demonstrate the revolution of internet in mobile and cloud. K1 , K2 CO 3 Explore various tools and programming paradigms for IoT applications K2 CO 4 Develop an IoT prototype for real time scenario. K2 , K3 CO 5 Understand the building blocks of IoT and security aspects. K3
Distributed Computing System	**KAI079**	CO 1 Define the characterization of Distributed Systems, Theoretical Foundation for Distributed System and Concepts in Message Passing Systems. K1 , K2 CO 2 Explain the Distributed Mutual Exclusion and Distributed Deadlock Detection. K3 CO 3 Apply the Agreement Protocols and Distributed Resource Management. K4 CO 4 Analyze the Failure Recovery in Distributed Systems and Fault Tolerance. K2 CO 5 Evaluate the Transactions and Concurrency Control, Distributed Transactions and Replication K1

VII & VIII

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IoT System Architectures	**KOT710**	CO 1 Understand IoT applications and IoT Architectures. K1 , K2 CO 2 Learn about IoT devices and event driven analysis K2 CO 3 Understand and analyze IIoT K2 CO 4 Understand safety and security testing of IoT systems K
Operating Systems for IoT	**KOT711**	CO 1 Understanding Free RTOS Techniques of Cube Software Tool. K1 CO 2 Knowledge on Micro Python Features. K1 CO 3 Understand and Acquire Knowledge on Micropython Hardware. K4 CO 4 Apply Basic Data Structures and Functions of Micro Python. K1, K2 CO 5 Knowledge on Windows 10 For Iot Operating System. K2
Mobile Application Development for IoT	**KOT712**	CO 1 Demonstrate basic concepts, principles and challenges in IoT. K1,K2 CO 2 Understand significance of IoT programming fundamentals K2 CO 3 Understand and analyze IoT programming applications. K2 CO 4 Develops IoT applications using standardized hardware. K2 CP 5 Discuss concepts of IoT Advance Wireless Interfaces and IoT Production System. K2
Cloud Computing	**KCS713**	CO 1 Describe architecture and underlying principles of cloud computing. K3 CO 2 Explain need, types and tools of Virtualization for cloud. K3, K4 CO 3 Describe Services Oriented Architecture and various types of cloud services. K2, K3 CO 4 Explain Inter cloud resources management cloud storage services and their providers Assess security services and standards for cloud computing. K2, K4 CO 5 Analyze advanced cloud technologies. K3, K6
Block chain Architecture Desig	**KCS714**	CO 1 Describe the basic understanding of Blockchain architecture along with its primitive. K1, K2 CO 2 Explain the requirements for basic protocol along with scalability aspects. K2, K3 CO 3 Design and deploy the consensus process using frontend and backend. K3, K4 CO 4 Apply Blockchain techniques for different use cases like Finance, Trade/Supply and Government activities. K4, K5

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	Mini Project or Internship Asse	KCS354/KCS554/KCS	CO 1 Developing a technical artifact requiring new technical skills and effectively utilizing a new software tool to complete a task K4 , K5 CO 2 Writing requirements documentation, Selecting appropriate technologies, identifying and creating appropriate test cases for systems. K5 , K6 CO 3 Demonstrating understanding of professional customs & practices and working with professional standards. K4 , K5 CO 4 Improving problem-solving, critical thinking skills and report writing. K4 , K5 CO 5 Learning professional skills like exercising leadership, behaving professionally, behaving ethically, listening effectively, participating as a member of a team, developing appropriate workplace attitudes. K2, K
	Project	KCS753/KCS851	CO 1 Analyze and understand the real life problem and apply their knowledge to get programming solution. K4 , K5 CO 2 Engage in the creative design process through the integration and application of diverse technical knowledge and expertise to meet customer needs and address social issues. K4 , K5 CO 3 Use the various tools and techniques, coding practices for developing real life solution to the problem. K5 , K6 CO 4 Find out the errors in software solutions and establishing the process to design maintainable software applications K4 , K5 CO 5 Write the report about what they are doing in project and learning the team working skills K5, K6

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PROGRAM OUTCOME (PO), PROGRAM SPECIFIC OUTCOME (PSO) (2023-24)

BTECH COMPUTER SCIENCE ENGGINERING (IOT)

PROGRAMME OUTCOME

1) **PO1:** Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2) **PO2:** Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3) **PO3:** Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4) **PO4:** Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5) **PO5:** Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6) **PO6:** The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7) **PO7:** Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8) **PO8:** Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9) **PO9:** Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10) **PO10:** Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11) **PO11:** Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12) **PO12:** Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES

PSO 1: Ability to learn and adapt quickly in the rapidly changing and ever evolving field of computer science.

PSO 2: Exhibit attitude for continuous learning and deliver efficient solutions for emerging challenges in the computation domain.

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			COURSE OUTCOME
SEMESTER	COURSE NAME	COURSE CODE	CO 1 Develop static web pages using HTML K2, K3 CO 2 Develop Java programs for window/web-based applications. K2, K3 CO 3 Design dynamic web pages using Javascript and XML. K3, K4 CO 4 Design dynamic web page using server site programming Ex. ASP/JSP/PHP K3, K4 CO 5 Design server site applications using JDDC,ODBC and secti
	ENGINEERING PHYSICS	BAS101 / BAS201	CO1:To explain the distribution of energy in black body radiation and to understand the difference in particle and wave nature with explanation of Compton effect and Schrodinger wave equation. CO2:To understand the concept of displacement current and consistency of Ampere's law and also the properties of electromagnetic waves in different medium with the use of Maxwell's equations. CO3:To understand the behavior of waves through various examples/applications of interference and diffraction phenomenon and the concept of grating and resolving power. CO4 To know the functioning of optical fiber and its properties and applications. To understand the concept, properties and applications of Laser. CO5 To know the properties and applications of superconducting materials and nano materials.
	ENGINEERING CHEMISTRY	BAS102 / BAS202	CO-1 Get an understanding of the theoretical principles of chemistry of molecular structure, bonding and properties, Chemistry of advanced materials (liquid crystals, Nanomaterials, Graphite & Fullerene) as well as the Principles of Green Chemistry. CO-2 Apply the fundamental concepts of determination of structure with various spectral techniques and stereochemistry. CO-3 Utilize the theory of construction of electrodes, batteries and fuel cells in redesigning new engineering products and categorize the reasons for corrosion and study methods to control corrosion and develop understanding of Chemistry of Engineering materials (Cement). CO-4 Develop understanding of the causes, impurities and hardness of water, apply the concepts

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ENGINEERING MATHEMATICS-	**BAS103**	CO 1 Understand the concept of complex matrices, Eigen values, Eigen vectors and apply the concept of rank to evaluate linear simultaneous equations CO 2 Remember the concept of differentiation to find successive differentiation, Leibnitz Theorem, and create curve tracing, and find partial and total derivatives CO 3 Applying the concept of partial differentiation to evaluate extrema, series expansion, error approximation of functions and Jacobians CO 4 Remember the concept of Beta and Gamma function; analyze area and volume and Dirichlet's theorem in multiple integral CO 5 Apply the concept of Vector Calculus to analyze and evaluate directional derivative, line, surface and volume integrals.
: ENGINEERING MATHEMATICS-II	**BAS203**	CO 1 Remember the concept differentiation to evaluate LDE of nth order with constant coefficient and LDE with variable coefficient of 2nd order. CO 2 Understand and apply the concept of Laplace Transform to evaluate differential equations CO 3 Understand the concept of convergence to analyze the convergence of series and expansion of the function for Fourier series. CO 4 Apply the concept of analyticity, Harmonic function and create the image of function applying conformal transformation CO 5 Apply the concept of Cauchy Integral theorem, Cauchy Integralformula, singularity and calculus of residue to evaluate integrals
: FUNDAMENTALS OF ELECTRICAL ENGINEERING	**BEE101 / BEE201**	CO 1 Apply the concepts of KVL/KCL and network theorems in solving DC circuits. CO 2 Analyze the steady state behavior of single phase and three phase AC electrical circuits. CO 3Identify the application areas of a single phase two winding transformer as well as an auto transformer and calculate their efficiency. Also identify the connections of a three phase transformer. CO 4 Illustrate the working principles of induction motor, synchronous machine as well as DC machine and employ them in different area of applications. CO 5 Describe the components of low voltage electrical installations and perform elementary calculations for energy consumption.

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SEM I & SEM II	FUNDAMENTALS OF ELECTRONICS ENGINEERING	BEC101 / BEC201 :	1. Describe the concept of PN Junction and devices. 2. Explain the concept of BJT, FET and MOFET. 3. Apply the concept of Operational amplifier to design linear and non-linear applications. 4. Perform number systems conversions, binary arithmetic and minimize logic functions. 5. Describe the fundamentals of communication technologies.
	PROGRAMMING FOR PROBLEM SOLVIN	BCS101 / BCS201	CO 1 To Develop Simple Algorithms for Arithmetic and Logical Problems. K2, K3 CO 2 To Translate the Algorithms to Programs & Execution (in C Language). K3 CO 3 To Implement Conditional Branching, Iteration and Recursion. K3 CO 4 To Decompose a Problem into Functions and Synthesize a Complete Program Using Divide and Conquer Approach. K4 CO 5 To Use Arrays, Pointers and Structures to Develop Algorithms and Programs. K2, K
	NDAMENTALS OF MECHANICAL ENGINEERI	BME101 / BME201:	CO1 Apply the concept of force resolution and stress and strain to solve basic problems K3 CO2 Understand the construction details and working of internal combustion engines, electric vehicle and hybrid vehicles. K2 CO3 Explain the construction detail and working of refrigerator, heat pump and airconditioner. K2 CO4 Understand fluid properties, conservation laws and hydraulic machinery used in real life. K2 CO5 Understand the working principle of different measuring instrument and
	ENVIRONMENT AND ECOLOGY	BAS104 / BAS204:	CO-1 Gain in-depth knowledge on natural processes that sustain life, and govern economy.CO-2 Estimate and Predict the consequences of human actions on the web of life, global economy and quality of human life. CO-3 Develop critical thinking for shaping strategies (scientific, social, economic and legal) for environmental protection and conservation of biodiversity, social equity and sustainable development. CO-4 Acquire values and attitudes towards understanding complex environmentaleconomic social challenges, and participate actively in solving current
	: SOFT SKILLS	BAS105 / BAS205	2. Demonstrate active listening with comprehension, and the ability to write clear and wellstructured emails and proposals. 3. Learn the use of correct body language and tone of voice to enhance communication. 4. Acquire the skills necessary to communicate effectively and deliver presentations with clarity and impact 5. Understand and apply some important aspects of core skills, like Leadership and stress

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: ENGINEERING PHYSICS LAB	BAS151 / BAS251	CO-1 Apply the principle of interference and diffraction to find the wavelength of monochromatic and polychromatic light. Apply CO-2 Compute and analyze various electrical and electronic properties of a given material by using various experiments. Analyze CO-3 Verify different established laws with the help of optical and electrical experiments. Apply CO-4 Determine and calculate various physical properties of a given material by using various experiments. Apply CO-5 Study and estimate the performance and parameter of given equipment by using graphical and computational analysis.
ENGINEERING CHEMISTRY LAB	BAS152 / BAS252	CO-1 Get an understanding of the use of different analytical instruments. CO-2 Measure the molecular / system properties such as surface tension, viscosity, conductance of solution, chloride and iron content in the water. CO-3 Measure the hardness and alkalinity of the water. CO-4 Know the fundamental concepts of the preparation of phenol formaldehyde & urea formaldehyde resin, adipic acid and Paracetamol. CO-5 Estimate the rate constant of reaction.
BASIC ELECTRICAL ENGINEERING LAB	BEE151 / BEE251	CO 1 Conduct experiments illustrating the application of KVL/KCL and network theorems to DC electrical circuits. K3 CO 2 Demonstrate the behavior of AC circuits connected to single phase AC supply and measure power in single phase as well as three phase electrical circuits. K4 CO 3 Perform experiment illustrating BH curve of magnetic materials. K3 CO 4 Calculate efficiency of a single phase transformer and DC machine. K4 CO 5Perform experiments on speed measurement and reversal of direction of three phase induction motor and Identify the type of DC and AC machines based on their construction

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: PROGRAMMING FOR PROBLEM SOLVING	BCS151 / BCS251	CO 1 Able to implement the algorithms and draw flowcharts for solving Mathematical and Engineering problems. CO 2 Demonstrate an understanding of computer programming language concepts. K3, K2 CO 3Ability to design and develop Computer programs, analyzes, and interprets the concept of pointers, declarations, initialization, operations on pointers and their usage. CO 4 Able to define data types and use them in simple data processing applications he/she must be able to use the concept of array of structures. CO 5 Develop confidence for self-education and ability for life-long learning needed for Computer language
ENGLISH LANGUAGE LAB	BAS155 / BAS255	1. Students will be enabled to understand the basic objective of the course by being acquainted with specific dimensions of communication skills i.e. Reading, Writing, Listening, Thinking and Speaking. 2. Students would be able to create substantial base by the formation of strong professional vocabulary for its application at different platforms and through numerous modes as Comprehension, reading, writing and speaking etc. 3. Students will apply it at their work place for writing purposes such as Presentation/official drafting/administrative communication and use it for document/project/report/research paper writing. 4. Students will be made to evaluate the correct and error-free writing by being well-versed in rules of English grammar and cultivate relevant technical style of communication &presentation at their work place and also for academic uses. 5. Students will apply it for practical and oral presentation purposes by being honed up in presentation skills and voice-dynamics. They will apply techniques for developing interpersonal communication skills and positive attitude leading to their professional competence.
ENGINEERING GRAPHICS & DESIGN LAB	BCE151/ BCE251:	CO 1: Use scales and draw projections of objects. CO 2: Explain views of solids and their sectional surfaces. CO 3: Analyze and draw isometric projections of objects. CO 4: Demonstrate orthographic representation of perspective views using modern tools. CO 5: Apply AutoCAD software for creation of engineering drawing and models
WORKSHOP PRACTICE LAB	WS151/ BWS251	CO1 Use various engineering materials, tools, machines and measuring equipments. K3 CO2 Perform machine operations in lathe and CNC machine. K3 CO3 Perform manufacturing operations on components in fitting and carpentry shop. K3 CO4 Perform operations in welding, moulding, casting and gas cutting. K3 CO5 Fabricate a job by 3D printing manufacturing technique

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III SEM	DATA STRUCTURE	BCS301	CO 1 Describe how arrays, linked lists, stacks, queues, trees, and graphs are represented in memory, used by the algorithms and their common applications. K1, K2 CO 2 Discuss the computational efficiency of the sorting and searching algorithms. K2 CO 3 Implementation of Trees and Graphs and perform various operations on these data structure. K3 CO 4 Understanding the concept of recursion, application of recursion and its implementation and removal
	COMPUTER ORGANIZATION AND ARCHITECTURE	BCS302	CO 1 Study of the basic structure and operation of a digital computer system. K1, K2 CO 2 Analysis of the design of arithmetic & logic unit and understanding of the fixed point and floating-point arithmetic operations. K2, K4 CO 3 Implementation of control unit techniques and the concept of Pipelining K3 CO 4 Understanding the hierarchical memory system, cache memories and virtual memory K2
	Discrete Structures & Theory of Logic	BCS303	CO 1 Acquire Knowledge of sets and relations for solving the problems of POSET and lattices. K3, K4 CO 2 Apply fundamental concepts of functions and Boolean algebra for solving the problems of logical abilities. K1, K2 CO 3 Employ the rules of propositions and predicate logic to solve the complex and logical problems. K3 CO 4 Explore the concepts of group theory and their applications for solving the advance
IV SEM	Operating system	BCS401	CO 1 Understand the structure and functions of OS K1, K2 CO 2 Learn about Processes, Threads and Scheduling algorithms. K1, K2 CO 3 Understand the principles of concurrency and Deadlocks K2 CO 4 Learn various memory management scheme K2 CO 5 Study I/O management and File systems. K2,K4
	Theory of Automata and Formal Languages	BCS402	CO 1 Analyse and design finite automata, pushdown automata, Turing machines, formal languages, and grammars K4, K6 CO 2 Analyse and design, Turing machines, formal languages, and grammars K4, K6 CO 3 Demonstrate the understanding of key notions, such as algorithm, computability, decidability, and complexity through problem solving K1, K5 CO 4 Prove the basic results of the Theory of Computation. K2,K3

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	Object Oriented Programming with Java	**BCS403**	CO 1 Develop the object-oriented programming concepts using Java K3, K4 CO 2 Implement exception handling, file handling, and multi-threading in Java K2,K4 CO 3 Apply new java features to build java programs. K3 CO 4 Analyse java programs with Collection Framework K4 CO 5 Test web and RESTful Web Services with Spring Boot using Spring Framework concepts K5
	DATABASE MANAGEMENT SYSTEM	**KCS 501**	CO 2 Apply query processing techniques to automate the real time problems of databases. K3, K4 CO 3 Identify and solve the redundancy problem in database tables using normalization. K2, K3 CO 4 Understand the concepts of transactions, their processing so they will familiar with broad range of database management issues including data integrity, security and recovery. K2, K4 CO 5 Design, develop and implement a small database project using database tools.
	ARTIFICIAL INTELLIGENCE	**KAI501**	and about intelligent agents. K2 CO 2 Understand search techniques and gaming theory. K2, K3 CO 3 The student will learn to apply knowledge representation techniques and problem solving strategies to common AI applications. K3 , K4 CO 4 Student should be aware of techniques used for classification and clustering. K2 , K3 CO 5 Student should aware of basics of pattern recognition and steps required for it.
	DESIGN AND ANALYSIS OF ALGORITHM	**KCS 503**	runtime and memory demands. K4, K6 CO 2 Find an algorithm to solve the problem (create) and prove that the algorithm solves the problem correctly (validate). K5, K6 CO 3 Understand the mathematical criterion for deciding whether an algorithm is efficient, and know many practically important problems that do not admit any efficient algorithms. K2, K5 CO 4 Apply classical sorting, searching, optimization and graph algorithms. K2, K4

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MATHEMATICAL FOUNDATION AI , ML AND	KAI 051	density estimations to perform analysis of various kinds of data K2, K4, K6 CO 2 Understand and manipulate data, design and perform simple Monte Carlo experiments, and be able to use resampling methods K5, K6 CO 3 Perform statistical analysis on variety of data K2, K5 CO 4 Perform appropriate statistical tests using R and visualize the outcome K2, K4 CO 5 Discuss the results obtained from their analyses after creating customized graphical and
WEB DESIGNING	KCS 052	CO 2 Visualize and Recognize the basic concept of HTML and application in web designing. K1, K2 CO 3 Recognize and apply the elements of Creating Style Sheet (CSS). K2, K4 CO 4 Understand the basic concept of Java Script and its application. K2, K3 CO 5 Introduce basics concept of Web Hosting and apply the concept of SEO
BUSINESS INTELLIGENCE AND ANALYTICS	KDS 051	CO 1 Understand the essentials of BI & data analytics and the corresponding terminologies K2 CO 2 Analyze the steps involved in the BI - Analytics process K3, K4 CO 3 Illustrate competently on the topic of analytics K2, K3 CO 4 Understand & Implement the K-Means Clustering with Iris Dataset K2, K3 CO 5 Demonstrate the real time scenario (Case study) by using BI & Analytics techniques
OBJECT ORIENTED SYSTEM DESIGN	KCS 054	programming to implement application K2, K4 CO 2 Understand, analyze and apply the role of overall modeling concepts (i.e. System, structural) K2, K3 CO 3 Understand, analyze and apply oops concepts (i.e. abstraction, inheritance) K2, K3, K4 CO 4 Understand the basic concepts of C++ to implement the object oriented concepts K2, K3 CO 5 To understand the object oriented approach to implement real world problem
DISTRIBUTED SYSTEM	KDS 052	CO 2 To get knowledge in distributed architecture, naming, synchronization, consistency and replication, fault tolerance, security, and distributed file systems. K2 CO 3 To analyze the current popular distributed systems such as peer-to-peer (P2P) systems will also be analyzed. K4 CO 4 To know about Shared Memory Techniques and have Sufficient knowledge about the

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V SEM	CLOUD COMPUTING	KML051	CO 1 Describe architecture and underlying principles of cloud computing. K3 CO 2 Explain need, types and tools of Virtualization for cloud. K3, K4 CO 3 Describe Services Oriented Architecture and various types of cloud services. K2, K3 CO 4 Explain Inter cloud resources management cloud storage services and their providers Assess security services and standards for cloud computing. K2, K4 CO 5 Analyze advanced cloud technologies.
	NATURAL LANGUAGE PROCESSING	KAI 052	CO 1 To learn the fundamentals of natural language processing K1 , K2 CO 2 To understand the use of CFG and PCFG in NLP K1 , K2 CO 3 To understand the role of semantics of sentences and pragmatic K2 CO 4 To Introduce Speech Production And Related Parameters Of Speech. K1 , K2 CO 5 To Show The Computation And Use Of Techniques Such As Short Time Fourier Transform, Linear Predictive Coefficients And Other Coefficients In The Analysis Of Speech.
	APPLICATION OF SOFT COMPUTING	KCS 056	problem K2, K4 CO 2 Understand the concepts and techniques of soft computing and foster their abilities in designing and implementing soft computing based solutions for real-world and engineering problems. K2,K4, K6 CO 3 Apply neural networks to pattern classification and regression problems and compare solutions by various soft computing approaches for a given problem. K3, K5 CO 4 Apply fuzzy logic and reasoning to handle uncertainty and solve engineering problems K3, K4
	INTELLIGENT DATABASE SYSTEM	KAI 053	CO 1 Understand the concepts of Intelligent database. K2 CO 2 Make study of the Database installation then create the database with user and apply SQL. K2, K3 CO 3 Understand the concepts of knowledge-based systems and apply with AI K2, K3 CO 4 Design and create the small applications K5, K6 CO 5 Analyze and Implement for various real-time applications in Intelligent Database System

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COMPILER DESIGN	**KCS 502**	Acquire knowledge of different phases and passes of the compiler and able to use the compiler tools like LEX, YACC, etc. Students will also be able to design different types of compiler tools to meet the requirements of the realistic constraints of compilers. K3, K6 CO 2 Understand the parser and its types i.e. Top-Down and Bottom-up parsers and construction of LL, SLR, CLR, and LALR parsing table. K2, K6 CO 3 Implement the compiler using syntax-directed translation method and get knowledge about the synthesized and inherited attributes. K4, K5 CO 4 Acquire knowledge about run time data structure like symbol table organization and different techniques used in that. K2, K3 CO 5 Understand the target machine's run time environment, its instruction set for code generation and techniques used for code optimization.
DATABASE MANAGEMENT SYSTEMS LAB	**KCS 551**	Understand and apply oracle 11 g products for creating tables, views, indexes, sequences and other database objects. K2, K4 CO 2 Design and implement a database schema for company data base, banking data base, library information system, payroll processing system, student information system. K3, K5, K6 CO 3 Write and execute simple and complex queries using DDL, DML, DCL and TCL K4, K5 CO 4 Write and execute PL/SQL blocks, procedure functions, packages and triggers, cursors. K4, K5 CO 5 Enforce entity integrity, referential integrity, key constraints, and domain constraints
ARTIFICIAL INTELLIGENCE LAB	**KAI 551**	CO 1 Use of python to understand the concept of AI K3 CO 2 Implementation of Different AI Techniques K4, K5 CO 3 Application of AI techniques in practical Life K4 CO 4 Understanding of Natural Language Tool Kit. K2 CO 5 Practical Application of Natural Language Tool Kit

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DESIGN AND ANALYSIS OF ALGORITHM LA	KCS 553	CO 1 Implement algorithm to solve problems by iterative approach. K2, K4 CO 2 Implement algorithm to solve problems by divide and conquer approach K3, K5 CO 3 Implement algorithm to solve problems by Greedy algorithm approach. K4, K5 CO 4 Implement algorithm to solve problems by Dynamic programming, backtracking, branch and bound approach. K4, K5 CO 5 Implement algorithm to solve problems by branch and bound approach.
MACHINE LEARNING TECHNIQUES	KAI 601	CO 2 To understand a wide variety of learning algorithms and how to evaluate models generated from data K1 , K3 CO 3 To understand the latest trends in machine learning K2 , K3 CO 4 To design appropriate machine learning algorithms and apply the algorithms to a realworld problems K4 , K6 CO 5 To optimize the models learned and report on the expected accuracy that can be achieved by applying the models
WEB TECHNOLOGY	KCS 602	CO 1 Explain web development Strategies and Protocols governing Web. K1, K2 CO 2 Develop Java programs for window/web-based applications. K2, K3 CO 3 Design web pages using HTML, XML, CSS and JavaScript. K2, K3 CO 4 Creation of client-server environment using socket programming K1, K2, CO 5 Building enterprise level applications and manipulate web databases using JDBC K3, K4 CO6 Design interactive web applications using Servlets and JSP
COMPUTER NETWORKS	KCS 603	and TCP/IP, networks devices and transmission media, Analog and digital data transmission K1,K2 CO2 Apply channel allocation, framing, error and flow control techniques. K3 CO3 Describe the functions of Network Layer i.e. Logical addressing, subnetting& Routing Mechanism. K2,K3 CO4 Explain the different Transport Layer function i.e. Port addressing, Connection Management, Error control and Flow control mechanism. K2,K3 CO5 Explain the functions offered by session and presentation layer and their implementation. K2,K3
CYBER FORENSIC ANALYTICS	KAI 061	CO 1 Outline the Cyber crime and its types. K1, K2 CO 2 Explore the Cyber Forensics Techniques K1, K2 CO 3 Use the Cyber Investigation Techniques K3, K4 CO 4 Explore the Cyber Evidence Management Techniques K3, K4 CO 5 Outline the Cyber Laws in India

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VI sem	IMAGE ANALYTICS	KDS 061	Infer the basics and fundamentals of digital image processing and Apply the various techniques for intensity transformations functions. Implement Color image Smoothing and Sharpening. K1, K2 CO 2 Illustrate Morphological operation and Apply Some Basic Morphological Algorithms. K2, K3 CO 3 Apply image segmentation techniques such as Optimum Global Thresholding using Otsu's Method, Active Contours: Snakes and Level Sets for various real-time applications. K3, K4 CO 4 Analysis various Feature Extraction methods and Implement for various real-time applications. K3, K4 CO 5 Apply and Analysis various Image Pattern Classification methods such as MinimumDistance Classification, Optimum (Bayes) Statistical Classification, and Deep Convolutional Neural Network
	ADVANCED MACHINE LEARNING	KML 061	CO 1 Understand advanced concepts and methods of machine learning and to develop an understanding of the role of machine learning in massive scale automation. K1, K2 CO 2 Apply various machine learning algorithms in a range of real-world applications. K3, K3 CO 3 Integrate and apply their expertise to produce solutions for real-world problems. K4, K5 CO 4 Comparative Analysis of different Machine Learning Algorithms K4 CO 5 Interpret and Analyze results with reasoning using different ML techniques
	STREAM PROCESSING AND ANALYTICS	KML 062 / KDS 053	CO 1 Explain the need for stream processing K1, K2 CO 2 Comprehend the architectures of stream processing. K2, K3 CO 3 Explain and run Distributed Processing and Resilience Model K1, K2 CO 4 Design effective streaming solutions using Structured Streaming K5, K6 CO 5 Design effective streaming solutions using Spark Streaming
	SOFTWARE ENGINEERING	KDS 063	Models. K1, K2 CO 2 Demonstrate the contents of a SRS and apply basic software quality assurance practices to ensure that design, development meet or exceed applicable standards. K1, K2 CO 3 Compare and contrast various methods for software design K2, K3 CO 4 Formulate testing strategy for software systems, employ techniques such as unit testing, Test driven development and functional testing. K3 CO 5 Manage software development process independently as well as in teams and make use of

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MACHINE LEARNING LAB	**KAI 651**	CO 1 Understand complexity of Machine Learning algorithms and their limitations; K5, K6 CO 2 Understand modern notions in data analysis-oriented computing; K5, K6 CO 3 Be capable of performing experiments in Machine Learning using real-world data. K5, K6 CO 4 Be capable of confidently applying common Machine Learning algorithms in practice and implementing their own;
WEB TECHNOLOGY LAB	**KCS 652**	CO 1 Develop static web pages using HTML K2, K3 CO 2 Develop Java programs for window/web-based applications. K2, K3 CO 3 Design dynamic web pages using Javascript and XML. K3, K4 CO 4 Design dynamic web page using server site programming Ex. ASP/JSP/PHP K3, K4 CO 5 Design server site applications using JDDC,ODBC and secti
COMPUTER NETWORKS LAB	**KCS 653**	CO 1 Simulate different network topologies. K3, K4 CO 2 Implement various framing methods of Data Link Layer. K3, K4 CO 3 Implement various Error and flow control techniques. K3, K4 CO 4 Implement network routing and addressing techniques. K3, K4 CO 5 Implement transport and security mechanisms
Optimization in Machine Learning	**KAI071**	CO 3 Can implement Newton's method and L-BFGS solvers for convex optimization problems, K3 , K4 CO 4 Can identify the trade-offs inherent in using first-order vs. second-order solvers for optimization problems arising in machine learning.K2 , K3 CO 5 Demonstrate competence with probability theory/statistics needed to formulate and solve machine learning problems.K2 , K4
Natural Language Processing	**KCS072**	CO 1 To learn the fundamentals of natural language processing K1 , K2 CO 2 To understand the use of CFG and PCFG in NLP K1 , K2 CO 3 To understand the role of semantics of sentences and pragmatic K2 CO 4 To Introduce Speech Production And Related Parameters Of Speech. K1 , K2 CO 5 To Show The Computation And Use Of Techniques Such As Short Time Fourier Transform, Linear Predictive Coefficients And Other Coefficients In The Analysis Of Speech. K3, K4
Text Analytics and Natural Language Proces	**KAI073**	CO 1 To understand the fundamentals of text analytics and natural language processing K2 CO 2 To learn understand the use of Natural Language Processing K2, K3 CO 3 To understand the role of semantics of sentences and pragmatic K3 , K4 CO 4 To Introduce Speech Production And Related Parameters Of Speech. K2 , K3 CO 5 To Show The Computation And Use Of Techniques Such As Short Time Fourier Transform, Linear Predictive Coefficients And Other Coefficients In The Analysis Of Speec

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Cryptography & Network Security	**KCS074**	cryptographic techniques.K2 , K3 CO 2Understand security protocols for protecting data on networks and be able to digitally sign emails and files.K1 , K2 CO 3 Understand vulnerability assessments and the weakness of using passwords for authentication K4 CO 4 Be able to perform simple vulnerability assessments and password audits K3
Design Data Warehousing and Data Mining	**KAI075**	CO 2 Understand and implement classical models and algorithms in data warehouses and data miningK3 CO 3Characterize the kinds of patterns that can be discovered by association rule mining, classification and clustering. K1 , K2 CO 4 Master data mining techniques in various applications like social, scientific and environmental
Time series analysis and Forecasting	**KAI076**	CO 2 Know basic concepts of univariate time series analysis; build appropriate econometric time series models. K3, K4 CO 3 Know basic concepts of multivariate time series analysis; build appropriate econometric time series models. K1 , K2 CO 4 Understand limitation and relevance of the models. K1 , K2
Software Engineering	**KAI077**	CO 2 To understand fundamental concepts of requirements engineering and Analysis Modeling. K2 CO 3 To understand the different design techniques and their implementation. K2, K3 CO 4 To learn various testing measures. K2 ,K4 CO 5 To learn various maintenance and project management techniques. K2, K3
Nature-Inspired Computing:	**KAI078**	CO 1 The basics of Natural systems K1 , K2 CO 2 The concepts of Natural systems and its applications K1 , K2 CO 3 Basic Natural systems functions(operations) K2 CO 4 Natural design considerations. K2 , K3 CO 5 Integration of Hardware and software in Natural applications. K3, K6
Distributed Computing System	**KAI079**	CO 1 Define the characterization of Distributed Systems, Theoretical Foundation for Distributed System and Concepts in Message Passing Systems. K1 , K2 CO 2 Explain the Distributed Mutual Exclusion and Distributed Deadlock Detection. K3 CO 3 Apply the Agreement Protocols and Distributed Resource Management. K4 CO 4 Analyze the Failure Recovery in Distributed Systems and Fault Tolerance. K2 CO 5 Evaluate the Transactions and Concurrency Control, Distributed Transactions and Replication K1

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VII & VIII	Quantum Computing	KCS710	are rendered tractable by quantum computation with reference to the relevant concepts in quantum theory. K1 , K2 CO 2 Demonstrate an understanding of a quantum computing algorithm by simulating it on a classical computer, and state some of the practical challenges in building a quantum computer. K2 , K3 CO 3 Contribute to a medium-scale application program as part of a co-operative team, making use of appropriate collaborative development tools (such as version control systems). K2 , K3 CO 4 Produce code and documentation that is comprehensible to a group of different programmers and present the theoretical background and results of a project in written and verbal form. K3 , K4 CO 5 Apply knowledge, skills, and understanding in executing a defined project of research, development, or investigation and in identifying and implementing relevant outcomes. K3, K6
	Mobile Computing	KCS711	telephony and channel allocation in cellular systems. K1, K4 CO 2 Explore the concept of Wireless Networking and Wireless LAN. K1 CO 3 Analyse and comprehend Data management issues like data replication for mobile computers, adaptive clustering for mobile wireless networks and Disconnected operations. K4 CO 4 Identify Mobile computing Agents and state the issues pertaining to security and fault tolerance in mobile computing environment. K1, K2 CO 5 Compare and contrast various routing protocols and will identify and interpret the
	Internet of Things	KCS712	CO 1 Demonstrate basic concepts, principles and challenges in IoT. K1,K2 CO 2 Illustrate functioning of hardware devices and sensors used for IoT. K2 CO 3 Analyze network communication aspects and protocols used in IoT. K4 CO 4 Apply IoT for developing real life applications using Ardunio programming. K3 CP 5 To develop IoT infrastructure for popular applications K2, K3

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Cloud Computing	**KCS713**	CO 1 Describe architecture and underlying principles of cloud computing. K3 CO 2 Explain need, types and tools of Virtualization for cloud. K3, K4 CO 3 Describe Services Oriented Architecture and various types of cloud services. K2, K3 CO 4 Explain Inter cloud resources management cloud storage services and their providers Assess security services and standards for cloud computing. K2, K4 CO 5 Analyze advanced cloud technologies. K3, K6
Block chain Architecture Design	**KCS714**	K2 CO 2 Explain the requirements for basic protocol along with scalability aspects. K2, K3 CO 3 Design and deploy the consensus process using frontend and backend. K3, K4 CO 4 Apply Blockchain techniques for different use cases like Finance, Trade/Supply and Government activities. K4, K5
Mini Project or Internship Assessment	**KCS354/KCS554/KC**	CO 1 Developing a technical artifact requiring new technical skills and effectively utilizing a new software tool to complete a task K4 , K5 CO 2 Writing requirements documentation, Selecting appropriate technologies, identifying and creating appropriate test cases for systems. K5 , K6 CO 3 Demonstrating understanding of professional customs & practices and working with professional standards. K4 , K5 CO 4 Improving problem-solving, critical thinking skills and report writing. K4 , K5 CO 5 Learning professional skills like exercising leadership, behaving professionally, behaving ethically, listening effectively, participating as a member of a team, developing appropriate workplace attitudes. K2, K

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	Project	**KCS753/KCS851**	programming solution. K4 , K5 CO 2 Engage in the creative design process through the integration and application of diverse technical knowledge and expertise to meet customer needs and address social issues. K4 , K5 CO 3 Use the various tools and techniques, coding practices for developing real life solution to the problem. K5 , K6 CO 4 Find out the errors in software solutions and establishing the process to design maintainable software applications

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PROGRAM OUTCOME (PO), PROGRAM SPECIFIC OUTCOME (PSO) (2023-24)

BTECH ARTIFICIAL INTELLIGENCE & DATA SCIENCE

PROGRAMME OUTCOME

1) **PO1:** Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2) **PO2:** Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3) **PO3:** Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4) **PO4:** Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5) **PO5:** Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6) **PO6:** The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7) **PO7:** Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8) **PO8:** Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9) **PO9:** Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10) **PO10:** Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11) **PO11:** Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12) **PO12:** Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES

PSO 1: Understand, analyze, and develop innovative solutions for real world problems in industry and research establishments related to Artificial Intelligence and Data Science

PSO 2: Ability to develop skills to address and solve social and environmental problem with ethics and perform multidisciplinary projects with advance technologies and tools.

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COURSE OUTCOME

SEMESTER	COURSE NAME	COURSE CODE	COURSE OUTCOME
	ENGINEERING PHYSICS	BAS101 / BAS201	CO1:To explain the distribution of energy in black body radiation and to understand the difference in particle and wave nature with explanation of Compton effect and Schrodinger wave equation. CO2:To understand the concept of displacement current and consistency of Ampere's law and also the properties of electromagnetic waves in different medium with the use of Maxwell's equations. CO3:To understand the behavior of waves through various examples/applications of interference and diffraction phenomenon and the concept of grating and resolving power. CO4 To know the functioning of optical fiber and its properties and applications. To understand the concept, properties and applications of Laser. CO5 To know the properties and applications of superconducting materials and nano materials.
	ENGINEERING CHEMISTRY	BAS102 / BAS202	CO-1 Get an understanding of the theoretical principles of chemistry of molecular structure, bonding and properties, Chemistry of advanced materials (liquid crystals, Nanomaterials, Graphite & Fullerene) as well as the Principles of Green Chemistry. CO-2 Apply the fundamental concepts of determination of structure with various spectral techniques and stereochemistry. CO-3 Utilize the theory of construction of electrodes, batteries and fuel cells in redesigning new engineering products and categorize the reasons for corrosion and study methods to control corrosion and develop understanding of Chemistry of Engineering materials (Cement). CO-4 Develop understanding of the causes, impurities and hardness of water, apply the

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ENGINEERING MATHEMATICS-	BAS103	CO 1 Understand the concept of complex matrices, Eigen values, Eigen vectors and apply the concept of rank to evaluate linear simultaneous equations CO 2 Remember the concept of differentiation to find successive differentiation, Leibnitz Theorem, and create curve tracing, and find partial and total derivatives CO 3 Applying the concept of partial differentiation to evaluate extrema, series expansion, error approximation of functions and Jacobians CO 4 Remember the concept of Beta and Gamma function; analyze area and volume and Dirichlet's theorem in multiple integral CO 5 Apply the concept of Vector Calculus to analyze and evaluate directional derivative, line, surface and volume integrals.
: ENGINEERING MATHEMATICS-II	BAS203	CO 1 Remember the concept differentiation to evaluate LDE of nth order with constant coefficient and LDE with variable coefficient of 2nd order. CO 2 Understand and apply the concept of Laplace Transform to evaluate differential equations CO 3 Understand the concept of convergence to analyze the convergence of series and expansion of the function for Fourier series. CO 4 Apply the concept of analyticity, Harmonic function and create the image of function applying conformal transformation CO 5 Apply the concept of Cauchy Integral theorem, Cauchy Integralformula, singularity and calculus of residue to evaluate integrals
: FUNDAMENTALS OF ELECTRICAL ENGINEERING	BEE101 / BEE201	CO 1 Apply the concepts of KVL/KCL and network theorems in solving DC circuits. CO 2 Analyze the steady state behavior of single phase and three phase AC electrical circuits. CO 3Identify the application areas of a single phase two winding transformer as well as an auto transformer and calculate their efficiency. Also identify the connections of a three phase transformer. CO 4 Illustrate the working principles of induction motor, synchronous machine as well as DC machine and employ them in different area of applications. CO 5 Describe the components of low voltage electrical installations and perform elementary calculations for energy consumption.

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SEM I & SEM II	FUNDAMENTALS OF ELECTRONICS ENGINEERING	BEC101 / BEC201 :	1. Describe the concept of PN Junction and devices. 2. Explain the concept of BJT, FET and MOFET. 3. Apply the concept of Operational amplifier to design linear and non-linear applications. 4. Perform number systems conversions, binary arithmetic and minimize logic functions. 5. Describe the fundamentals of communication technologies.
	PROGRAMMING FOR PROBLEM SOLVIN	BCS101 / BCS201	CO 1 To Develop Simple Algorithms for Arithmetic and Logical Problems. K2, K3 CO 2 To Translate the Algorithms to Programs & Execution (in C Language). K3 CO 3 To Implement Conditional Branching, Iteration and Recursion. K3 CO 4 To Decompose a Problem into Functions and Synthesize a Complete Program Using Divide and Conquer Approach. K4 CO 5 To Use Arrays, Pointers and Structures to Develop Algorithms and Programs. K2, K
	FUNDAMENTALS OF MECHANICAL ENGINEERING	BME101 / BME201:	CO1 Apply the concept of force resolution and stress and strain to solve basic problems K3 CO2 Understand the construction details and working of internal combustion engines, electric vehicle and hybrid vehicles. K2 CO3 Explain the construction detail and working of refrigerator, heat pump and airconditioner. K2 CO4 Understand fluid properties, conservation laws and hydraulic machinery used in real life. K2 CO5 Understand the working principle of different measuring instrument and
	ENVIRONMENT AND ECOLOGY	BAS104 / BAS204:	CO-1 Gain in-depth knowledge on natural processes that sustain life, and govern economy.CO-2 Estimate and Predict the consequences of human actions on the web of life, global economy and quality of human life. CO-3 Develop critical thinking for shaping strategies (scientific, social, economic and legal) for environmental protection and conservation of biodiversity, social equity and sustainable development. CO-4 Acquire values and attitudes towards understanding complex environmentaleconomic social challenges, and participate actively in solving current environmental problems and preventing the future ones.
	: SOFT SKILLS	BAS105 / BAS205	2. Demonstrate active listening with comprehension, and the ability to write clear and wellstructured emails and proposals. 3. Learn the use of correct body language and tone of voice to enhance communication. 4. Acquire the skills necessary to communicate effectively and deliver presentations with clarity and impact

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: ENGINEERING PHYSICS LAB	BAS151 / BAS251	CO-1 Apply the principle of interference and diffraction to find the wavelength of monochromatic and polychromatic light. Apply CO-2 Compute and analyze various electrical and electronic properties of a given material by using various experiments. Analyze CO-3 Verify different established laws with the help of optical and electrical experiments. Apply CO-4 Determine and calculate various physical properties of a given material by using various experiments. Apply CO-5 Study and estimate the performance and parameter of given equipment by using graphical and computational analysis.
ENGINEERING CHEMISTRY LAB	BAS152 / BAS252	CO-1 Get an understanding of the use of different analytical instruments. CO-2 Measure the molecular / system properties such as surface tension, viscosity, conductance of solution, chloride and iron content in the water. CO-3 Measure the hardness and alkalinity of the water. CO-4 Know the fundamental concepts of the preparation of phenol formaldehyde & urea formaldehyde resin, adipic acid and Paracetamol. CO-5 Estimate the rate constant of reaction.
BASIC ELECTRICAL ENGINEERING LAB	BEE151 / BEE251	CO 1 Conduct experiments illustrating the application of KVL/KCL and network theorems to DC electrical circuits. K3 CO 2 Demonstrate the behavior of AC circuits connected to single phase AC supply and measure power in single phase as well as three phase electrical circuits. K4 CO 3 Perform experiment illustrating BH curve of magnetic materials. K3 CO 4 Calculate efficiency of a single phase transformer and DC machine. K4 CO 5Perform experiments on speed measurement and reversal of direction of three phase induction motor and Identify the type of DC and AC machines based on their construction

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: PROGRAMMING FOR PROBLEM SOLVING LAB	BCS151 / BCS251	CO 1 Able to implement the algorithms and draw flowcharts for solving Mathematical and Engineering problems. CO 2 Demonstrate an understanding of computer programming language concepts. K3, K2 CO 3Ability to design and develop Computer programs, analyzes, and interprets the concept of pointers, declarations, initialization, operations on pointers and their usage. CO 4 Able to define data types and use them in simple data processing applications he/she must be able to use the concept of array of structures. CO 5 Develop confidence for self-education and ability for life-long learning needed for Computer language
ENGLISH LANGUAGE LAB	BAS155 / BAS255	1. Students will be enabled to understand the basic objective of the course by being acquainted with specific dimensions of communication skills i.e. Reading, Writing, Listening, Thinking and Speaking. 2. Students would be able to create substantial base by the formation of strong professional vocabulary for its application at different platforms and through numerous modes as Comprehension, reading, writing and speaking etc. 3. Students will apply it at their work place for writing purposes such as Presentation/official drafting/administrative communication and use it for document/project/report/research paper writing. 4. Students will be made to evaluate the correct and error-free writing by being well-versed in rules of English grammar and cultivate relevant technical style of communication &presentation at their work place and also for academic uses. 5. Students will apply it for practical and oral presentation purposes by being honed up in presentation skills and voice-dynamics. They will apply techniques for developing interpersonal
ENGINEERING GRAPHICS & DESIGN LAB	BCE151/ BCE251:	CO 1: Use scales and draw projections of objects. CO 2: Explain views of solids and their sectional surfaces. CO 3: Analyze and draw isometric projections of objects. CO 4: Demonstrate orthographic representation of perspective views using modern tools. CO 5: Apply AutoCAD software for creation of engineering drawing and models
WORKSHOP PRACTICE LAB	WS151/ BWS251	CO1 Use various engineering materials, tools, machines and measuring equipments. K3 CO2 Perform machine operations in lathe and CNC machine. K3 CO3 Perform manufacturing operations on components in fitting and carpentry shop. K3 CO4 Perform operations in welding, moulding, casting and gas cutting. K3 CO5 Fabricate a job by 3D printing manufacturing technique

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III SEM	DATA STRUCTURE	BCS301	CO 1 Describe how arrays, linked lists, stacks, queues, trees, and graphs are represented in memory, used by the algorithms and their common applications. K1, K2 CO 2 Discuss the computational efficiency of the sorting and searching algorithms. K2 CO 3 Implementation of Trees and Graphs and perform various operations on these data structure. K3 CO 4 Understanding the concept of recursion, application of recursion and its implementation and removal
	COMPUTER ORGANIZATION AND ARCHITECTURE	BCS302	CO 1 Study of the basic structure and operation of a digital computer system. K1, K2 CO 2 Analysis of the design of arithmetic & logic unit and understanding of the fixed point and floating-point arithmetic operations. K2, K4 CO 3 Implementation of control unit techniques and the concept of Pipelining K3 CO 4 Understanding the hierarchical memory system, cache memories and virtual memory K2 CO 5 Understanding the different ways of communicating with I/O devices and standard I/O
	Discrete Structures & Theory of Logic	BCS303	CO 1 Acquire Knowledge of sets and relations for solving the problems of POSET and lattices. K3, K4 CO 2 Apply fundamental concepts of functions and Boolean algebra for solving the problems of logical abilities. K1, K2 CO 3 Employ the rules of propositions and predicate logic to solve the complex and logical problems. K3 CO 4 Explore the concepts of group theory and their applications for solving the advance
	Operating system	BCS401	CO 1 Understand the structure and functions of OS K1, K2 CO 2 Learn about Processes, Threads and Scheduling algorithms. K1, K2 CO 3 Understand the principles of concurrency and Deadlocks K2 CO 4 Learn various memory management scheme K2 CO 5 Study I/O management and File systems. K2,K4

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IV SEM	**Theory of Automata and Formal Languages**	**BCS402**	CO 1 Analyse and design finite automata, pushdown automata, Turing machines, formal languages, and grammars K4, K6 CO 2 Analyse and design, Turing machines, formal languages, and grammars K4, K6 CO 3 Demonstrate the understanding of key notions, such as algorithm, computability, decidability, and complexity through problem solving K1, K5 CO 4 Prove the basic results of the Theory of Computation. K2,K3
	Object Oriented Programming with Java	**BCS403**	CO 1 Develop the object-oriented programming concepts using Java K3, K4 CO 2 Implement exception handling, file handling, and multi-threading in Java K2,K4 CO 3 Apply new java features to build java programs. K3 CO 4 Analyse java programs with Collection Framework K4 CO 5 Test web and RESTful Web Services with Spring Boot using Spring Framework concepts K5
	Database Management System	**KCS501**	K4 CO 3 Identify and solve the redundancy problem in database tables using normalization. K2, K3 CO 4Understand the concepts of transactions, their processing so they will familiar with broad range of database management issues including data integrity, security and recovery.K2, K4 CO 5 Design, develop and implement a small database project using database tools. K3, K6
	Artificial Intelligence	**KAI 501**	and about intelligent agents.K2 CO 2 Understand search techniques and gaming theory. K2, K3 CO 3 The student will learn to apply knowledge representation techniques and problem solving strategies to common AI applications.K3 , K4 CO 4 Student should be aware of techniques used for classification and clustering. K2 , K3 CO 5 Student should aware of basics of pattern recognition and steps required for it. K2 , K4

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V sem	Design and Analysis of Algorithm	KCS503	runtime and memory demands.K4, K6 CO 2 Find an algorithm to solve the problem (create) and prove that the algorithm solves the problem correctly (validate).K5, K6 CO 3 Understand the mathematical criterion for deciding whether an algorithm is efficient, and know many practically important problems that do not admit any efficient algorithms.K2, K5 CO 4 Apply classical sorting, searching, optimization and graph algorithms. K2, K4 CO 5 Understand basic techniques for designing algorithms, including the techniques of
	Mathematical Foundation AI , ML and Data Science	KAI051	density estimations to perform analysis of various kinds of data. K2, K4, K6 CO 2Understand and manipulate data, design and perform simple Monte Carlo experiments, and be able to use resampling methods K5, K6 CO 3 Perform statistical analysis on variety of data K2, K5 CO 4 Perform appropriate statistical tests using R and visualize the outcome K2, K4 CO 5Discuss the results obtained from their analyses after creating customized graphical and
	Web Designing	KCS052	CO 2 Visualize and Recognize the basic concept of HTML and application in web designing. K1, K2 CO 3 Recognize and apply the elements of Creating Style Sheet (CSS). K2, K4 CO 4 Understand the basic concept of Java Script and its application. K2, K3 CO 5 Introduce basics concept of Web Hosting and apply the concept of SEO K2, K3
	Business Intelligence and Analytics	KDS051	CO 1 Understand the essentials of BI & data analytics and the corresponding terminologiesK2 CO 2 Analyze the steps involved in the BI - Analytics process K3, K4 CO 3 illustrate competently on the topic of analytics K2, K3 CO 4 Understand & Implement the K-Means Clustering with Iris Dataset K2, K3 CO 5 Demonstrate the real time scenario (Case study) by using BI & Analytics techniquesK5, K6
	Object Oriented System Design	KCS054	programming to implement application K2, K4 CO 2 Understand, analyze and apply the role of overall modeling concepts (i.e. System, structural) K2, K3 CO 3 Understand, analyze and apply oops concepts (i.e. abstraction, inheritance) K2, K3, K4 CO 4 Understand the basic concepts of C++ to implement the object oriented concepts K2, K3 CO 5 To understand the object oriented approach to implement real world problem. K2, K3

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DISTRIBUTED SYSTEM **ion and Deadlock.**	**KDS052**	CO 2 To get knowledge in distributed architecture, naming, synchronization, consistency and replication, fault tolerance, security, and distributed file systems. K2 CO 3 To analyze the current popular distributed systems such as peer-to-peer (P2P) systems will also be analyzed. K4 CO 4 To know about Shared Memory Techniques and have Sufficient knowledge about file
Cloud Computing	**KML051**	CO 2 Explain need, types and tools of Virtualization for cloud. K3, K4 CO 3 Describe Services Oriented Architecture and various types of cloud services. K2, K3 CO 4Explain Inter cloud resources management cloud storage services and their providers Assess security services and standards for cloud computing.K2, K4 CO 5 Analyze advanced cloud technologies. K3, K6
Natural Language Processing	**KAI052**	CO 1 To learn the fundamentals of natural language processing K1 , K2 CO 2 To understand the use of CFG and PCFG in NLP K1 , K2 CO 3 To understand the role of semantics of sentences and pragmatic K2 CO 4 To Introduce Speech Production And Related Parameters Of Speech. K1 , K2 CO 5 To Show The Computation And Use Of Techniques Such As Short Time Fourier Transform, Linear Predictive Coefficients And Other Coefficients In The Analysis Of Speech. K3, K4
Application of Soft Computing	**KCS056**	problem K2, K4 CO 2Understand the concepts and techniques of soft computing and foster their abilities in designing and implementing soft computing based solutions for real-world and engineering problems.K2,K4, K6 CO 3Apply neural networks to pattern classification and regression problems and compare solutions by various soft computing approaches for a given problem.K3, K5
Intelligent Database System	**KAI053**	CO 1 Understand the concepts of Intelligent database. K2 CO 2 Make study of the Database installation then create the database with user and apply SQL K2, K3 CO 3 Understand the concepts of knowledge-based systems and apply with AI K2, K3 CO 4 Design and create the small applications K5, K6 CO 5 Analyse and Implement for various real-time applications in Intelligent Database System K4, K5

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	Compiler Design	**KCS502**	compiler tools like LEX, YACC, etc. Students will also be able to design different types of compiler tools to meet the requirements of the realistic constraints of compilers.K3, K6 CO 2 Understand the parser and its types i.e. Top-Down and Bottom-up parsers and construction of LL, SLR, CLR, and LALR parsing table. K2, K6 CO 3 Implement the compiler using syntax-directed translation method and get knowledge about the synthesized and inherited attributes.K4, K5 CO 4 Acquire knowledge about run time data structure like symbol table organization and different techniques used in that.K2, K3
	Data Analytics	**KAD601**	CO 2 Apply classification and regression techniques K3 CO 3 Explain and apply mining techniques on streaming data K2, K3 CO 4 Compare different clustering and frequent pattern mining algorithms K4 CO 5 Describe the concept of R programming and implement analytics on Big data using R. K2,K3
	Web Technology	**KCS602**	CO 1 Explain web development Strategies and Protocols governing Web. K1, K2 CO 2 Develop Java programs for window/web-based applications. K2, K3 CO 3 Design web pages using HTML, XML, CSS and JavaScript. K2, K3 CO 4 Creation of client-server environment using socket programming K1, K2, CO 5 Building enterprise level applications and manipulate web databases using JDBC K3, K4 CO6 Design interactive web applications using Servlets and JSP K2, K3
	Computer Networks	**KCS603**	and TCP/IP, networks devices and transmission media, Analog and digital data transmission K1,K2 CO2 Apply channel allocation, framing, error and flow control techniques. K3 CO3 Describe the functions of Network Layer i.e. Logical addressing, subnetting & Routing Mechanism. K2,K3 CO4 Explain the different Transport Layer function i.e. Port addressing, Connection Management, Error control and Flow control mechanism. K2,K3 CO5 Explain the functions offered by session and presentation layer and their Implementation. K2,K3 CO6 Explain the different protocols used at application layer i.e. HTTP, SNMP, SMTP, FTP,

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VI SEM	Cyber Forensic analytics	KAI061	CO 1 Outline the Cyber crime and its types. K1, K2 CO 2 Explore the Cyber Forensics Techniques K1, K2 CO 3 Use the Cyber Investigation Techniques K3, K4 CO 4 Explore the Cyber Evidence Management Techniques K3, K4 CO 5 Outline the Cyber Laws in India K1, K
	Image Analytics	KDS061	techniques for intensity transformations functions. Implement Color image Smoothing and Sharpening. K1, K2 CO 2 Illustrate Morphological operation and Apply Some Basic Morphological Algorithms. K2, K3 CO 3 Apply image segmentation techniques such as Optimum Global Thresholding using Otsu's Method, Active Contours: Snakes and Level Sets for various real-time applications. K3, K4 CO 4 Analysis various Feature Extraction methods and Implement for various real-time applications. K3, K4 CO 5 Apply and Analysis various Image Pattern Classification methods such as Minimum-Distance Classification, Optimum (Bayes) Statistical Classification, and Deep Convolutional Neural
	Machine Learning Techniques	KAD061	CO 2 To understand a wide variety of learning algorithms and how to evaluate models generated from data K1 , K3 CO 3 To understand the latest trends in machine learning K2 , K3 CO 4 To design appropriate machine learning algorithms and apply the algorithms to a real-world problems K4 , K6 CO 5 To optimize the models learned and report on the expected accuracy that can be achieved by
	Stream Processing and Analytics	KML062	CO 1 Explain the need for stream processing K1, K2 CO 2 Comprehend the architectures of stream processing. K2, K3 CO 3 Explain and run Distributed Processing and Resilience Model K1, K2 CO 4 Design effective streaming solutions using Structured Streaming K5, K6 CO 5 Design effective streaming solutions using Spark Streaming K5, K

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Software Engineering	**KDS063**	Models. K1, K2 CO 2 Demonstrate the contents of a SRS and apply basic software quality assurance practices to ensure that design, development meet or exceed applicable standards. K1, K2 CO 3 Compare and contrast various methods for software design K2, K3 CO 4 Formulate testing strategy for software systems, employ techniques such as unit testing, Test driven development and functional testing. K3 CO 5 Manage software development process independently as well as in teams and make use of

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