Details of Course Outcome

Sl. No.	Particulars	Page No.
02	List of Course Outcome of Courses taught in Civil Engineering	1-9
03	List of Course Outcome of Courses taught in Computer Science & Engineering	10-19
04	List of Course Outcome of Courses taught in Electrical & Communication Engineering	20-35
05	List of Course Outcome of Courses taught in Electrical & Electronics Engineering	36-46
06	List of Course Outcome of Courses taught in Information Science & Engineering	47-62
07	List of Course Outcome of Courses taught in Mechanical Engineering	63-90

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(Affiliated to Visvesvaraya Technological University, Belagavi& Approved by AICTE, New Delhi.)
(Accredited by NAAC with "A" Grade)
(ISO 9001 – 2015 & ISO14001 – 2015 Certified)
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Department of Civil Engineering

Course outcomes

22 Scheme
I Year Civil Engineering

Course code	Course title	Cours Outcome
BCIVC103/203	ENGINEERING MECHANICS	CO1-Compute the resultant of a force system and resolution of a force. CO2-Comprehend the action for forces, moments, and other types of loads on rigid bodies and compute the reactive forces. CO3-Analyse the frictional resistance offered by different planes. CO4-Locate the centroid and compute the moment of inertia of sections. CO5-Analyze the bodies in motion.

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II Year Civil Engineering

Course code	Course title	Cours Outcome
BCV301	STRENGTH OF MATERIALS	1. Evaluate the simple stresses, strains, and compound stresses 2. Calculate the Bending moments, shear force and draw BMD, SFD for various types of beams and loadings. 3. Analyse the bending stress, shear stress and torsional stress in beams and shafts with different cross sections. 4. Evaluate the deflection in beams and determine the stability of the columns. 5. Evaluate the behaviour and strength of structural elements under the action of compound stresses and stresses in thin and thick cylinders. .
BCV302	Engineering Survey	1. Summarize various types of surveying and carry out distance measurement using various equipment's. 2. Illustrate the use and applications of levelling and theodolite. 3. Plot contours, longitudinal and cross sections for construction projects. 4. Set curves for construction works and carry out estimation of areas and volumes. 5.Demonstrate the necessary skills to carry out GPS and DRONE Surveying
BCV303	Engineering Geology	1. Apply geological knowledge in different civil engineering practice. 2. Acquire knowledge on durability and competence of foundation rocks, and will be able to use the best building materials. 3. Students will become competent enough for the safety, stability, economy, and life of the structures that they construct. 4. Able to solve various issues related to ground water exploration, build up dams, bridges, tunnels which are often confronted with ground water problems. 5. Students will become Intelligent enough to apply GIS, GPS, and remote sensing as a latest tool in different civil engineering for safe and solid construction.
BCV304	Water Supply and Wastewater Engineering	1.Estimate the average and peak water demand for a community. 2. Evaluate water quality and environmental significance of various parameters and plan suitable treatment system. 3. Design the different units of water treatment plant. 4. Design the various units of wastewater treatment plant. 5. Design of various AOPs and low-cost treatment units.
BCV305	Computer Aided Building Planning and Drawing	1. Prepare, read, and interpret the drawings in a professional set up. 2. Know the procedures of submission of drawings and Develop working and submission drawings for building. 3. Plan of residential or public building as per the given requirements.

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BCV306B	Geospatial Techniques in Practice	1.Comprehend different geospatial techniques in the Construction Industry. 2. Understand the application of geospatial equipment like Total Station, GNSS, LIDAR, UAV (Drones), etc., 3. Evaluate the various spatial analysis operations by using GIS Environment. 4. Create a map layout with all essential cartographic elements in GIS Environment. 5. Illustrate the various geospatial emerging trends of GIS in Industry
BCV358A	Data Analytics with Excel	1. Prepare the data sets and perform the analysis. 2. Analyse and perform repetitive calculations using several functions. 3. Design and apply solutions to verify the data sets
BCV401	Analysis of Structures	1. identify the different forms of structural systems and analyse the trusses. 2. Evaluate the slope and deflections in beams, frames, and trusses by using moment area method and energy principle. 3. Analyse and determine the stress resultants inarches and cables. 4. Analyse the indeterminate structures and construct BMD AND SFD using slope deflection methods. 5. Analyse the indeterminate structures and construct BMD AND SFD using Moment Distribution Method.
BCV402	Fluid Mechanics and Hydraulics	1. Explain the fundamental properties of fluids and solve problems on fluid pressure and hydrostatics. 2. Apply the principles of kinematics and dynamics of fluid flow to solve problems on velocity and pressure. 3. Compute the discharge through pipes, notches and weirs. 4. Design the turbines and open channels of different sections and to estimate the energy loss in hydraulic jump. 5. Able to interpret the experimental results of discharge, efficiency based on the test conducted in the laboratory
BCV403	Transportation Engineering	1. Explain the basic principles of geometric design in the context of transportation engineering and planning. 2. Select the appropriate pavement materials for construction and design the pavement as per standard practices. 3. Conduct traffic studies and analyse traffic data for practical applications. 4. Identify the Components parts of Railway Track and design the suitable runway for an airport. 5. Able to interpret the experimental results of highway materials based on laboratory tests and design the pavement as per IRC guidelines.

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BCVL404	Building Materials Testing Laboratory	1. Analyze the physical characteristics, and behavior of common building materials. 2.Reproduce the Basic knowledge of mathematics and engineering in finding the strength in tension compression shear and torsion for steel 3. Evaluate the impact of engineering solutions on the society and will be aware of contemporary issues regarding. 4. Recognize the importance of ethical conduct, integrity, and accuracy in materials testing.
BCV405C	Concreting Techniques and Practices	1.Evaluate the properties of concrete by conducting test on cement, aggregate and concrete (with & without admixtures) for using the data for Mix design procedures. 2. Understand to Select and proportionate different materials used in a concrete mix including admixtures. 3. Design a concrete mix as per requirement of construction project. 4. Apply the best practices in concrete construction from industry's requirement, thumb rules, mitigation of concreting issues at Sites.
BCVL456A	Building Information Modelling in Civil Engineering - Basic	1. Prepare, read, and interpret the drawings in a professional set up. 2. Know the procedures of submission of drawings and Develop working and submission drawings for building. 3. Plan of residential or public building as per the given requirements with details

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III Year Civil Engineering

21CV51	Hydrology and Water Resource Engineering	1. Provide a background in the theory of hydrological processes and their measurement 2. Estimate runoff and develop unit hydrographs. 3. Find the water requirement and frequency of irrigation for various crops. 4. Find the canal capacity and compute the reservoir capacity. 5. Analyse floods and droughts. Emphasise on the importance of conservation of water and water bodies.
21CV52	Transportation Engineering	1.Acquire the capability of proposing a new alignment or re-alignment of existing roads, conduct necessary field investigation for generation of required data. 2. Evaluate the engineering properties of the materials and suggest the suitability of the same for pavement construction. 3. Design road geometrics, structural components of pavement and drainage. 4. Evaluate the highway economics by few select methods and will have a basic knowledge of various highway financing concepts.
21CV53	Design of RC Structural Elements	1.Understand the design philosophy and principles. 2. Solve engineering problems of RC elements subjected to flexure, shear, and torsion. 3. Demonstrate the procedural knowledge in designs of RC structural elements such as slabs, columns and footings. 4. Owns professional and ethical responsibility.
21CV54	Geotechnical Engineering	1.Determine the index properties of soil and hence classify the soil 2. Assess the compaction and consolidation characteristics of soil 3. Determine the permeability of soils and assess the seepage in hydraulic structures 4. Evaluate shear parameters of the soil using shear tests 5. Ability to determine bearing capacity of soil and achieve proficiency in proportioning shallow isolated and combined footings for uniform bearing pressure
21CVL55	Geotechnical Engineering Laboratory	1.Physical and index properties of the soil 2. Classify based on index properties and field identification 3. To determine OMC and MDD, plan and assess field compaction program 4. Shear strength and consolidation parameters to assess strength and deformation characteristics 5. In-situ shear strength characteristics (SPT-Demonstration)

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21CIV57	Environmental Studies	1. Understand the principles of ecology and environmental issues that apply to air, land, and water issues on a global scale. 2. Develop critical thinking and/or observation skills, and apply them to the analysis of a problem or question related to the environment. 3. Demonstrate ecology knowledge of a complex relationship between biotic and a biotic component. 4. Apply their ecological knowledge to illustrate and graph a problem and describe the realities that managers face when dealing with complex issues.
21CV582	Software Applications	1. Determine the forces in the truss members 2. Analyse and design the truss 3. Analyse and design industrial structures
21CV61	Construction Management and Entrepreneurship	1. Understand various management principles of construction industry. 2.Use planning, organizing, scheduling, monitoring, and controlling techniques for managing construction activity. 3.Understand importance of quality control and safety in construction. 4. Understand managing data pertaining to construction project. 5. Evaluate alternatives and develop capital budget for different scenarios.
21CV62	Concrete Technology	1.Assess and infer various properties of cement, cementitious materials, Fine and coarse aggregate as per codal provision and specifications (L2) 2. Design the concrete mix for the given materials as per IS:10262-2019 provisions (L4) 3. Understand the manufacturing process and asses the quality of green (L2) 4. Describe the properties of fresh and hardened concrete – Strength and Durability aspects (L3) 5.Examine and Evaluate properties of Cement and Concrete
21CV63	Design Of Steel Structural Elements	1.Possess knowledge of Steel Structures Advantages and Disadvantages of Steel structures, steel code provisions and plastic behaviour of structural steel. 2. Understand the Concept of Bolted and Welded connections. 3. Understand the Concept of Design of compression members, built-up columns, and columns splices 4. Understand the Concept of Design of tension members, simple slab base and gusseted base. 5. Understand the Concept of Design of laterally supported and un-supported steel beams.
21CV642	Applied Geotechnical Engineering	1. Ability to planned and execute geotechnical site investigation. 2. Ability to determine bearing capacity of soil. 3. Ability to estimate factor of safety.

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21CV651	Remote Sensing and GIS	1. Understand and remember the principle of Remote Sensing (RS) and Geographical Information Systems (GIS) data acquisition and its applications. 2. Apply RS and GIS technologies in various fields of engineering and social needs 3. Analyse and evaluate the information obtained by applying RS and GIS technologies. 4. Create a feasible solution in the different fields of application of RS and GIS

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18CV71	Quality Surveying and Contract Management	1. Taking out quantities and work out the cost and preparation of abstract for the estimated cost for various civil engineering works. 2. Prepare detailed and abstract estimates for various road works, structural works and water supply and sanitary works. 3. Prepare the specifications and analyze the rates for various items of work. 4. Assess contract and tender documents for various construction works. 5. Prepare valuation reports of buildings
18CV72	Design of RCC and Steel Structures	1. Students will acquire the basic knowledge in design of RCC and Steel Structures. 2. Students will have the ability to follow design procedures as per codal provisions and skills to arrive at structurally safe RC and Steel members
18CV732	Air Pollution and Control	1. Identify the major sources of air pollution and understand their effects on health and environment. 2. Evaluate the dispersion of air pollutants in the atmosphere and to develop air quality models. 3. Ascertain and evaluate sampling techniques for atmospheric and stack pollutants. 4. Choose and design control techniques for particulate and gaseous emissions.
18CV742	Design Concept of Building Services	1. Describe the basics of house plumbing and waste water collection and disposal. 2. Discuss the safety and guidelines with respect to fire safety. 3. Describe the issues with respect to quantity of water, rain water harvesting and roof top harvesting. 4. Understand and implement the requirements of thermal comfort in buildings.
18CV753	Environmental Protection and Management	1. Appreciate the elements of Corporate Environmental Management systems complying to international environmental management system standards. 2. Lead pollution prevention assessment team and implement waste minimization options. 3. Develop, Implement, maintain and Audit Environmental Management systems for Organizations

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18CVL76	Computer Aided Detailing of Structures	Prepare detailed working drawings
18CVL77	Geotechnical Engineering Laboratory	1. Ability to planned and execute geotechnical site investigation. 2. Ability to determine bearing capacity of soil. 3. Ability to estimate factor of safety.
18CV81	Design of Pre-Stress concrete	1. Understand the requirement of PSC members for present scenario. 2. Analyse the stresses encountered in PSC element during transfer and at working. 3. Understand the effectiveness of the design of PSC after studying losses. 4. Capable of analyzing the PSC element and finding its efficiency. 5. Design PSC beam for different requirements.
18CV824	Rehabilitation and Retrofitting	1. Identify the causes for structural (Concrete) deterioration. 2. Assess the type and extent of damage and carry out damage assessment of structures through various types of tests. 3. Recommend maintenance requirements of the buildings and preventive measures against influencing factors. 4. Select suitable material and suggest an appropriate method for repair and rehabilitation.
18CVP83	Project Work Phase-2	Describe the project and be able to defend it. • Develop critical thinking and problem-solving skills. • Learn to use modern tools and techniques. • Communicate effectively and to present ideas clearly and coherently both in written and oral forms. • Develop skills to work in a team to achieve common goal. • Develop skills of project management and finance. • Develop skills of self-learning, evaluate their learning and take appropriate actions to improve it. • Prepare them for life-long learning to face the challenges and support the technological changes to meet the societal needs
18CVS84	Technical Seminar	Develop knowledge in the field of Civil Engineering and other disciplines through independent learning and collaborative study. • Identify and discuss the current, real-time issues and challenges in engineering & technology. • Develop written and oral communication skills. • Explore concepts in larger diverse social and academic contexts. • Apply principles of ethics and respect in interaction with others. Develop the skills to enable
18CVI85	Internship /Professional Practice	This course will enable students to get the field exposure

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DEPARTMENT OF CIVIL ENGINEERING

CO ATTAINMENT SUMMARY FILE

NAME	BHAVYA C H	SEM/SEC	4A	Year of study	2023-24	ODD/EVEN
COURSE	Fluid Mechanics and Hydraulics	CODE	BCV402	COURSE NAME	C103	EVEN

COURSE OUTCOMES. At the end of the Course students will be able to ....

CO-1	C103.1	Explain the fundamental properties of fluids and solve problems on fluid pressure and hydrostatics.
CO-2	C103.2	Apply the principles of kinematics and dynamics of fluid flow to solve problems on velocity and pressure.
CO-3	C103.3	Compute the discharge through pipes, notches and weirs
CO-4	C103.4	Design the turbines and open channels of different sections and to estimate the energy loss in hydraulic jump
CO-5	C103.5	Express the relationship between the motion of bodies and analyze bodies in motion.

Prerequisite Subjects: Fluid Mechanics and Hydraulics

COURSE ARTICULATION MATRIX-CO-PO MAPPING

GRADUATE ATTRIBUTES	Apply Knowledge	Analysis	Design	Investigation	Modern Tools	Society	Environment	Ethics	Team Work	Communication	Proj Mgmt Finance	Life Long Learn
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C103.1	1	3			-	-	-	-	-	-	-	2
C103.2	3	3	3	-	-	-	-	-	-	-	-	2
C103.3	3	1	3	3	-	-	-	-	-	-	-	2
C103.4	3	-	3	3	-	-	-	-	-	-	-	2
C103.5	3	-	3	3	-	-	-	-	-	-	-	2
#REF!	-	-	-	-	-	-	-	-	-	-	-	-
Average	2.60	2.33	3.00	3.00	-	-	-	-	-	-	-	2.00

CO-PSO Matrix

PSO1Apply of problem solving by adopting analytical, numerical and experimental skills with awreness of societal impact. PSO2.Expertise in design and technical areas of civil engineering such as Design of most echonomical channels. PSO3.To apply knoeledge of environmental studies such as water supply engineering, sanitary and sewage engineeing, industrial wastewater engineering and to know the impact of environmental issues

PSO	1	2	3	4
C103.1	3	1	2	-
C103.2	3	2	2	-
C103.3	3	2	2	-
C103.4	3	2	2	-
C103.5	3	2	2	-
#REF!	-	-	-	-
Average	3.00	1.80	2.00	-

Mapping Corelation:	Low	Med	High	NO	L1: Remember	L2:Understanding	L3:Apply	L4:Analyze	L5:Evaluate
	1	2	3	-	L6:Create				

ATTAINMENT METHODS AND TOOLS

DIRECT ATTAINMENT 80%			INDIRECT ATTAINMENT 20%	
TOOLS	Frequency & Mode	Weightage	TOOLS	Frequency
Internal Evaluation	3 tests and Average	50	Course End Survey	once in Sem End
Semester End Exam	End of semester by VTU equal for all CO	50		

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

COURSE OUTCOMES

Second year-2022 scheme

Course Code	Course Name	Course Outcomes (COs)	
BCS301	Mathematics for Computer Science	CO-1	Explain the basic concepts of probability, random variables, probability distribution. Apply suitable probability distribution models for the given scenario
		CO-2	Apply the notion of a discrete-time Markov chain and n-step transition probabilities to solve the given problem.
		CO-3	Use statistical methodology and tools in the engineering problem-solving process.
		CO-4	Compute the confidence intervals for the mean of the population
		CO-5	Apply the ANOVA test related to engineering problems
BCS302	Digital Design and Computer Organisation	CO-1	Apply the K–Map techniques to simplify various Boolean expressions.
		CO-2	Design different types of combinational and sequential circuits along with Verilog programs.
		CO-3	Describe the fundamentals of machine instructions, addressing modes and Processor performance.
		CO-4	Explain the approaches involved in achieving communication between processor and I/O devices.
		CO-5	Analyze internal Organization of Memory and Impact of cache/Pipelining on Processor Performance.
BCS303	Operating Systems	CO-1	Explain the structure and functionality of operating system.
		CO-2	Apply appropriate CPU scheduling algorithms for the given problem.
		CO-3	Analyze the various techniques for process synchronization and deadlock handling.
		CO-4	Apply the various techniques for memory management.
		CO-5	Explain file and secondary storage management strategies.
BCS304	Data Structures and Applications	CO-1	Explain different data structures and their applications.

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		CO-2	Apply Arrays, Stacks and Queue data structures to solve the given problems.
		CO-3	Use the concept of linked list in problem solving.
		CO-4	Develop solutions using trees and graphs to model the real-world problem.
		CO-5	Explain the advanced Data Structures concepts such as Hashing Techniques and Optimal Binary Search Trees.
BCSL305	Data Structures Laboratory	CO-1	Analyze various linear and non-linear data structures
		CO-2	Demonstrate the working nature of different types of data structures and their applications
		CO-3	Use appropriate searching and sorting algorithms for the give scenario.
		CO-4	Apply the appropriate data structure for solving real world problems
BCS306A	Object Oriented Programming with Java	CO-1	Demonstrate proficiency in writing simple programs involving branching and looping structures.
		CO-2	Design a class involving data members and methods for the given scenario.
		CO-3	Apply the concepts of inheritance and interfaces in solving real world problems
		CO-4	Use the concept of packages and exception handling in solving complex problem
		CO-5	Apply concepts of multithreading, auto boxing and enumerations in program development.
BCS401	Analysis & Design of Algorithms	CO-1	Apply asymptotic notational method to analyze the performance of the algorithms in terms of time complexity.
		CO-2	Demonstrate Brute force approach and decrease & conquer approaches to solve computational problems.
		CO-3	Demonstrate Divide & Conquer, decrease & conquer approaches to solve computational problems.
		CO-4	Demonstrate dynamic programming &

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			Greedy Approaches to solve the given real world or complex computational problems.
		CO-5	Illustrate backtracking, branch & bound and approximation methods.
BCS402	Microcontrollers	CO-1	Understand the fundamentals of ARM-based systems and basic architecture of CISC and RISC.
		CO-2	Familiarize with ARM programming modules along with registers, CPSR and Flags.
		CO-3	Develop ALP using various instructions to program the ARM controller.
		CO-4	Understand the Exceptions and Interrupt handling mechanism in Microcontrollers.
		CO-5	Discuss the ARM Firmware packages and Cache memory polices.
BCS403	Database Management Systems	CO-1	Describe the basic elements of a relational database management system
		CO-2	Design entity relationship for the given scenario.
		CO-3	Apply various Structured Query Language (SQL) statements for database manipulation.
		CO-4	Analyze various normalization forms for the given application.
		CO-5	Understand the concepts related to NoSQL databases.
BCSL404	Analysis & Design of Algorithms Lab	CO-1	Develop programs to solve computational problems using suitable algorithm design strategy
		CO-2	Compare algorithm design strategies by developing equivalent programs and observing running times for analysis (Empirical).
		CO-3	Make use of suitable integrated development tools to develop programs
		CO-4	Choose appropriate algorithm design techniques to develop solution to the computational and complex problems.
		CO-5	Demonstrate and present the development of program, its execution and running time(s) and record the

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			results/inferences.
BCS456A	Discrete Mathematical Structures	CO-1	Apply concepts of logical reasoning and mathematical proof techniques in proving theorems and statements.
		CO-2	Demonstrate the application of discrete structures in different fields of computer science.
		CO-3	Apply the basic concepts of relations, functions and partially ordered sets for computer representations.
		CO-4	Solve problems involving recurrence relations and generating functions.
		CO-5	Illustrate the fundamental principles of Algebraic structures with the problems related to computer science & engineering.
BBOC407	Biology For Computer Engineers	CO-1	Understanding the basic concepts of a cell and the vital role of different types of biomolecules
		CO-2	Understanding various engineering applications of different types of biomolecules
		CO-3	Analysis of human anatomy for bioengineering designs
		CO-4	Collaborate the concepts of biomimetics for specific requirements
		CO-5	Think critically towards exploring innovative bio based solutions for socially relevant problems

COURSE OUTCOMES

Third year-2021 scheme

Course Code	Course Name	Course Outcomes (COs)	
21CS51	Automata Theory and compiler Design	CO-1	Acquire fundamental understanding of the core concepts in automata theory and Theory of Computation.
		CO-2	Design and Develop Lexical analyzers, Parsers and Code generators.
		CO-3	Design Grammars and Automata(recognizers) for different language classes

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		CO-4	Acquire fundamental understanding of the structure of a Compiler and Apply concepts automata theory and Theory of Computation to design Compilers
		CO-5	Design computations models for problems in Automata theory and adaptation of such model in the field of compilers
21CS52	Computer Networks	CO-1	To build an understanding of the fundamental concepts of computer networking.
		CO-2	To familiarize the students with the basic taxonomy and terminology of the computer networking area.
		CO-3	To understand basic computer network technology.
		CO-4	To identify the different types of network topologies and protocols.
		CO-5	To enumerate the layers of the OSI model and TCP/IP. Explain the function(s) of each type.
21CS53	Database Management Systems	CO-1	Identify, analyze and define database objects, enforce integrity constraints on a database using RDBMS
		CO-2	Use Structured Query Language for database manipulation and also demonstrate the basic query evaluation
		CO-3	Develop application to interact with databases, relational algebra expression
		CO-4	Analyze the functional dependency by using normalization process.
		CO-5	Demonstrate the use of concurrency and transaction in database.
21CS54	Artificial Intelligence and Machine Learning	CO-1	Gain a historical perspective of AI and its foundations
		CO-2	Become familiar with basic principles of AI toward problem solving
		CO-3	Familiarize with the basics of Machine Learning & Machine Learning process, basics of Decision Tree, and probability learning
		CO-4	Understand the working of Artificial Neural Networks and basic concepts of clustering algorithms
21CSL55	Database Management Systems Laboratory with Mini Project	CO-1	Create, Update and query on the database
		CO-2	Demonstrate the working of different concepts of DBMS
		CO-3	Implement, analyze and evaluate the

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			project developed for an application.
21CS61	Software Engineering & Project Management	CO-1	Understand the activities involved in software engineering and analyze the role of various process models
		CO-2	Explain the basics of object-oriented concepts and build a suitable class model using modelling techniques
		CO-3	Describe various software testing methods and to understand the importance of agile methodology and DevOps
		CO-4	Illustrate the role of project planning and quality management in software development
		CO-5	Understand the importance of activity planning and different planning models
21CS62	Fullstack Development	CO-1	Understand the working of MVT based full stack web development with Django.
		CO-2	Designing of Models and Forms for rapid development of web pages.
		CO-3	Analyze the role of Template Inheritance and Generic views for developing full stack web applications.
		CO-4	Apply the Django framework libraries to render nonHTML contents like CSV and PDF.
		CO-5	Perform jQuery based AJAX integration to Django Apps to build responsive full stack web applications,
21CS63	Computer Graphics and Fundamentals of Image Processing	CO-1	Construct geometric objects using Computer Graphics principles and OpenGL APIs.
		CO-2	Use OpenGL APIs and related mathematics for 2D and 3D geometric Operations on the objects.
		CO-3	Design GUI with necessary techniques required to animate the created objects
		CO-4	Apply OpenCV for developing Image processing applications.
		CO-5	Apply Image segmentation techniques along with programming, using OpenCV, for developing simple applications.
21CSL66	Data science and Visualization	CO-1	Understand the data in different forms
		CO-2	Apply different techniques to Explore

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			Data Analysis and the Data Science Process
		CO-3	Analyze feature selection algorithms & design a recommender system.
		CO-4	Evaluate data visualization tools and libraries and plot graphs.
		CO-5	Develop different charts and include mathematical expressions.
21CSL66	Computer Graphics and Image Processing Laboratory	CO-1	Use openGL /OpenCV for the development of mini Projects.
		CO-2	Analyze the necessity mathematics and design required to demonstrate basic geometric transformation techniques.
		CO-3	Demonstrate the ability to design and develop input interactive techniques.
		CO-4	Apply the concepts to Develop user friendly applications using Graphics and IP concepts.

COURSE OUTCOMES

Third year-2018 scheme

Course Code	Course Name	Course Outcomes (COs)	
18CS71	Artificial Intelligence and Machine Learning	CO-1	Appaise the theory of Artificial intelligency and Machine Learing
		CO-2	Illustrate the working of AI and ML Algorithms
		CO-3	Demonstrate the application of AI and ML
18CS72	Big Data Analytics	CO-1	Understand fundamentals of Big Data analytics.
		CO-2	Explore the Hadoop framework and Hadoop Distributed File system Illustrate the concepts of NoSQL using MongoDB and Cassandra for Big Data
		CO-3	Employ MapReduce programming model to process the big data.
		CO-4	Illustrate the concepts of NoSQL using MongoDB and Cassandra for Big Data
		CO-5	Understand various machine learning algorithms for Big Data Analytics, Web Mining and Social Network Analysis
18CS734	User Interface Design	CO-1	Interpret the principles Of User Interface Design

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		CO-2	Outline the human characteristics, Business Functions With Design Standards.
		CO-3	Design the various aspects of Menu creation
		CO-4	Design the various aspects of Windows creation with device based Controls
		CO-5	Design Screen based Control for Windows and perform different kinds of windows testing
18CS744	Cryptography	CO-1	Fundamentals of Cryptography, Design of Classical encryption techniques and Block cipher.
		CO-2	Explain Public-key cryptography and RSA, Other Public-key cryptosystems.
		CO-3	Fundamentals of Elliptic curve, Key Management and Distribution.
		CO-4	Explain X-509 Certificate,Electronic Mail Security.
		CO-5	About IP Security
18CSL76	Artificial Intelligence And Machine Learning Laboratory	CO-1	Implement and demonstrate AI and ML algorithms
		CO-2	Evaluate different algorithms
18CS81	Internet of Things	CO-1	Interpret the impact and challenges posed by IoT networks leading to new architectural models.
		CO-2	Compare and contrast the deployment of smart objects and the technologies to connect them to network
		CO-3	Appraise the role of IoT protocols for efficient network communication.
		CO-4	Elaborate the need for Data Analytics and Security in IoT.
		CO-5	Illustrate different sensor technologies for sensing real world entities and identify the applications of IoT in Industry
18CS822	Storage Area Network	CO-1	Identify key challenges in managing information, virtualization, analyze various components of data center environment and performance parameter of disk drive
		CO-2	Interpret various levels and implementations of RAID ,Components and types of Intelligent Storage

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			Systems, SAN, FC SAN and its components
		CO-3	Interpret iSCSI, FCIP and various aspects of NAS
		CO-4	Describe various aspects of BC,archives and backup
		CO-5	Apply the techniques used for local , remote replication and secure storage infrastructure

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HoD
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Department of Electronics & Communication Engineering

2023-24 BATCH Course Outcomes

2022 Scheme I Year and II year			
Course code	**Subject code**	**Course Name**	
C101	BMATE101	Mathematics-I for Electrical & Electronics Engineering Stream	CO1: Apply the knowledge of calculus to solve problems related to polar curves and learn the notion of partial differentiation to compute rate of change of multivariate functions
			CO2 analyze the solution of linear and nonlinear ordinary differential equations
			CO3 apply the concept of change of order of integration and variables to evaluate multiple integrals and their usage in computing area and volume
			CO4 make use of matrix theory for solving the system of linear equations and compute eigenvalues and eigenvectors
			CO5 familiarize with modern mathematical tools namely MATHEMATICA/ MATLAB/ PYTHON/SCILAB
C102	BPHYE102/202	Applied Physics for EEE Stream	CO1: Describe the fundamental principles of the Quantum Mechanics and the essentials of Photonics.
			CO2 Elucidate the concepts of conductors, dielectrics and superconductivity
			CO3 Discuss the fundamentals of vector calculus and their applications in Maxwell's Equations and EM Waves.

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20

			CO4 Summarize the properties of semiconductors and the working principles of semiconductor devices.
			CO5 Practice working in groups to conduct experiments in physics and Perform precise and honest measurements.
C103	BEEE103	Elements of Electrical Engineering	CO1: Understand the concepts of DC circuits and Electromagnetism.
			CO2 Understand the concepts of single phase and Three phase AC circuits.
			CO3 Apply the basic Electrical laws to solve circuits
			CO4 Understand the concepts of measurements and measuring Instruments
			CO5 Explain the concepts of domestic wiring, electricity billing, circuit protective devices and personal safety measures
C104	BCEDK203/203	Computer Aided Engineering Drawing	CO1. Draw and communicate the objects with definite shape and dimensions.
			CO2. Recognize and Draw the shape and size of objects through different views.
			CO3. Develop the lateral surfaces of the object.
			CO4. Create a Drawing views using CAD software.
			CO5. Identify the interdisciplinary engineering components or systems through its graphical representation.
C105	BENGK106-206	Communicative English	CO1: Understand and apply the Fundamentals of Communication Skills in their communication skills.

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			CO2: Identify the nuances of phonetics, intonation and enhance pronunciation skills.
			CO3: To impart basic English grammar and essentials of language skills as per present requirement.
			CO4: Understand and use all types of English vocabulary and language proficiency.
			CO5: Adopt the Techniques of Information Transfer through presentation.
C106	BMATE201	Mathematics-II for Electrical & Electronics Engineering Stream	CO1: Understand the applications of vector calculus refer to solenoidal, irrotational vectors, line integral and surface integral.
			CO2 Demonstrate the idea of Linear dependence and independence of sets in the vector space, and linear transformation
			CO3 To understand the concept of Laplace transform and to solve initial value problems.
			CO4 Apply the knowledge of numerical methods in solving physical and engineering phenomena.
			CO5 Get familiarize with modern mathematical tools namely MATHEMATICA/MATLAB/PYTHON/ SCILAB
C107	BCHEE202/202	Chemistry for Electrical and Electronics Engineering stream	CO1: Identify the terms and applications processes involved in scientific and engineering
			CO2. Explain the phenomena of chemistry to describe the methods of engineering processes

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			CO3. Solvetheproblemsinchemistrythatarepertinentinengineeringapplications
			CO4. Apply the basic concepts of chemistry to explain the chemical properties and processes
			CO5. Analyze properties and multi-disciplinary situations
C108	BBEE103/203	Basic Electronics	CO1: Develop the basic knowledge on construction, operation and characteristics of semiconductor devices. (Level: C3)
			CO2: Apply the acquired knowledge to construct small scale circuits consisting of semiconductor devices (Level: C3)
			CO3: Develop competence knowledge to construct basic digital circuit by make use of basic gate and its function. (Level: C3)
			CO4: Construct the conceptual blocks for basic communication system. (Level: C3)
			CO5: Apply the knowledge of various transducers principle in sensor system. (Level: C3)
C109	BPWSK206-106	Professional Writing Skills in English	CO1: To understand and identify the Common Errors in Writing and Speaking.
			CO2 To Achieve better technical writing and Presentation skills
			CO3 To read technical proposals properly and make them to Write good technical reports.
			CO4 Acquire Employment and Workplace communication skills.
			CO5 To learn about Techniques of Information Transfer through presentation in different level.
C110	BICOK107-207	Indian Constitution	CO1: Analyse the basic structure of Indian Constitution
			CO2 Remember their Fundamental Rights, DPSP's and Fundamental Duties (FD's) of our constitution.
			CO3 know about our Union Government, political structure & codes, procedures.
			CO4 Understand our State Executive & Elections system of India.
			CO5 Remember the Amendments and Emergency Provisions, other important provisions given by the constitution.

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C111	BIDTK158/258	INNOVATION and DESIGN THINKING	CO1: Appreciate various design process procedure
			CO2: Generate and develop design ideas through different technique
			CO3 :Identify the significance of reverse Engineering to Understand products
			CO4: Draw technical drawing for design ideas
C201	BMATEC301	AV Mathematics-III for EC Engineering	CO1: Demonstrate the Fourier series to study the behavior of periodic functions and their applications in system communications, digital signal processing, and field theory.
			CO2. To use Fourier transforms to analyze problems involving continuous-time signals
			CO3. To apply Z-Transform techniques to solve difference equations
			CO4. Understand that physical systems can be described by differential equations and solve such equations
			CO5. Make use of correlation and regression analysis to fit a suitable mathematical model for statistical data
C202	BEC302	Digital System Design using Verilog	CO1. Simplify Boolean functions using K-map and Quine-McCluskey minimization technique.
			CO2. Analyze and design for combinational logic circuits.
			CO3. Analyze the concepts of Flip Flops (SR, D, T and JK) and to design the synchronous sequential circuits using Flip Flops.
			CO4. Model Combinational circuits (adders, subtractors, multiplexers) and sequential circuits using Verilog descriptions
C203	BEC303	Electronic Principles and Circuits	CO1. Understand the characteristics of BJTs and FETs for switching and amplifier circuits
			CO2. Design and analyze amplifiers and oscillators with different circuit configurations and biasing conditions
			CO3. Understand the feedback topologies and approximations in the design of amplifiers and oscillators.

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			CO4. Design of circuits using linear ICs for wide range applications such as ADC, DAC, filters and timers.
			CO5. Understand the power electronic device components and its functions for basic power electronic circuits.
C204	BEC304	Network Analysis	CO1. Determine currents and voltages using source transformation/ source shifting/ mesh/ nodal analysis and reduce given network using star- delta transformation.
			CO2. Solve problems by applying Network Theorems and electrical laws to reduce circuit complexities and to arrive at feasible solutions.
			CO3. Analyse the circuit parameters during switching transients and apply Laplace transform to solve the given network
			CO4. Evaluate the frequency response for resonant circuits and the network parameters for two port networks
C205	BECL305	Analog and Digital Systems Design Laboratory	CO1. Design and analyse the BJT/FET amplifier and oscillator circuits.
			CO2. Design and test Op-amp circuits to realize the mathematical computations, DAC and precision rectifiers.
			CO3. Design and test the combinational logic circuits for the given specifications.
			CO4. Test the sequential logic circuits for the given functionality.
			CO5. Demonstrate the basic circuit experiments using 555 timers.
C206	BEC306C	Computer Organization and Architecture	CO1. Explain the basic organization of a computer system
			CO2. Describe the addressing modes, instruction formats and program control statement.
			CO3. Explain different ways of accessing an input/ output device including interrupts.
			CO4. Illustrate the organization of different types of semiconductor and other secondary storage memories.

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			CO5. Illustrate simple processor organization based on hard wired control and microprogrammed control.
C207	BEC358A	Lab VIEW Programming	CO1: Use LabVIEW to create data acquisition, analysis and display operations
			CO2: Create user interfaces with charts, graph and buttons
			CO3: Use the programming structures and data types that exist in LabVIEW
			CO4: Use various editing and debugging techniques.
C208	BEC401	ELECTROMAGNETIC THEORY	CO1. Evaluate problems on electrostatic force, electric field due to point, linear, volume charges by applying conventional methods and charge in a volume...
			CO2. Apply Gauss law to evaluate Electric fields due to different charge distributions and Volume Charge distribution by using Divergence Theorem
			CO3. Determine potential and energy with respect to point charge and capacitance using Laplace equation and Apply Biot-Savart's and Ampere's laws for evaluating Magnetic field for different current configurations
			CO4. Calculate magnetic force, potential energy and Magnetization with respect to magnetic materials and voltage induced in electric circuits
			CO5. Apply Maxwell's equations for time varying fields, EM waves in free space and conductors and Evaluate power associated with EM waves using Poynting theorem
C209	BEC402	PRINCIPLES OF COMMUNICATION SYSTEMS	CO1. Understand the principles of analog communication systems and noise modelling.
			CO2. Identify the schemes for analog modulation and demodulation and compare their performance.
			CO3Design of PCM systems through the processes sampling, quantization and encoding.
			CO4. Describe the ideal condition, practical considerations of the signal representation for baseband transmission of digital signals

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			CO5. Identify and associate the random variables and random process in Communication system design.
C210	BEC403	Control Systems	CO1. Deduce transfer function of a given physical system, from differential equation representation or Block Diagram representation and SFG representation. 4
			CO2. Calculate time response specifications and analyse the stability of the system.
			CO3. Draw and analyse the effect of gain on system behaviour using root loci.
			CO4.Perform frequency response Analysis and find the stability of the system.
			CO5. Represent State model of the system and find the time response of the system.
C211	BECL404	Communication Laboratory	CO1. Illustrate the AM generation and detection using suitable electronic circuits
			CO2. Design of FM circuits for modulation, demodulation and noise suppression.
			CO3. Design and test the sampling, Multiplexing and pulse modulation techniques using electronic hardware.
			CO4. Design and demonstrate the electronic circuits used for RF transmitters and receivers.
C212	BEC405A	MICROCONTROLLERS	CO1. Describe the difference between Microprocessor and Microcontroller, Types of Processor Architectures and Architecture of 8051Microcontroller
			CO2. Discuss the types of 8051 Microcontroller Addressing modes & Instructions with Assembly Language Programs.
			CO3. Explain the programming operation of Timers/Counters and Serial port of 8051 Microcontroller.
			CO4. Illustrate the Interrupt Structure of 8051 Microcontroller & its programming.
			CO5. Develop C programs to interface I/O devices with 8051 Microcontroller.
C213	BECL456A	Microcontrollers Lab	CO1. Write a Assembly Language/C programs in 8051for solving simple problems that manipulate input data using different instructions.

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			CO2. Develop Testing and experimental procedures on 8051 Microcontroller, Analyze their operation under different cases.
			CO3. Developprogramsfor8051Microcontrollertoimplementreal world problems
			CO4. DevelopMicrocontrollerapplicationsusingexternalhardwareinterface.
2021 scheme III year			
Course code	**Subject code**	**Course Name**	
C301	21EC51	Digital Communication	CO1: Analyze different digital modulation techniques and choose the appropriate modulation technique for the given specifications.
			CO2: Test and validate symbol processing and performance parameters at the receiver under ideal and corrupted bandlimited channels.
			CO3: Differentiate various spread spectrum schemes and compute the performance parameters of communication system.
			CO4: Apply the fundamentals of information theory and perform source coding for given message
			CO5: Apply different encoding and decoding techniques with error Detection and Correction.
C302	21EC52	Object Oriented Programming with Java & Data Structures	CO1. Use OOP concepts effectively to build simple application programs.
			CO2. Set up a Java JDK environment to create, debug and run simple java programs

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			CO3. Explain and implement the object-oriented core-concepts such as class, object, inheritance and exception handling using JAVA.
			CO4. Implement the data structures such as Arrays, Lists, Stack, Queue and Trees using Java
			CO5. Make a decision on choosing a suitable data structure for a specific application program.
C303	21EC53	Computer Communication Networks	CO1. Understand the concepts of networking thoroughly.
			CO2. Identify the protocols and services of different layers.
			CO3. Distinguish the basic network configurations and standards associated with each network.
			CO4. Discuss and analyse the various applications that can be implemented on networks.
C304	21EC54	Microwave Theory and Antennas	CO1. Describe the use and advantages of microwave transmission.
			CO2. Analyze various parameters related to transmission lines.
			CO3. Identify microwave devices for several applications
			CO4. Analyze various antenna parameters and their significance in building the RF system.
			CO5. Identify various antenna configurations for suitable applications.
C305	21ECL55	Communication Lab II	CO1. Design and test the digital modulation circuits and display the waveforms.

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			CO2. To Implement the source coding algorithm using C/C++/ MATLAB code.
			CO3. To Implement the Error Control coding algorithms using C/C++/ MATLAB code.
			CO4. Illustrate the operations of networking concepts and protocols using C programming and network simulators.
C306	21EC581	IoT (Internet of Things) Lab	CO1. Understand internet of Things and its hardware and software components
			CO2. Interface I/O devices, sensors & communication modules
			CO3. Remotely monitor data and control devices
			CO4. Develop real life IoT based projects
C307	21EC62	Computer Organization & ARM Microcontrollers	CO1. Explain the basic organization of a computer system.
			CO2. Demonstrate functioning of different sub systems, such as processor, Input/output, and memory.
			CO3. Describe the architectural features and instructions of 32-bit microcontroller ARM Cortex M3.
			CO4. Apply the knowledge gained for Programming ARM Cortex M3 for different applications.
C308	21EC63	VLSI Design and Testing	CO1. Demonstrate understanding of MOS transistor theory, CMOS fabrication flow and technology scaling

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			CO2. Draw the basic gates using the stick and layout diagram with the knowledge of physical design aspects.
			CO3. Interpret memory elements along with timing considerations.
			CO4. Interpret testing and testability issues in combinational logic design.
			CO5. Interpret testing and testability issues in combinational logic design.
C309	21ECL66	VLSI Laboratory	CO1. Design and simulate combinational and sequential digital circuits using Verilog HDL.
			CO2. Understand the synthesis process of digital circuits using EDA tool.
			CO3. Perform ASIC design flow and understand the process of synthesis, synthesis constraints and evaluating the synthesis reports to obtain optimum gate level netlist.
			CO4. Design and simulate basic CMOS circuits like inverter, common source amplifier, differential amplifier, SRAM.
			CO5. Perform RTL_GDSII flow and understand the stages in ASIC design.
C310	21EC643	Python Programming	CO1. To acquire programming skills in
			CO2. To demonstrate data structure representation using Python
			CO3. To develop the skill of pattern matching and files in Python
			CO4. To acquire Object Oriented Skills in Python

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			CO5. To develop the ability to write database applications in Python
2018 scheme IV year			
Course code	**Subject code**	**Course Name**	
			CO1: Understand the concepts of networking thoroughly
			CO2: Identify the protocols and services of different layers.
			CO3: Distinguish the basic network configurations and standards associated with each network.
			CO4: Analyze a simple network and measurement of its parameters.
C402	18EC72	VLSI DESIGN	CO1: Demonstrate understanding of MOS transistor theory, CMOS fabrication flow and technology scaling.
			CO2: Draw the basic gates using the stick and layout diagrams with the knowledge of physical design aspects.
			CO3: Demonstrate ability to design Combinational, sequential and dynamic logic circuits as per the requirements
			CO4: Interpret Memory elements along with timing considerations
			CO5: Interpret testing and testability issues in VLSI Design
C403	18EC732	SATELLITE COMMUNICATION	CO1: Describe the satellite orbits and its trajectories with the definitions of parameters associated with it.

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			CO2: Describe the electronic hardware systems associated with the satellite subsystem and earth station.
			CO3: Describe the various applications of satellite with the focus on national satellite system.
			CO4: Compute the satellite link parameters under various propagation conditions with the illustration of multiple access techniques.
C404	18EC743	MULTIMEDIA COMMUNICATION	CO1: Understand basics of different multimedia networks and applications.
			CO2: Understand different compression techniques to compress audio and video.
			CO3: Describe multimedia Communication across Networks.
			CO4: Analyse different media types to represent them in digital form.
			CO5: Compress different types of text and images using different compression techniques.
C405	18EC745	MACHINE LEARNING WITH PYTHON	CO1: Identify the problems in machine learning.
			CO2: Select supervised, unsupervised or reinforcement learning for problem solving.
			CO3: Apply theory of probability and statistics in machine learning
			CO4: Apply concept learning, ANN, Bayes classifier, k nearest neighbor
			CO5: Perform statistical analysis of machine learning techniques.

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C406	18ECL76	COMPUTER NETWORKS LAB	CO1: Use the network simulator for learning and practice of networking algorithms.
			CO2: Illustrate the operations of network protocols and algorithms using C programming.
			CO3: Simulate the network with different configurations to measure the performance parameters.
			CO4: Implement the data link and routing protocols using C programming.
C407	18ECL77	VLSI LAB	CO1: Design and simulate combinational and sequential digital circuits using Verilog HDL
			CO2: Understand the Synthesis process of digital circuits using EDA tool.
			CO3: Perform ASIC design flow and understand the process of synthesis, synthesis constraints and evaluating the synthesis reports to obtain optimum gate level net list
			CO4: Design and simulate basic CMOS circuits like inverter, common source amplifier and differential amplifiers.
			CO5: Perform RTL-GDSII flow and understand the stages in ASIC design.
C408	18EC81	WIRELESS AND CELLULAR COMMUNICATION	CO1: Explain concepts of propagation mechanisms like Reflection, Diffraction, Scattering in wireless channels.
			CO2: Develop a scheme for idle mode, call set up, call progress handling and call tear down in a GSM cellular network.

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			CO3: Develop a scheme for idle mode, call set up, call progress handling and call tear down in a CDMA cellular network.
			CO4: Understand the Basic operations of Air interface in a LTE 4G system.
C409	18EC821	NETWORK SECURITY	CO1: Explain network security services and mechanisms and explain security concepts
			CO2: Understand the concept of Transport Level Security and Secure Socket Layer.
			CO3: Explain Security concerns in Internet Protocol security
			CO4: Explain Intruders, Intrusion detection and Malicious Software
			CO5: Describe Firewalls, Firewall Characteristics, Biasing and Configuration

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Department of Electrical and Electronics Engineering

Course outcomes

2022 Scheme

I Year Electrical and Electronics Engineering

Course code	Course title	Cours Outcome
BEEE103	Elements of Electrical Engineering	1. To explain the basic laws used in the analysis of DC circuits, electromagnetism. 2. To explain the behavior of circuit elements in single-phase circuits. 3. To explain three phase circuits, balanced loads, and measurement of three phase power. 4. To explain the measuring techniques, measuring instruments and domestic wiring. 5. To explain electricity billing, equipment and personal safety measures

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2022 Scheme

II Year Electrical and Electronics Engineering

Course code	Course title	Cours Outcome
BMATE301	Mathematics-III for EE Engineering	1. Find the Fourier series, half range Fourier series and Fourier coefficients of periodic functions. 2. Find the Fourier and inverse Fourier transforms of a periodic function. 3. Solve the finite difference equations using Z-transforms. 4. Apply the concept of statistics for curve fitting, correlation and regression.
IPCC BEE302	Electric Circuit Analysis	1. Analyze the electric circuit with different technique. 2. Apply network theorems in electric circuits. 3. Examine the resonance condition of parallel and series RLC circuits. 4. Determine the transient behavior of networks. 5. Evaluate the two port parameters and unbalanced three phase systems
IPCC BEE 303	Analog Electronic Circuits	1. Design diode circuits and transistor biasing. 2. Analyze the performance of transistor amplifier circuits. 3. Analyze multi-stage and feedback amplifiers. 4. Design the power amplifiers and oscillators. 5. Design amplifiers using JFET/MOSFET.
BEE304	Transformers And Generators	1. Explain construction and operation of single phase, three phase and auto transformer. 2. Analyze the performance of single phase and three phase transformers. 3. Explain the construction of DC generator and Synchronous generators. 4. Analyze the performance of salient and non-salient pole generators.
BEEL305	Transformers And Generators Laboratory	1. Evaluate the performance of transformers from the test data obtained. 2. Operate two single phase transformers of different KVA rating in parallel. 3. Build the three-phase operation and phase conversion using single phase transformers. 4. Compute the voltage regulation of synchronous generator using the test data obtained in the laboratory
BEE 306A	Digital Logic Circuit	1. Develop simplified switching equation using Karnaugh Maps and QuineMcClusky techniques. 2. Design Multiplexer, Encoder, Decoder, Adder, Subtractors and Comparator as digital combinational control circuits. 3. Design latch and flip flops, their characteristic equations. 4. Develop counters, shift registers as sequential control circuits. and state diagrams for the given clocked sequential circuits. 5. Develop Mealy/Moore Models and illustrate the functioning of Read only and Read/Write Memories, Programmable ROM, EPROM and Flash memory
UHV 21UH36/49	Social Connect And Responsibility	1. Provide a formal platform for students to communicate and connect to the surrounding. 2. Create a responsible connection with the society. 3. Understand the community in general in which they work. 4. Identify the needs and problems of the community and involve them in problem –solving. 5. Develop among themselves a sense of social & civic responsibility & utilize their knowledge in finding practical solutions to individual and community problems. 6. Develop competence required for group-living and sharing of responsibilities & gain skills in mobilizing community participation to acquire leadership qualities and democratic attitudes.
AEC BEEL358A	Scilab/Matlab For Transformers And Generators	1. Prescribe hours of teaching –learning process, provide opportunity to perform the 2. experiments/programmers at their own time, at their own pace, at any place as per their convenience and repeat any number of times to understand the concept.

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		3. Provide unhindered access to perform whenever the students wish. 4. Vary different parameters to study the behavior of the circuit without the risk of damaging equipment/device or injuring themselves.
PCC BEE 401	Electric Motors	1. Constructional features of Motors and select a suitable drive for specific application. 2. Constructional features of Three Phase and Single-phase induction Motors 3. Different test to be conducted for the assessment of the performance characteristics of motors. 4. Speed control of motor by a different method. 5. Explain the construction and operation of Synchronous motor and special motors
PCC BEE 402	Transmissio n And Distribution	1. Explain the concepts and importance of HVAC, HVDC, EHVAC and UHVAC transmission systems and its components. 2. Determine inductance and capacitance of overhead transmission lines. 3. Determine the parameters of the transmission line for different configurations and asses the performance of line. 4. Explain the effect of corona and use of underground cables. 5. Explain different types and reliability of AC distribution system.
IPCC BEE403	Microcontro ller	1. Discuss the internal architecture, addressing modes of 8051. 2. Utilize the concept of assembler, stack, flag register, loop, jump and call instructions to write assembly language program. 3. Develop 8051C programs for time delay, I/O bit manipulation, logic and arithmetic operations, data conversion and data serialization. 4. Make use of the hardware connection of 8051 chip for programming its timers, serial ports and interrupts 5. Explain the Interfacing of 8051 with real-world devices
PCCL BEEL404	Electric Motors Laboratory	1. Demonstrate the speed control of DC machines. 2. Determine the performance characteristics of dc machines by conducting suitable tests. 3. Analyse the performance of single phase and three phase induction motor 4. Test induction motor to pre-determine the performance characteristics. 5. Evaluate performance of synchronous motor to draw the characteristics curves.
ESC BEE405A	Electrical Power Generation And Economics	1. Classify and explain the working of hydroelectric power plants. 2. Explain the working of steam power plants, diesel power plants and gas turbine power plants. 3. Illustrate the working of nuclear power plants. 4. Classify various substations and explain the importance of grounding. 5. Compute various economic factors of power system operation including the power factor improvement
AEC BEEL456A	Basics Of Vhdl Lab	1. Offer students the freedom to conduct experiments/programs outside of scheduled class time. This allows for independent exploration, personalized pacing, and convenient learning environments. 2. Ensure students have continuous and easy access to the necessary resources and tools for their experiments/programs whenever their learning needs arise. 3. Provide a virtual or simulated environment where students can freely manipulate variables and observe the behavior of circuits without the risk of damaging equipment, incurring costs, or causing harm to themselves. 4. Allow students to repeat experiments/programs as many times as they need to fully grasp the underlying concepts and develop a deeper understanding of the subject matter. 5. Enable students to explore specific areas of interest and conduct unique experiments based on their individual learning styles and goals
BSC BBOK407	Biology For Engineers	1. To familiarize the students with the basic biological concepts and their engineering applications 2. To enable the students with an understanding of bio design principles to create novel devices and structures 3. "To provide the students an appreciation of how biological systems can be re-designed as substitute products for 4. natural systems" 5. To motivate the students, develop the interdisciplinary vision of biological engineering

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BUHK 408	Universal Human Value Course	1. To help the students appreciate the essential complementarity between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity which are the core aspirations of all human beings. 2. To facilitate the development of a Holistic perspective among students towards life and profession as well as towards happiness and prosperity based on a correct understanding of the Human reality and the rest of existence. Such a holistic perspective forms the basis of Universal Human Values and movement towards value-based living in a natural way. 3. To highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually fulfilling human behavior and mutually enriching interaction with Nature 4. This course is intended to provide a much-needed orientation input in value education to the young enquiring minds

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2021 Scheme

III Year Electrical and Electronics Engineering

PCC 21EE51	Transmission And Distribution	1. Explain the concepts and importance of HVAC, HVDC, EHVAC and UHVAC transmission systems and its components. 2. Determine inductance and capacitance of overhead transmission lines. 3. Determine the parameters of the transmission line for different configurations and asses the performance of line. 4. Explain the effect of corona and use of underground cables. 5. Explain different types and reliability of AC distribution system.
IPCC21EE52	Control Systems	1. Determine the transfer function of a linear time invariant system. 2. Apply block diagram manipulation techniques and signal flow graph to obtain transfer function of LTI systems. 3. Analyze time response of first and second order control systems. 4. Evaluate the stability of LTI systems using RH criterion, Root locus, Bode plots and Nyquist plots. 5. Design of PD, PI &PID controllers.
PCC21EE53	Power System Analysis - 1	1. Model the power system components & construct per unit impedance diagram of power system. 2. Analyze three phase symmetrical faults on power system. 3. Compute unbalanced phasors in terms of sequence components and vice versa, also develop sequence networks. 4. Analyze various unsymmetrical faults on power system. 5. Examine dynamics of synchronous machine and determine the power system stability.
PCC21EE54	Power Electronics	1. To give an overview of applications power electronics, different types of power semiconductor devices, their switching characteristics. 2. To explain power diode characteristics, types, their operation and the effects of power diodes on RL circuits. 3. To explain the techniques for design and analysis of single-phase diode rectifier circuits. 4. To explain different power transistors, their steady state and switching characteristics and imitations. 5. To explain different types of Thyristors, their gate characteristics and gate control requirements. 6. To explain the design, analysis techniques, performance parameters and characteristics of controlled rectifiers, DC- DC, DC -AC converters and Voltage controllers.
PCC21L55	Power Electronics Laboratory	1. Obtain static characteristics of semiconductor devices to discuss their performance. 2. Trigger the SCR by different methods. 3. Verify the performance of single phase controlled full wave rectifier and AC voltage controller with R and RL loads. 4. Control the speed of a DC motor, universal motor and stepper motors. 5. Verify the performance of single-phase full bridge inverter connected to resistive load
AEC21RM156	Research Methodology & Intellectual Property Rights	1. Describe the basics of research and need of Ethics in Engineering Research 2. Carryout Literature Review, Technical Reading, and Attributions & Citations 3. To know the fundamentals of Patent laws and drafting procedure. 4. To know the fundamentals of Copyrights and Related Rights and Trademarks 5. To know the fundamentals of Industrial designs and Geographical indicators.
HSMC21CIV57	Environment Studies	1. To create environmental awareness among the students 2. To gain knowledge on different types of pollution in the environment
HSMC21EE61	Management And Entrepreneurship	1. Explain the field of management, task of the manager, planning and steps in decision making.

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		2. Discuss the structure of organization, importance of staffing, leadership styles, modes of communication, techniques of coordination and importance of managerial control in business. 3. Explain the concepts of entrepreneurship and a businessman's social responsibilities towards different groups. 4. Illustrate the role of SSI's in the development of country and state/central level institutions/agencies supporting business enterprises. 5. Discuss the concepts of project management, capital budgeting, project feasibility studies, need for project report and new control techniques.
IPCC21EE62	Power System Analysis - 2	1. Formulate network matrices and models for solving load flow problems. 2. Perform steady state power flow analysis of power systems using numerical iterative techniques. 3. Solve issues of economic load dispatch and unit commitment problems. 4. Analyze short circuit faults in power system networks using bus impedance matrix and Apply Point by Point method and Runge Kutta Method to solve Swing Equation. 5. Develop a program in suitable package (a) to assess the performance of medium and long transmission lines, (b) to obtain the power angle characteristics of salient and non-salient pole alternator. and (c) to assess the transient stability under three phase fault at different locations in a of radial power systems.
21EE643	Electrical Machine Design	1. To discuss design factors, limitations in design and modern trends in design and manufacturing of electrical machines 2. To discuss the properties of electrical, magnetic and insulating materials used in the design of electrical machines. 3. To derive the output equation of DC machine, single phase, three phase transformers, induction motor and synchronous machines. 4. To discuss the selection of specific loadings, for various machines 5. To discuss separation of main dimensions for different electrical machines 6. To discuss design of field windings for DC machines and synchronous machines. To evaluate the performance parameters of transformer, induction motor 7. To design of cooling tubes for the transformer for a given temperature rise 8. To explain design of rotor of squirrel cage rotor and slip ring rotor. 9. To define short circuit ratio and discuss its effect on machine performance
PCC21EEL66	Digital Signal Processing Laboratory	1. To explain basic signals, their classification, basic operations on signals, sampling of analog signals, and the properties of the systems 2. To explain the convolution of signals in continuous and discrete time domain and the properties of impulse response representation 3. To explain the computation of Discrete Fourier, transform of a sequence by direct method, Linear transformation Method and using Fast Fourier Transformation Algorithms 4. To explain design of IIR all pole analog filters and transform them into digital filter using Impulse Invariant and Bilinear transformation Techniques and to obtain their Realization. 5. To explain design of FIR filters using Window Method and Frequency Sampling Method and to obtain their Realization

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2018 Scheme

IV Year Electrical and Electronics Engineering

18EE71	Power System Analysis-2	1. Develop network matrices and models for solving load flow problems. 2. Evaluate the steady state power flow analysis of power systems using numerical iterative techniques. 3. Determine optimum generation scheduling and optimal unit commitment of thermal power plants. 4. Analyze short circuit faults in power system networks using bus impedance matrix. 5. Determine numerical solution of swing equation for multi-machine stability.
18EE72	Power System Protection	1. Develop network matrices and models for solving load flow problems. 2. Evaluate the steady state power flow analysis of power systems using numerical iterative techniques. 3. Determine optimum generation scheduling and optimal unit commitment of thermal power plants. 4. Analyze short circuit faults in power system networks using bus impedance matrix. 5. Determine numerical solution of swing equation for multi-machine stability.
18EE731	Solar And Wind Energy	1. Discuss the importance of energy in human life, relationship among economy and environment with energy use and the increasing role of renewable energy. 2. Explain the concept of energy storage, the principles of energy storage devices and solar radiation on horizontal and tilted surface, its characteristics, measurement and analysis of radiation data. 3. Describe the process of harnessing solar energy and its applications in heating and cooling. 4. Discuss fabrication, operation of solar cell, electrical characteristics, sizing and design of solar PV systems and their applications. 5. Explain basic Principles of Wind Energy Conversion, collection of wind data, energy estimation and site selection. 6. Discuss the performance of Wind-machines, energy storage, applications of Wind Energy and environmental aspects.
18EE732	Sensors And Transducers	1. Explain need of transducers and sensors, their classification, advantages and disadvantages and their working. 2. Discuss the recent trends in sensor technologies and their selection. 3. Explain the basics of signal conditioning, signal conditioning equipment, configuration of Data Acquisition System and data conversion. 4. Describe data transmission and telemetry. 5. Explain the measurement of non-electrical quantities- Pressure, temperature, flow, speed, force, torque, power and viscosity
18EE733	Integration Of Distributed Generation	1. Explain power generation by alternate energy source like wind power and solar power. 2. Discuss the integration of distributed generation and its effect on the performance of the power system. 3. Examine the impact of integration of distributed generation on Voltage Magnitude Variations. 4. explain the impact of integration of distributed generation on Power Quality Disturbances.
18EE734	Advanced Control Systems	1. Discuss state variable approach for linear time invariant systems in both the continuous and discrete time systems. 2. Develop of state models for linear continuous – time and

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		discrete – time systems. 3. Apply vector and matrix algebra to find the solution of state equations for linear continuous – time and discrete – time systems. 4. Define controllability and observability of a system and test for controllability and observability of a given system. 5. Design pole assignment and state observer using state feedback. 6. Develop the describing function for the nonlinearity present to assess the stability of the system and Lyapunov function for the stability analysis of nonlinear systems.
18EE735	Reactive Power Control In Electric Power Systems	1. Distinguish the importance of load compensation in symmetrical as well as unsymmetrical loads. 2. Explain various compensation methods in transmission lines. 3. Distinguish demand side reactive power management & user side reactive power management. 4. Construct model for reactive power coordination and effects of harmonics on electrical equipment's. 5. Discuss the Reactive Power Planning for the electricity boards.
18EE741	Industrial Drives And Applications	1. Explain choice of electric drives, its parts, and advantages 2. Discuss dynamics and modes of operation of electric drives. 3. Explain the selection of power rating of motor and control of dc motor using rectifiers. 4. Analyze the performance of induction motor drives under different conditions. 5. Analyze the control of induction motor, synchronous motor and stepper motor drives. 6. Discuss typical applications of electrical drives in the industry .
18EE742	Utilization Of Electrical Power	1. Analyze heating, welding scheme and Electrolytic process. 2. Design illumination scheme for various application. 3. Explain the different traction system and speed control for the traction systems. 4. Explain the various braking operation for different types of drives, Tramways and Trolley. 5. Analyze about the Performance, concept and architecture of different Electric Vehicles.
18EE743	PLC And SCADA	1. Describe the hardware components of PLC: I/O modules, CPU, memory devices, other support. 2. devices, operating modes and PLC programming. 3. Describe field devices Relays, Contactors, Motor Starters, Switches, Sensors, Output Control 4. Devices, Seal-In Circuits, and Latching Relays commonly used with I/O module. 5. Convert relay schematics and narrative descriptions into PLC ladder logic programs. 6. Analyze PLC timer and counter ladder logic programs.
18EE744	Smart Grid	1. Explain the architecture, measurement techniques and tools for the analysis of smart grid. 2. Discuss classical optimization techniques and computational methods for smart grid design, planning and operation. 3. Explain predictive grid management and control technology for enhancing the smart grid performance. 4. Develop cleaner, more environmentally responsible technologies for the electric system. 5. Discuss the computational techniques, communication, measurement, and monitoring technology tools essential to the design of the smart grid.
18EE745	Artificial Neural Network With Applications To Power Systems	1. Develop Neural Network and apply elementary information processing tasks that neural network can solve. 2. Develop Neural Network and apply powerful useful learning techniques.

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		3. Develop and analyze multilayer feed forward network for mapping provided through the first network layer and error back propagation algorithm. 4. Analyze and apply algorithmic type problems to tackle problems for which algorithms are not available. 5. Develop and analyze supervised/unsupervised, learning modes of Neural Network for different applications.
18EE751	Industrial Motors & Control	1. Explain the procedure of selecting rating of the motor for any application. 2. Classify DC motors, explain the torque speed characteristics and select a motor for an application. 3. Explain the types of Starting and Breaking of Motors 4. Explain the different types of Speed Control of Motors 5. Selection of Motors for Industrial Drives & Economic Selection of Electric Motors. 6. Discuss Electrical Drawings, Installation, Maintenance & Safety
18EE752	Sensors And Transducers	1. Explain need of transducers and sensors, their classification, advantages and disadvantages and their working. 2. Discuss the recent trends in sensor technologies and their selection. 3. Explain the basics of signal conditioning, signal conditioning equipment, configuration of Data Acquisition System and data conversion. 4. Describe data transmission and telemetry. 5. Explain the measurement of non-electrical quantities- Pressure, temperature, flow, speed, force, torque, power and viscosity
18EE753	Electric Vehicles	1. Explain the roadway fundamentals, laws of motion, vehicle mechanics and propulsion system design. 2. Explain the working of electric vehicles and hybrid electric vehicles in recent trends. 3. Model batteries, Fuel cells, PEMFC and super capacitors. 4. Analyze DC and AC drive topologies used for electric vehicle application. 5. Develop the electric propulsion unit and its control for application of electric vehicles.
18EE754	Electrical Energy Conservation And Auditing	1. Analyze about energy scenario nationwide and worldwide. 2. Discuss load management techniques and energy efficiency. 3. Explain the need of energy audit and energy audit methodology. 4. Explain various pillars of electricity market design. 5. Conduct energy audit of electrical systems and buildings.
18EEL76	Power System Simulation Laboratory	1. Develop a program in MATLAB to assess the performance of medium transmission lines. 2. Build a program in MATLAB to obtain the power-angle curve of salient and non-salient pole synchronous machines. 3. Develop a program in MATLAB to assess transient stability through swing curve. 4. Build programs in MATLAB to formulate bus admittance and bus impedance matrices and analyze short circuit faults using Mi-Power software package. 5. Solve power flow problem for a simple power system using Mi-Power software package. 6. Solve optimal generation scheduling problems for thermal power plants using Mi-Power software package.
18EEL77	Relay And High Voltage Laboratory	1. Determine the characteristics of electromagnetic relays. 2. Determine the characteristics of microprocessor based relays 3. Analyze the spark over characteristics for both uniform and non-uniform configurations using High AC and DC voltages. 4. Measure high AC and DC voltages and breakdown strength

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		of transformer oil. 5. Determine the electric field and measure the capacitance of different electrode configuration models
18EEP78	Project Phase – I	1. Identify and formulate the engineering problems for the need of society. 2. Demonstrate a sound technical knowledge of their selected project topic. 3. Design solutions for engineering problems using modern tool/technology to investigate with interpretation of data. 4. Discuss the impact of the engineering solutions in societal and environmental contexts for sustainable development with commit to professional ethics. 5. Develop teamwork for conducting the project and Communicate effectively through reports & presentations. 6. Adapt engineering, management and ethical principles for Project management and finance.
18EE81	Power System Operation And Control	1. Describe various levels of controls in power systems, components, architecture and configuration of SCADA. 2. Build mathematical models of ALFC by identifying the basic control loops in generator and functions of AGC in an isolated and interconnected systems. 3. Apply the voltage and reactive power controls in power system. 4. Explain reliability, security, contingency analysis, state estimation and its issues in power systems.
18EE821	Facts And Hvdc Transmission	1. Discuss transmission interconnections, flow of Power in an AC System, limits of the loading capability, dynamic stability considerations of a transmission interconnection and controllable parameters. 2. Explain the basic concepts, definitions of flexible ac transmission systems and benefits from FACTS technology. 3. Describe shunt controllers, Static Var Compensator and Static Compensator for injecting reactive power in the transmission system in enhancing the controllability and power transfer capability. 4. Describe series Controllers Thyristor-Controlled Series Capacitor (TCSC) and the Static Synchronous Series Compensator (SSSC) for control of the transmission line current. 5. Explain advantages of HVDC power transmission, overview and organization of HVDC system and converter control for HVDC systems, commutation failure, control functions. 6. Describe the basic components of a converter, the methods for compensating the reactive power demanded by the converter.
18EE822	Electrical Estmation And Costing	1. Explain the principles of estimation and Indian electricity rules. 2. Estimate internal wiring installation using the concepts of cable types and specifications. 3. Estimate service connections and motor wiring installations. 4. Estimate overhead transmission and distribution lines. 5. Estimate substation using the substation components.
18EE823	Electric Vehicle Technologies	1. Explain the working of electric vehicles and recent trends. 2. Analyze different power converter topology used for electric vehicle application. 3. Develop the electric propulsion unit and its control for application of electric vehicles. 4. Design converters for battery charging and explain transformer less topology.
18EE824	Power System Planning	1. Explain the basic concept and structure of power system planning. 2. Analyze the different strategy of generation planning to improve national grid.

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		3. Analyze different designing of optimum power system expansion with computer aided planning. 4. Explain the process to improve reliability of power system and reactive power compensation.
18EE825	Electrical Power Quality	1. Evaluate power quality procedures and standards. 2. Estimate voltage sag performance; explain principles of protection and Sources of transient over voltages. 3. Identify various sources of harmonics, explain effects of harmonic distortion. 4. Evaluate harmonic distortion, control harmonic distortion. 5. Estimate power quality in distribution planning. Identify power quality issues in utility system.
18EEP83	Project Work Phase-Ii	1. Demonstrate the design and solution of the selected project. 2. Build the critical thinking and use problem solving skills. 3. Discuss the impact of the engineering solutions in societal and environmental contexts for sustainable development with commit to professional ethics. 4. Develop on their own, reflect on their learning and take appropriate actions to improve it. 5. Develop teamwork for conducting the project and communicate effectively through reports & presentations. 6. Adapt engineering, management and ethical principles for Project management and finance.
18EES84	Technical Seminar	1. Develop knowledge in the field of electrical and electronics engineering and other disciplines through independent learning and collaborative study. 2. Identify and discuss current, real-time issues. 3. Develop oral and written communication skills. 4. Build an appreciation of the self in relation to its larger diverse social and academic contexts. 5. Apply principles of ethics and respect in interaction with others.
18EEI85	Internship/Professional Practice	1. Adapt the practical experience within industry in which the internship is done. 2. Apply knowledge and skills learned to classroom work and project. 3. Develop a greater understanding about career options. 4. Develop and refine the oral and written communication skills. 5. Adapt the knowledge of administration, marketing, finance and economics.

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Department of Information Science & Engineering

2023-24 BATCH Course Outcomes

2022 Scheme III Year and IV year			
Course code	**Subject code**	**Course Name**	**Course Outcomes**
PCC/BSC	BCS301	Mathematics for Computer Science	1. Explain the basic concepts of probability, random variables, probability distribution 2. Apply suitable probability distribution models for the given scenario. 3. Apply the notion of a discrete-time Markov chain and n-step transition probabilities to solve the given problem 4. Use statistical methodology and tools in the engineering problem-solving process. 5. Compute the confidence intervals for the mean of the population. 6. Apply the ANOVA test related to engineering problems.
IPCC	BCS302	Digital Design & Computer Organization	CO1: Apply the K–Map techniques to simplify various Boolean expressions. CO2: Design different types of combinational and sequential circuits along with Verilog programs. CO3: Describe the fundamentals of machine instructions, addressing modes and Processor performance. CO4: Explain the approaches involved in achieving communication between processor and I/O devices.

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			CO5:Analyze internal Organization of Memory and Impact of cache/Pipelining on Processor Performance
IPCC	BCS303	Operating Systems	CO 1. Explain the structure and functionality of operating system CO 2. Apply appropriate CPU scheduling algorithms for the given problem. CO 3. Analyse the various techniques for process synchronization and deadlock handling. CO 4. Apply the various techniques for memory management CO 5. Explain file and secondary storage management strategies. CO 6. Describe the need for information protection mechanisms
PCC	BCS304	Data Structures and Applications	CO 1. Explain different data structures and their applications. CO 2. Apply Arrays, Stacks and Queue data structures to solve the given problems. CO 3. Use the concept of linked list in problem solving. CO 4. Develop solutions using trees and graphs to model the real-world problem. CO 5. Explain the advanced Data Structures concepts such as Hashing Techniques and Optimal Binary Search Trees
PCCL	BCSL305	Data Structures Lab	• Analyze various linear and non-linear data structures • Demonstrate the working nature of different types of data structures and their applications • Use appropriate searching and sorting algorithms for the give scenario.

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			• Apply the appropriate data structure for solving real world problems
ESC	BCS306A	Object Oriented Programming with Java	1. Demonstrate proficiency in writing simple programs involving branching and looping structures. 2. Design a class involving data members and methods for the given scenario. 3. Apply the concepts of inheritance and interfaces in solving real world problems. 4. Use the concept of packages and exception handling in solving complex problem 5. Apply concepts of multithreading, autoboxing and enumerations in program development

UHV	BSCK307	Social Connect & Responsibility	CO1: Communicate and connect to the surrounding. CO2: Create a responsible connection with the society. CO3: Involve in the community in general in which they work. CO4: Notice the needs and problems of the community and involve them in problem –solving. CO5: Develop among themselves a sense of social & civic responsibility & utilize their knowledge in finding practical solutions to individual and community problems. CO6: Develop competence required for group-living and sharing of responsibilities & gain skills in mobilizing community participation to acquire leadership qualities and democratic attitudes.

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			CO 3. Apply the concepts of Swings to build Java applications CO 4. Develop web based applications using Java servlets and JSP CO 5. Use JDBC to build database applications
IPCC	BCS403	Database Management Systems	• Describe the basic elements of a relational database management system • Design entity relationship for the given scenario. • Apply various Structured Query Language (SQL) statements for database manipulation. • Analyse various normalization forms for the given application. • Develop database applications for the given real world problem. • Understand the concepts related to NoSQL databases.

PCCL	BCSL404	Analysis & Design of Algorithms Lab	1. Develop programs to solve computational problems using suitable algorithm design strategy. 2. Compare algorithm design strategies by developing equivalent programs and observing running times for analysis (Empirical). 3. Make use of suitable integrated development tools to develop programs 4. Choose appropriate algorithm design techniques to develop solution to the computational and complex problems. 5. Demonstrate and present the development of program, its execution and running time(s) and record the results/inferences.

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AEC/ SEC	BCS358D	Data Visualization with Phyton	CO 1. Demonstrate the use of IDLE or PyCharm IDE to create Python Applications CO 2. Use Python programming constructs to develop programs for solving real-world problems CO 3. Use Matplotlib for drawing different Plots CO 4. Demonstrate working with Seaborn, Bokeh for visualization. CO 5. Use Plotly for drawing Time Series and Maps.
PCC/BS C	BCS401	Analysis & Design of Algorithms	1. Apply asymptotic notational method to analyze the performance of the algorithms in terms of time complexity. 2. Demonstrate divide & conquer approaches and decrease & conquer approaches to solve computational problems. 3. Make use of transform & conquer and dynamic programming design approaches to solve the given real world or complex computational problems. 4. Apply greedy and input enhancement methods to solve graph & string based computational problems. 5. Analyse various classes (P,NP and NP Complete) of problems 6. Illustrate backtracking, branch & bound and approximation methods.
IPCC	BIS402	Advanced Java	CO 1. Apply appropriate collection class/interface to solve the given problem CO 2. Demonstrate the concepts of String operations in Java

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ESC	BCS405A	Discrete Mathematical Structures	1. Apply concepts of logical reasoning and mathematical proof techniques in proving theorems and statements. 2. Demonstrate the application of discrete structures in different fields of computer science. 3. Apply the basic concepts of relations, functions and partially ordered sets for computer representations. 4. Solve problems involving recurrence relations and generating functions. 5. Illustrate the fundamental principles of Algebraic structures with the problems related to computer science & engineering.
AEC/ SEC	BCS456A	Green IT and Sustainability	1. Classify the challenges for Green ICT 2. Relate the environmental impact due to emerging technologies. 3. Demonstrate different aspects of ICT metrics. 4. Compare the various parameters related to Sustainable Cloud Computing. 5. Interpret the effects of software design on the sustainability

BSC	BBOC407	Biology For Computer Engineers	1. Elucidate the basic biological concepts via relevant industrial applications and case studies. 2. Evaluate the principles of design and development, for exploring novel bioengineering projects. 3. Corroborate the concepts of biomimetics for specific requirements. 4. Think critically towards exploring innovative biobased solutions for socially relevant problems

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UHV	BUHK408	Universal human values course	They would become more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind. • They would have better critical ability. • They would also become sensitive to their commitment towards what they have understood (human values, human relationship and human society). • It is hoped that they would be able to apply what they have learnt to their own self in different day-to-day settings in real life, at least a beginning would be made in this direction

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Department of Information science & Engineering

2023-24 BATCH Course Outcomes

2021 Scheme			
Course code	**Subject code**	**Course Name**	**Course Outcomes**
BSC	21CS51	Automata Theory and compiler Design	CO 1. Apply the knowledge of searching and reasoning techniques for different applications.
			CO 2. Have a good understanding of machine leaning in relation to other fields and fundamental issues and challenges of machine learning
			CO 3. Apply the knowledge of classification algorithms on various dataset and compare results
			CO 4. Model the neuron and Neural Network, and to analyze ANN learning and its applications.
			CO 5. Identifying the suitable clustering algorithm for different pattern
IPCC	21CS52	Computer Networks	CO 1. Learn the basic needs of communication system.
			CO 2. Interpret the communication challenges and its solution
			CO 3. Identify and organize the communication system network components
			CO 4. Design communication networks for user requirements
PCC	21CS53	Database	CO 1. Identify, analyze and define database objects, enforce integrity constraints on a database

H R Rao

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		Management Systems	using RDBMS
			CO 2. Use Structured Query Language (SQL) for database manipulation and also demonstrate the basic of query evaluation.
			CO 3. Design and build simple database systems and relate the concept of transaction, concurrency control and recovery in database
			CO 4. Develop application to interact with databases, relational algebra expression
			CO 5. Develop applications using tuple and domain relation expression from queries.
PCC	21CS54	Artificial Intelligence and Machine Learning	CO 1. Apply the knowledge of searching and reasoning techniques for different applications.
			CO 2. Have a good understanding of machine leaning in relation to other fields and fundamental issues and challenges of machine learning
			CO 3. Apply the knowledge of classification algorithms on various dataset and compare results
			CO 4. Model the neuron and Neural Network, and to analyze ANN learning and its applications.
			CO 5. Identifying the suitable clustering algorithm for different pattern
PCC	21CSL55	Database Management Systems Laboratory with Mini Project	CO 1. Create, Update and query on the database.
			CO 2. Demonstrate the working of different concepts of DBMS
			CO 3. Implement, analyze and evaluate the project developed for an application.
2021 Scheme			

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Course code	Subject code	Course Name	Course Outcomes
AEC	21RMI56	Research Methodology & Intellectual Property Rights	CO1. To know the meaning of engineering research.
			CO2. To know the procedure of Literature Review and Technical Reading
			CO3. To know the fundamentals of patent laws and drafting procedure .
			CO 4. Understanding the copyright laws and subject matters of copyrights and designs
			CO5. Understandingthebasicprinciplesofdesignrights.
HSMC	21CIV57	Environmental Studies	CO1: Understand the principles of ecology and environmental issues that apply to air, land, and water issues on a global scale,
			CO2: Develop critical thinking and/or observation skills, and apply them to the analysis of a problem or question related to the environment.
			CO3: Demonstrate ecology knowledge of a complex relationship between biotic and a biotic components
			CO4: Apply their ecological knowledge to illustrate and graph a problem and describe the realities that managers face when dealing with complex issues.

HR Ranga

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2021 Scheme			
Course code	**Subject code**	**Course Name**	**Course Outcomes**
AEC	21CSL582	C# programming	1. Develop programs involving basic features of C# programming language
			2. Make use of exception handling features to safeguard program against runtime anomalies
			3. Apply concepts of OOP in developing solutions to problems
			4. Develop programs to illustrate handling of text files
			5. Make use of modern tools to develop C# programs and applications
HSMC	21CS61	Software Engineering and Project Management	CO 1. Understand the activities involved in software engineering and analyze the role of various process models
			CO 2. Explain the basics of object-oriented concepts and build a suitable class model using modelling technique
			CO 3. Describe various software testing methods and to understand the importance of agile methodology and DevOps
			CO 4. Illustrate the role of project planning and quality management in software development
			CO 5. Understand the importance of activity planning and different planning models
IPCC	21CS62	FULLSTACK	CO 1. Understand the working of MVT based full stack web development with Django.

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		DEVELOPMENT	
			CO 2. Designing of Models and Forms for rapid development of web pages
			CO 3. Analyze the role of Template Inheritance and Generic views for developing full stack web applications.
			CO 4. Apply the Django framework libraries to render nonHTML contents like CSV and PDF
			CO 5. Perform jQuery based AJAX integration to Django Apps to build responsive full stack web applications,
PCC	21IS63	Software Testing	CO 1. Explain the significance of software testing and quality assurance in software development
			CO 2. Apply the concepts of software testing to assess the most appropriate testing method.
			CO 3. Analyze the importance of testing in software development
			CO 4. Evaluate the suitable testing model to derive test cases for any given software
			CO 5. Develop appropriate document for the software artefact
PEC	21CS644	Data science and Visualization	CO 1. Understand the data in different forms
			CO 2. Apply different techniques to Explore Data Analysis and the Data Science Process
			CO 3. Analyze feature selection algorithms & design a recommender system
			CO 4. Evaluate data visualization tools and libraries and plot graphs
			CO 5. Develop different charts and include mathematical expressions.
OEC	21BT651	ECOLOGY AND	Understand the importance of the ecosystem, different types and their impact on the environment

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		ECOSYSTEM	
			Correlate the energy flow in ecosystems to maintain ecological balance.
			Analyse the impact of Pollution on the Ecosystem.
			Appreciate the ethical context of environmental issues and the links between human and natural systems
PCC	21ISL66	SOFTWARE TESTING LABORATORY	CO 1. List out the requirements for the given problem and develop test cases for any given problem .
			. CO 2. Design and implement the solution for given problem and to design flow graph
			CO 3. Use Eclipse/NetBeans IDE and testing tools to design, develop, debug the Project and create appropriate document for the software artifact
			CO 4. Use the appropriate functional testing strategies. Compare the different testing techniques
			CO 5. Classify and Compare the problems according to a suitable testing model applying the test coverage metrics

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DEPARTMENT OF INFORMATION SCIENCE AND ENGINEERING

FOURTH YEAR CO'S

VII SEM CO

Course code	Subject code	Course Name	Course Outcomes
PCC	18CS71	Artificial Intelligence and Machine Learning	CO1. Appaise the theory of Artificial intelligence and Machine Learning. CO2. Illustrate the working of AI and ML Algorithms. CO3. Demonstrate the applications of AI and ML.
PCC	18CS72	Big Data Analytics	CO1. Understand fundamentals of Big Data analytics. CO2. Investigate Hadoop framework and Hadoop Distributed File system. CO3. Illustrate the concepts of NoSQL using MongoDB and Cassandra for Big Data. CO4. Demonstrate the MapReduce programming model to process the big data along with Hadoop tools. CO5. Use Machine Learning algorithms for real world big data. CO6. Analyze web contents and Social Networks to provide analytics with relevant visualization tools.
PEC	18CS734	User Interface Design	CO1. Design the User Interface, design, menu creation, windows creation and connection between menus and windows.
PEC	18CS744	Cryptography	CO1. Define cryptography and its principles. CO2. Explain Cryptography algorithms. CO3. Illustrate Public and Private key cryptography. CO4. Explain Key management, distribution and ceritification. CO5. Explain authentication protocols. CO6. Tell about IPSec.

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CO

OEC	18BT752	FORENSIC SCIENCE	CO1.List the various types of forensic branches of science. CO2.Explain the various applications of techniques and usage of technology to gain knowledge and insight that have legal implications.
	18CV753	ENVIRONMENTAL PROTECTION AND MANAGEMENT	CO1. Appreciate the elements of Corporate Environmental Management systems complying to international environmental management system standards. CO2. Lead pollution prevention assessment team and implement waste minimization options. CO3. Develop, Implement, maintain and Audit Environmental Management systems for Organizations.
	18ME751	ENERGY AND ENVIRONMENT	CO1: Understand energy scenario, energy sources and their utilization. CO2: Understand various methods of energy storage, energy management and economic analysis. CO3: Analyse the awareness about environment and eco system. CO4: Understand the environment pollution along with social issues and acts.
	18EE754	ELECTRICAL ENERGY CONSERVATION AND AUDITING	CO1• Discuss load management techniques and energy efficiency. CO2• Understand the need of energy audit and energy audit methodology. CO3• Understand various pillars of electricity market design. CO4• Conduct energy audit of electrical systems and buildings. CO5• Show an understanding of demand side management and energy conservation.
	18EE752	ELECTRIC VEHICLES	CO1. Explain the roadway fundamentals, laws of motion, vehicle mechanics and propulsion system design. CO2 Explain the working of electric vehicles and hybrid electric vehicles in recent trends. CO3• Model batteries, Fuel cells, PEMFC and super capacitors. CO4• Analyze DC and AC drive topologies used for electric vehicle application. CO5• Develop the electric propulsion unit and its control for application of electric vehicles.

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	18EC753	ARM EMBEDDED SYSTEMS	CO1. Describe the principle of smart sensors and process of micromachining in development of smart sensors. CO2. Develop intelligent systems by interfacing the smart sensors to MCUs and DSPs. CO3. Analyze the use of smart sensors in communication, MEMS and automation. CO4. Evaluate the standards of smart sensors by the assessment of reliability testing and packaging. CO5. Discuss the applications of smart sensors in different fields and recent development. CO6. Develop/sketch the simple models of intelligent instrumentation.
PCC	18CSL76	Artificial Intelligence and Machine Learning Laboratory	CO1. Implement and evaluate AI and ML algorithms in and Python programming language.
VIII SEM CO			
PCC	18CS81	Internet of Things	CO1. Interpret the impact and challenges posed by IoT networks leading to new architectural models. CO2. Compare and contrast the deployment of smart objects and the technologies to connect them to network. CO3. Appraise the role of IoT protocols for efficient network communication. CO4. Elaborate the need for Data Analytics and Security in IoT. CO5. Illustrate different sensor technologies for sensing real world entities and identify the applications of IoT in Industry.
PEC	18CS822	Storage Area Networks	CO1. Identify key challenges in managing information and analyze different storage networking technologies and virtualization. CO2. Explain components and the implementation of NAS. CO3. Describe CAS architecture and types of archives and forms of virtualization. CO4. Illustrate the storage infrastructure and management activities.

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DEPARTMENT Of MECHANICAL ENGINEERING

Department of Mechanical Engineering

COURSE OUTCOMES AND COURSE ARTICULATION MATRIX

2022 SCHEME

MECHANICS OF MATERIALS-BME301

CO1	Understand the concepts of stress and strain in simple and compound bars.
CO2	Explain the importance of principal stresses and principal planes & Analyse cylindrical pressure vessels under various loadings
CO3	Apply the knowledge to understand the load transferring mechanism in beams and stress distribution due to shearing force and bending moment
CO4	Evaluate stresses induced in different cross-sectional members subjected to shear loads
CO5	Apply basic equation of simple torsion in designing of circular shafts & Columns

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	-	-	-	-	-	-	-	-	-	2	3	2	-
CO2	3	-	-	-	-	-	-	-	-	-	-	2	2	-	-
CO3	3	2	-	-	-	-	-	-	-	-	-	2	3	2	-
CO4	3	-	-	-	-	-	2	-	-	-	-	2	3	-	1
CO5	3	-	-	-	-	-	2	-	-	-	-	2	3	-	1
Average	3.00	2.00	-	-	-	-	2.00	-	-	-	-	2.00	2.80	2.00	1.00

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DEPARTMENT Of MECHANICAL ENGINEERING

MANUFACTURING PROCESS-BME302															
CO1	Describe the casting process and prepare different types of cast products. Acquire knowledge on Pattern, Core, Gating, Riser system and to use Jolt, Squeeze, and Sand Slinger Moulding machines														
CO2	Compare the Gas fired pit, Resistance, Coreless, Electrical and Cupola Metal Furnaces. Compare the Gravity, Pressure die, Centrifugal, Squeeze, slush and Continuous Metal mold castings														
CO3	Understand the Solidification process and Casting of Non-Ferrous Metals.														
CO4	Describe the Metal Arc, TIG, MIG, Submerged and Atomic Hydrogen Welding processes etc. used in manufacturing														
CO5	Describe the methods of different joining processes and thermal effects in joining process														
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	3	3	-	-	-	-	3	-	-	-	-	2	3	1	1
CO2	3	3	1	-	-	-	-	-	-	-	-	2	3	2	1
CO3	3	3	-	-	-	-	-	-	-	-	-	2	3	-	3
CO4	3	-	-	-	-	-	-	-	-	-	-	2	3	-	3
CO5	3	-	-	-	-	-	-	-	-	-	-	2	3	-	1
Average	3.00	3.00	1.00	-	-	-	3.00	-	-	-	-	2.00	3.00	1.50	1.80

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64

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MATERIAL SCIENCE AND ENGINEERING-BME303															
CO1	Explain the crystallography, crystal structure and imperfections in Solids														
CO2	Explain the phase transformation of Solidification.														
CO3	Describe the heat treatment process of metals. Cooling method for controlling the microstructure and plastic deformation to modify their properties.														
CO4	Explain the powder metallurgy process, types and surface modifications														
CO5	Explain the method of materials selection, material data, properties and knowledge sources for computer-aided selection of materials.														
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	3	2	1	-	-	-	1	-	-	-	-	2	3	2	-
CO2	3	2	1	-	-	-	1	-	-	-	-	2	3	2	-
CO3	3	3	1	-	-	-	1	-	-	-	-	2	3	2	-
CO4	3	3	1	-	-	-	1	-	-	-	-	2	3	2	-
CO5	3	2	1	-	-	-	1	-	-	-	-	2	3	2	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Average	3.00	2.40	1.00	-	-	-	1.00	-	-	-	-	2.00	3.00	2.00	-

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BASIC THERMODYNAMICS-BME304	
CO1	Explain fundamentals of thermodynamics and evaluate the energy interactions across the boundary of thermodynamic systems.
CO2	CO2: Apply 1st law of thermodynamics to closed and open systems and determine quantity of energy transfers.
CO3	Evaluate the feasibility of cyclic and non-cyclic processes using 2nd law of thermodynamics
CO4	Apply the knowledge of entropy, reversibility and irreversibility to solve numerical problems and Interpret the behaviour of pure substances and its applications in practical problems.
CO5	Recognize differences between ideal and real gases and evaluate thermodynamic properties of ideal and real gas mixtures using various relations

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1	-	-	-	-	-	-	-	-	2	3	2	-
CO2	3	3	2	-	-	-	-	-	-	-	-	2	3	2	-
CO3	3	2	2	1	-	-	-	-	-	-	-	2	3	2	-
CO4	3	2	2	-	-	-	-	-	-	-	-	2	3	2	-
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Average	3.00	2.25	1.75	1.00	-	-	-	-	-	-	-	2.00	3.00	2.00	-

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APPLIED THERMODYNAMICS-BME401															
CO1	Analyse air standard cycle to evaluate the performance of I C engines.														
CO2	Analyze the gas power cycles to evaluate the overall efficiency of gas turbine plant.														
CO3	Apply thermodynamic concepts to analyze the performance of vapour power cycles.														
CO4	Analyze the vapour compression and vapour absorption systems to improve refrigeration														
CO5	Determination of various parameters of air compressors and steam nozzels														
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	3	-	-	-	-	-	-	-	-	-	-	1	3	-	-
CO2	3	-	-	-	-	-	-	-	-	-	-	1	3	-	-
CO3	3	-	-	-	-	-	2	-	-	-	-	2	3	-	2
CO4	3	-	-	-	-	-	2	-	-	-	-	2	3	-	2
CO5	3	-	-	-	-	-	2	-	-	-	-	2	3	-	-
Average	3.00	-	-	-	-	-	2.00	-	-	-	-	1.60	3.00	-	2.00

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MACHINING SCIENCE & METROLOGY-BME402															
CO1	Analyze various cutting parameters in metal cutting.														
CO2	Understand the construction of machines & machine tools and compute the machining time of various operations.														
CO3	Understand the concept of Temperature in Metal Cutting, forms of wear in metal cutting and Cutting fluids														
CO4	Understand the objectives of metrology, methods of measurement, standards of measurement & various measurement parameters.Explain tolerance, limits of size, fits, geometric and position tolerances, gauges and their design.														
CO5	Understand the working principle of different types of comparators,guage , angular measurements.														
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	3	-	-	-	3	-	-	-	-	2	-	3	2	-	3
CO2	3	2	-	-	3	-	-	-	-	2	-	3	2	-	3
CO3	3	2	-	-	3	-	-	-	-	2	-	3	2	-	3
CO4	3	2	-	-	3	-	-	-	-	2	-	3	2	-	3
CO5	3	2	-	-	3	-	-	-	-	2	-	3	2	-	3
Average	3.00	2.00	-	-	3.00	-	-	-	-	2.00	-	3.00	2.00	-	3.00

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FLUID MECHANICS-BME403															
CO1	Identify and calculate the key fluid properties used in the analysis of fluid behavior.														
CO2	Understand and apply the principles of pressure, buoyancy and floatation														
CO3	Apply the knowledge of fluid dynamics while addressing problems of mechanical and chemical engineering.														
CO4	Understand the concept of boundary layer in fluid flow and apply dimensional analysis to form dimensionless numbers in terms of input output variables.														
CO5	Understand the basic concept of compressible flow and CFD														
CO6	Conduct basic experiments of fluid mechanics and understand the experimental uncertainties.														
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	3	3	2	3	-	-	-	-	3	3	-	3	3	3	3
CO2	3	3	3	2	-	-	3	-	3	3	-	3	3	3	2
CO3	3	3	3	3	-	-	3	-	3	3	-	3	3	3	2
CO4	3	3	1	1	-	-	-	-	1	3	-	3	3	3	2
CO5	3	2	1	1	-	-	-	-	1	3	-	3	3	3	2
CO6	3	3	2	1	-	-	1	-	2	3	-	3	3	3	-
Average	3.00	2.83	2.00	1.83	-	-	2.33	-	2.17	3.00	-	3.00	3.00	3.00	2.20

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SAPTHAGIRI COLLEGE OF ENGINEERING
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(Affiliated to Visvesvaraya Technological University, Belagavi & Approved by AICTE, New Delhi.)
(Accredited by NAAC with "A" Grade) (Accredited by NBA for ECE, CSE, ISE, ME & EEE)
(An ISO 9001 – 2015 & ISO 14001 – 2015 Certified Institution)
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DEPARTMENT Of MECHANICAL ENGINEERING

NON TRADITIONAL MACHINING-BME405A															
CO1	Describe non-traditional machining process and compare with Traditional machining process. Recognize the need for Non-traditional machining process.														
CO2	Describe the constructional features, performance parameters, process characteristics, applications, advantages, and limitations of USM, AJM and WJM.														
CO3	Characterize the need of Chemical and electro-chemical machining process along with the constructional features, process parameters, process characteristics, applications, advantages, and limitations.														
CO4	Illustrate the constructional feature of the equipment, process parameters, process characteristics,applications , advantages,and limitatios of EDM & PAM														
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	3	3	3	3	-	-	1	-	2	3	-	3	3	3	2
CO2	3	2	1	3	-	-	-	-	2	3	-	2	3	3	2
CO3	3	2	2	3	-	-	-	-	2	3	-	2	3	3	2
CO4	3	3	3	3	-	-	2	-	2	3	-	3	3	3	2
Average	3.00	2.50	2.25	3.00	-	-	1.50	-	2.00	3.00	-	2.50	3.00	3.00	2.00

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SAPTHAGIRI COLLEGE OF ENGINEERING

Department of Mechanical Engineering

COURSE OUTCOMES AND COURSE ARTICULATION MATRIX

2021 SCHEME

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
	PROGRAM OUTCOMES												PROGRAM SPECIFIC OUTCOMES		
	Apply Knowledge	Problem Analysis	Design Solution	Investigation	Modern Tools	Society,Health, Safety, Legal	Environment & Sustainability	Ethics	Individual & Team Work	Report, Document,Presentation, Communication	Proj Mgmt Finance	Life Long Learn	Design,Thermal, Manufacturing	Analytical, Experimental, Creativity	Modern Tools, Management, Product Development
					3	2	1	-							
					High	Medium	Low	No							

21EME15/25-Elements of Mechanical Engineering	
CO1	Describe different sources of energy and calculcate steam properties.
CO2	Summarize the Properties, Composition, and Industrial Application of Engineering Materials
CO3	Paraphraze the automobile technology in transport application and demonstrate basics of Refrigeration and Air-Conditioning
CO4	Analyze the Power transmission systems and describe basics of robotics.
CO5	Describe the concepts of manufacturing and machine tools and latest trends

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	-	-	-	-	2	-	-	-	-	-	-		-
CO2	-	-	-	-	-	-	-	-	-	-	-	-	-		-
CO3	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-
CO4	2	2	-	-	-	-	-	-	-	-	-	3	-	-	-
CO5	-	-	-	-	-	-	-	-	-	-	-	3	3	-	-
Average	2.00	2.00	-	-	-	-	2.00	-	-	-	-	3.00	3.00	-	-

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21EVN15/25-Engineering Visualization

CO1	Visualize and analyze the objects and Demonstrate the usage of CAD software
CO2	Identify the interdisciplinary engineering components or systems through its graphical representation
CO3	Draw orthographic projections of points, lines, planes and solids
CO4	Generate the development of lateral surfaces of solids and isometric projections of solids

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	-	3	-	-	-	-	3	-	3	-	-	3
CO2	3	-	-	-	3	-	-	-	-	3	-	3	-	-	3
CO3	3	3	-	-	3	-	-	-	-	3	-	3	-	-	3
CO4	3	3	-		3	-	-	-	-	-	-	3	-	-	-
Average	3.00	3.00	-	-	3.00	-	-	-	-	3.00	-	3.00	-	-	3.00

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SECOND YEAR

Metal Casting Forming & Joining Process-21ME32

CO1	Select appropriate primary manufacturing process and related parameters for obtaining initial shape and size of components.
CO2	Design and develop adequate tooling linked with casting, welding and forming operations.
CO3	Appreciate the effect of process parameters on quality of manufactured components
CO4	Demonstrate various skills in preparation of molding sand for conducting tensile, shear and compression tests using Universal sand testing machine.
CO5	Demonstrate skills in preparation of forging models involving upsetting, drawing and bending operations.
CO6	Demonstrate skills in preparation of Welding models.

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	-	-	-	-	-	-	-	-	-	3	3	3	-
CO2	3	3	-	-	-	-	-	-	-	-	-	3	3	3	-
CO3	3	3	-	-	-	-	-	-	-	-	-	2	3	3	-
CO4	3	3	-	-	-	-	-	-	-	-	-	3	3	3	-
CO5	3	3	-	-	-	-	-	-	-	-	-	3	3	3	-
CO6	3	3	-	-	-	-	-	-	-	-	-	3	3	3	-
Average	3.00	2.75	-	-	-	-	-	-	-	-	-	2.75	3.00	3.00	-

Material Science and Engineering 21ME33

CO1	Understand the atomic arrangement in crystalline materials and describe the periodic arrangement of atoms in terms of unit cell parameters.
CO2	Understand the importance of phase diagrams and the phase transformations.
CO3	Know various heat treatment methods for controlling the microstructure.
CO4	Correlate between material properties with component design and identify various kinds of defects.
CO5	Apply the method of materials selection, material data and knowledge sources for computer-aided selection of materials.

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	-	-	-	-	-	-	2	3	-	-
CO2	3	-	2	-	-	-	-	-	-	-	-	2	3	-	-
CO3	3	-	-	-	-	-	2	-	-	-	-	2	3	-	-
CO4	3	-	-	-	-	-	-	-	-	-	-	2	3	-	-
CO5	3	-	-	-	-	-	-	-	-	-	-	2	3	-	-
-	3.00	-	2.00	-	-	-	2.00	-	-	-	-	2.00	3.00	-	-

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Thermodynamics 21ME34															
CO1	Determine heat and work interactions in different thermodynamic Processes And first law of thermodynamics.														
CO2	Analyze thermodynamic systems based on Second law of thermodynamics & Entropy concepts														
CO3	Analyze the behavior of the ideal and real gases using gas laws. Compute combustion thermodynamics property.														
CO4	Compute available energy in thermodynamic systems and Pure substances utilization.														
CO5	Analyze the performance parameters of Vapour Power and Gas power Cycles.														
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	3	2	-	-	-	-	2	-	-	-	-	2	3	3	-
CO2	3	2	-	-	-	-	2	-	-	-	-	3	3	3	-
CO3	3	3	-	-	-	-	2	-	-	-	-	2	3	3	-
CO4	3	2	-	-	-	-	-	-	-	-	-	2	3	3	2
CO5	3	2	-	-	-	-	2	-	-	-	-	2	3	3	2
Average	3.00	2.20	-	-	-	-	2.00	-	-	-	-	2.20	3.00	3.00	2.00

Machine Drawing GD&T- 21ME35															
CO1	Interpret the Machining and surface finish symbols on the component drawings														
CO2	Apply limits and tolerances to assemblies and choose appropriate fits for given assemblies.														
CO3	Illustrate various machine components through drawings														
CO4	Create assembly drawings as per the conventions.														
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	-	-	-	-	-	-	-	-	-	-	-	2	2	-	3
CO2	-	-	-	-	-	-	-	-	-	-	-	2	2	-	3
CO3	-	-	-	-	-	-	-	-	-	-	-	2	2	-	3
CO4	-	-	-	-	-	-	-	-	-	-	-	2	2	-	3
CO5	-	-	-	-	-	-	-	-	-	-	-	2	2	-	3
Average	-	-	-	-	-	-	-	-	-	-	-	2.00	3.00	-	3

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Machining Science and Jigs & Fixtures-21ME42															
CO1	Demonstrate the Conventional CNC machines and advanced manufacturing process operations														
CO2	Determine tool life, cutting force, and economy of the machining process.														
CO3	Analyze the influence of various parameters on machine tools' performance														
CO4	Select the appropriate machine tools and process, the Jigs, and fixtures for various applications.														
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	2	-	-	-	-	-	-	-	-	-	-	-	2	-	-
CO2	2	-	-	-	-	-	-	-	-	-	-	-	2	-	-
CO3	2	-	-	-	-	-	-	-	-	-	-	-	2	-	2
CO4	3	-	-	-	-	-	-	-	-	-	-	-	2	-	2
Average	2.20	-	-	-	-	-	-	-	-	-	-	-	2.00	-	2.00

Fluid Mechanics-21ME43															
CO1	Calculate the Fluid properties, Stability of floating bodies and hydrostatic forces on surfaces														
CO2	Apply the principles of fluid kinematics and dynamics for fluid flow problems														
CO3	Analyze the fluid flows.														
CO4	Formulate the relations of fluid properties by using dimensional analysis.														
CO5	Describe the boundary layer concept														
CO6	Explain the thermodynamics of compressible flow and basics of CFD.														
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	2	2	-	-	-	-	-	-	-	-	-	3	2	-	-
CO2	3	3	-	-	-	-	-	-	-	-	-	3	2	-	-
CO3	3	3	-	-	-	-	-	-	-	-	-	3	2	-	-
CO4	3	3	-	-	-	-	-	-	-	-	-	3	3	-	-
CO5	3	2	-	-	-	-	-	-	-	-	-	3	2	-	-
CO6	3	2	-	-	-	-	-	-	-	-	-	3	2	-	-
Average	2.75	2.75	-	-	-	-	-	-	-	-	-	3.00	2.25	-	-

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Mechanics of Materials-21ME44

CO1	Understand simple, compound, thermal stresses and strains their relations and strain energy
CO2	Analyse structural members for stresses, strains and deformations.
CO3	Analyse the structural members subjected to bending and shear loads.
CO4	Analyse shafts subjected to twisting loads.
CO5	Analyse the short columns for stability.

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	-	-	-	-	-	-	-	-	-	-	2	2	-	-
CO2	2	3	-	-	-	-	-	-	-	-	-	2	3	-	-
CO3	2	3	-	-	-	-	-	-	-	-	-	2	3	-	-
CO4	2	3	-	-	-	-	-	-	-	-	-	2	3	-	-
CO5	2	3	-	-	-	-	-	-	-	-	-	2	3	-	-
Average	2.00	3.00	-	-	-	-	-	-	-	-	-	2.00	2.80	-	-

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THIRD YEAR

Management & Economics 18ME51

CO1	Describe the Overview and functions of Management.
CO2	Discuss Decision making, Organizing, Staffing, Directing and Controlling
CO3	Estimate the interest by various Methods.
CO4	Estimate Present, future and annual worth and rate of returns
CO5	Determine the Cost and Depreciation of Product.

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	-	-	2	2	-	2	2	-	-	3
CO2	-	-	-	-	-	-	-	2	2	-	2	2	-	-	3
CO3	2	2	-	-	-	-	-	-	-	-	3	2	-	-	-
CO4	2	3	-	2	-	-	-	-	-	-	3	2	-	-	-
CO5	2	3	-	-	-	-	-	2	-	-	3	3	-	-	3
Average	2.00	2.67	-	2.00	-	-	-	2.00	2.00	-	2.60	2.20	-	-	3.00

Design of Machine Elements-I 18ME52

CO1	Describe and apply various codes and standards in design process.
CO2	Analyze the behaviour of machine elements subjected to static, impact and fatigue loading.
CO3	Design shafts, couplings and joints for power transmission
CO4	Design riveted and welded joints
CO5	Design threaded fasteners and power screws

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	3	-	-	-	-	-	-	-	-	3	3	-	-
CO2	3	3	3	2	-	2	-	-	-	-	-	3	3	3	2
CO3	3	3	3	2	-	2	-	-	-	-	-	2	3	3	2
CO4	3	3	3	2	-	2	-	-	-	-	-	2	3	3	2
CO5	3	3	3	2	-	2	-	-	-	-	-	2	3	3	2
Average	3.00	3.00	3.00	2.00	-	2.00	-	-	-	-	-	2.40	3.00	3.00	2.00

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Dynamics of Machines 18ME53															
CO1	Examine simple mechanisms for static and dynamic equilibrium.														
CO2	Investigate the balancing of rotating and reciprocating masses.														
CO3	Evaluate various characteristics of the governor and gyroscope.														
CO4	Analyze free vibration of single degree of freedom systems.														
CO5	Analyze forced vibration of single degree of freedom system and transverse vibration of the shaft														
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	3	3	2	-	-	-	-	-	-	-	-	3	3	3	-
CO2	3	3	2	-	-	-	2	-	-	-	-	2	3	3	-
CO3	3	2	-	-	-	-	-	-	-	-	-	-	3	3	-
CO4	3	3	-	-	-	-	-	-	-	-	-	2	3	3	-
CO5	3	3	2	-	-	-	-	-	-	-	-	2	3	3	-
Average	3.00	2.80	2.00	-	-	-	2.00	-	-	-	-	2.25	3.00	3.00	-

Turbo Machines 18ME54															
CO1	Determine the fluid flow parameters by using model studies.														
CO2	Determine efficiency of turbo machines by using thermodynamic principles.														
CO3	Analyze energy transfer in turbo machines.														
CO4	Determine performance parameters of steam turbine.														
CO5	Design and determine performance parameters of hydraulic turbines.														
CO6	Evaluate performance parameters of centrifugal pump, centrifugal and axial compressor.														
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	3	3	2	-	-	-	-	-	-	-	-	2	3	3	-
CO2	3	2	-	-	-	-	-	-	-	-	-	3	3	3	-
CO3	3	3	-	-	-	-	-	-	-	-	-	3	3	3	-
CO4	3	3	2	-	-	-	2	-	-	-	-	2	3	3	-
CO5	3	3	3	-	-	-	-	-	-	-	-	2	3	3	-
CO6	3	3	2	-	-	-	-	-	-	-	-	2	3	3	-
Average	3.00	2.83	2.25	-	-	-	2.00	-	-	-	-	2.33	3.00	3.00	-

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Fluid Power Engg 18ME55															
CO1	Describe structural components and working of hydraulic systems.														
CO2	Distinguish different types of pumps and actuators and Determine performance parameters.														
CO3	Apply the design of hydraulic circuit using control components for given applications.														
CO4	Describe pneumatic power system and its components.														
CO5	Apply the design of pneumatic control circuit.														
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	-	-	-	-	-	-	-	-	-	-	-	2	3	-	-
CO2	2	-	-	-	-	-	-	-	-	-	-	2	3	-	-
CO3	2	2	2	-	-	-	-	-	-	-	-	-	3	-	-
CO4	-	-	-	-	-	-	-	-	-	-	-	2	3	-	-
CO5	2	2	2	-	-	-	-	-	-	-	-	-	3	-	-
Average	2.00	2.00	2.00	-	-	-	-	-	-	-	-	2.00	3.00	-	-

OPERATIONS MANAGEMENT (18ME56)															
CO1	Able to describe Production Management Functions and Interpret Decision making Process.														
CO2	Able to explain the forecasting process.														
CO3	Able to recognize the Capacity and location Planning.														
CO4	Able to explain the Aggregate Planning and Master Scheduling.														
CO5	Able to identifythe Material Requirement Planningand Supply Chain Management.														
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	2	-	-	-	-	-	-	2	-	2	2	2	1	-	2
CO2	2	-	-	-	-	-	-	-	-	2	2	2	1	-	2
CO3	2	-	-	-	-	-	-	-	-	2	2	2	1	-	2
CO4	2	-	-	-	2	-	-	-	-	2	2	2	1	2	2
CO5	2	-	-	-	2	-	-	-	-	2	2	2	1	2	2
Average	2.00	-	-	-	2.00	-	-	2.00	-	2.00	2.00	2.00	1.00	2.00	2.00

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Environmental Studies (18CIV59)															
CO1	Understand the principles of ecology and environmental issues that apply to air, land, and water issues on a global scale,														
CO2	Develop critical thinking and/or observation skills, and apply them to the analysis of a problem or question related to the environment.														
CO3	Demonstrate ecology knowledge of a complex relationship between biotic and a biotic components.														
CO4															
CO5															
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	-	-	-	-	-	3	3	-	-	-	-	3	-	-	-
CO2	-	-	-	-	-	3	3	-	-	-	-	3	-	-	-
CO3	-	-	-	-	-	3	3	-	-	-	-	3	-	-	-
CO4													-	-	-
CO5															
Average	-	-	-	-	-	3.00	3.00	-	-	-	-	3.00	-	-	-

Fluid Mechanics & Machines Lab 18MEL57															
CO1	Analyze the performance of power developing and Power absorbing machines.														
CO2	Calibrate and determine the flow properties of flow measuring devices.														
CO3	Analyze major and minor losses for flow through pipes.														
CO4	Analyze the impact of jet on vanes.														
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	-	3	-	2	-	-	1	-	3	3	-	3	3	3	-
CO2	-	3	-	2	-	-	1	-	3	3	-	-	3	3	-
CO3	-	3	-	2	-	-	1	-	3	3	-	2	3	3	-
CO4	-	3	-	2	-	-	1	-	3	3	-	-	3	3	-
Average	-	3.00	-	2.00	-	-	1.00	-	3.00	3.00	-	2.50	3.00	3.00	-

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Energy Conversion Lab 18MEL58															
CO1	Analyze the properties of fuels and oils.														
CO2	Analyze performance of IC engines and draw its characteristics.														
CO3	Investigate performance on Air Compressors and draw its characteristics.														
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	-	3	-	3	-	3	3	-	2	3	-	2	3	3	-
CO2	-	3	-	3	-	2	3	-	3	3	-	2	3	3	-
CO3	-	3	-	3	-	2	3	-	3	3	-	2	3	3	-
Average	-	3.00	-	3.00	-	2.33	3.00	-	2.67	3.00	-	2.00	3.00	3.00	-

Finite Element Analysis 18ME61															
CO1	Apply basics of finite element formulation methods.														
CO2	Derive interpolation functions for structural elements.														
CO3	Apply finite element formulation to determine structural behavior of bar, truss, beam and shaft.														
CO4	Formulate 1D heat transfer and fluid flow problems.														
CO5	Determine numerical solution for axisymmetric triangular element subjected to point load.														
CO6	Formulate ID bar and truss element subjected to dynamic loading.														
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	3	2	-	-	-	-	-	-	-	-	-	-	3	2	-
CO2	2	-	-	-	-	-	-	-	-	-	-	-	3	1	-
CO3	3	3	3	2	-	-	-	-	-	-	-	3	3	3	-
CO4	3	3	3	2	-	-	-	-	-	-	-	2	3	3	-
CO5	3	3	3	2	-	-	-	-	-	-	-	2	3	3	-
CO6	3	3	3	2	-	-	-	-	-	-	-	2	3	3	-
Average	2.83	2.80	3.00	2.00	-	-	-	-	-	-	-	2.25	3.00	2.50	-

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Design of Machine Elements-II 18ME62															
CO1	Design springs, clutches and brakes.														
CO2	Design belts and wire ropes for power transmission.														
CO3	Design different types of gears.														
CO4	Design and analyze bearings for engineering applications														
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	3	3	3	2	-	2	2	-	-	-	-	3	3	3	-
CO2	3	3	3	2	-	2	2	-	-	-	-	3	3	3	2
CO3	3	3	3	3	-	2	2	-	-	-	-	3	3	3	2
CO4	3	3	3	2	-	2	2	-	-	-	-	3	3	3	2
Average	3.00	3.00	3.00	2.25	-	2.00	2.00	-	-	-	-	3.00	3.00	3.00	2.00

Heat Transfer 18ME63															
CO1	Apply concept of the conduction heat transfer of steady and unsteady state.														
CO2	Analyze one-dimensional and two-dimensional steady and unsteady state heat conduction using numerical methods.														
CO3	Analyze the radiation heat transfer by applying fundamental laws														
CO4	Determine convective heat transfer using non-dimensional numbers.														
CO5	Evaluate performance parameters using LMTD and NTU methods.														
CO6	Determine heat transfer co-efficient of boiling and condensation.														
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	3	2	2	2	-	-	2	-	-	-	-	2	3	3	-
CO2	3	3	3	-	-	-	1	-	-	-	-	2	3	3	-
CO3	3	3	3	-	-	-	2	-	-	-	-	2	3	3	-
CO4	3	2	3	2	-	-	-	-	-	-	-	-	3	3	-
CO5	3	2	2	2	-	-	2	-	-	-	-	2	3	3	-
CO6	3	2	3	2	-	-	2	-	-	-	-	2	3	3	-
Average	3.00	2.33	2.67	2.00	-	-	1.80	-	-	-	-	2.00	3.00	3.00	-

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Heat Transfer Lab 18MEL67															
CO1	Estimate the thermal conductivity of metal rod, composite wall and effectiveness of extended surfaces.														
CO2	Analyze convective heat transfer coefficient for free and forced convection														
CO3	Investigate the surface emmissivity of a test plate and Stefan Boltzman constant validation.														
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	-	3	-	3	-	2	2	-	3	3	-	2	3	3	-
CO2	-	3	-	3	-	2	2	-	3	3	-	2	3	3	-
CO3	-	3	-	3	-	2	2	-	3	3	-	2	3	3	-
Average	-	3.00	-	3.00	-	2.00	2.00	-	3.00	3.00	-	2.00	3.00	3.00	-

Modeling & Analysis Lab 18MEL68															
CO1	Demonstrate the finite element analysis software.														
CO2	Analyze 1-D and 2-D Structural Problems.														
CO3	Analyze 1-D and 2-D Heat Transfer Problems.														
CO4	Evaluate the dynamic behavior for Bars and Beams Problems														
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	-	-	-	-	3	-	-	-	-	-	-	3	3	3	3
CO2	-	3	2	2	3	-	-	-	2	3	-	3	3	3	3
CO3	-	3	2	2	3	-	-	-	2	3	-	3	3	3	3
CO4	-	3	2	2	3	-	-	-	2	3	-	3	3	3	3
Average	-	3.00	2.00	2.00	3.00	-	-	-	2.00	3.00	-	3.00	3.00	3.00	3.00

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FOURTH YEAR															
Control Engineering 18ME71															
CO1	Describe the Basic Principles of control system and controllers														
CO2	Determine the system governing equations for physical models of mechanical, hydraulic,Pneumatic and electrical system.														
CO3	Illustrate the response of 1st and 2nd order systems														
CO4	Determine the transfer function of a control system using Block diagram reduction technique and Signal flow graphs														
CO5	Solve the stability of the control system using Nyquist, Polar, Bode and root locus methods														
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	-	-	2	-	-	-	-	-	-	-	-	2	-	-	-
CO2	3	3	2	-	-	-	-	-	-	-	-	2	3	3	-
CO3	3	3	-	-	-	-	-	-	-	-	-	-	3	3	-
CO4	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-
CO5	3	3	-	-	-	-	-	-	-	-	-	-	3	3	-
Average	3.00	3.00	2.00	-	-	-	-	-	-	-	-	2.00	3.00	3.00	-

Computer Aided Design and Manufacturing-18ME72															
CO1	Describe the basics of automated manufacturing systems and mathematical model to analyze the different types of automated flowlines.														
CO2	Explain the different types of manufacturing planning and control system using graphics software.														
CO3	Discuss the Flexible manufacturing system														
CO4	Write CNC part program and programs for Robots.														
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	-	-	-	-	-	-	-	-	-	-	-	3	3	-	-
CO2	-	-	-	-	-	-	-	-	-	-	-	3	3	-	-
CO3	-	-	-	-	-	-	-	-	-	-	-	3	3	-	-
CO4	-	-	-	-	-	-	-	-	-	-	-	3	3	-	-
Average	-	-	-	-	-	-	-	-	-	-	-	3.00	3.00	-	-

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Design Lab -18MEL76															
CO1	Analyse the vibration characteristics in a single degree of freedom vibrating systems														
CO2	Analyse the rotating elements for balancing, critical speed of shaft.														
CO3	Compute the fringe constant of photo elastic material for different loading conditions.														
CO4	Analyse the characteristics of governors														
CO5	Evaluate the stresses for combined loading in straight and curved beam using strain gauges														
CO6	Analyse pressure distribution in journal bearing														
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	-	3	-	3	-	-	-	-	3	3	-	3	3	3	-
CO2	-	3	-	3	-	-	-	-	3	3	-	3	3	2	-
CO3	-	3	-	3	-	-	-	-	3	3	-	-	3	2	-
CO4	-	3	-	3	-	-	-	-	3	3	-	-	3	2	-
CO5	-	3	-	3	-	-	-	-	3	3	-	3	3	2	-
CO6	-	3	-	3	-	-	-	-	3	3	-	2	3	2	-
Average	-	3.00	-	3.00	-	-	-	-	3.00	3.00	-	2.75	3.00	2.17	-

CIM Lab-18MEL77															
CO1	Demonstrate the Simulation softwares in Manufacturing														
CO2	Simulate Turning Operations using CNC software														
CO3	Simulate Milling operations using CNC software														
CO4	Demonstrate flexible manufacturing and Robots.														
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	-	-	-	-	3	-	-	-	-	3	-	2	3	-	3
CO2	-	3	-	-	3	-	-	-	2	3	-	2	3	2	3
CO3	-	3	-	-	3	-	-	-	2	3	-	2	3	2	3
CO4	-	-	-	-	3	-	-	-	-	-	-	2	2	-	2
Average	-	3.00	-	-	3.00	-	-	-	2.00	3.00	-	2.00	2.75	2.00	2.75

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Project Phase 1 18MEP78															
CO1	Identify, formulate and analyze engineering problems for the need of society.														
CO2	Design solutions for engineering problems using modern tool/technology to investigate with interpretation of data														
CO3	Analyze the impact of the engineering solutions in societal and environmental contexts for sustainable development with commit to professional ethics														
CO4	Work individually and in team, Communicate effectively through reports and presentations.														
CO5	Apply engineering, management and ethical principles for Project management and finance														
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	3	3	-	3	-	3	3	-	-	-	-	3	3	3	-
CO2	3	3	3	3	3	3	3	-	-	-	-	3	3	3	3
CO3	3	3	-	3	-	3	3	-	-	-	-	3	3	3	-
CO4	-	-	-	-	-	-	-	-	3	3	-	3	-	-	-
CO5	3	-	-	-	-	-	-	3	-	-	3	3	-	-	3
Average	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00

Operations Research-18ME735															
CO1	Describe the basics of operations research and Analyze linear programming problems														
CO2	Formulate and optimize transportation and assignment problems.														
CO3	Evaluate project completion time using PERT and CPM techniques and formulate strategies of game.														
CO4	Evaluate job sequencing and queuing theory models.														
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	3	3	2	-	-	-	-	-	-	-	2	2	-	3	-
CO2	3	3	2	2	-	-	-	-	-	-	2	2	-	3	-
CO3	3	3	3	2	-	-	-	-	-	-	3	2	-	3	-
CO4	3	3	2	2	-	-	-	-	-	-	3	2	-	3	-
Average	3.00	3.00	2.25	2.00	-	-	-	-	-	-	2.50	2.00	-	3.00	-

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Additive Manufacturing-18ME741															
CO1	Describe the different process of additive manufacturing														
CO2	Illustrate the working of different types of actuators														
CO3	Outline the different process of polymerization and powder metallurgy techniques.														
CO4	Describe the different characterization techniques.														
CO5	Demonstrate the various NC, CNC machine programming and Automation techniques														
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	-	-	-	-	-	-	-	-	-	-	-	3	3	-	-
CO2	-	-	-	-	-	-	-	-	-	-	-	3	3	-	-
CO3	-	-	-	-	-	-	-	-	-	-	-	3	3	-	-
CO4	-	-	-	-	-	-	-	-	-	-	-	3	3	-	-
CO5	3	2	-	-	-	-	-	-	-	-	-	3	3	2	-
Average	3.00	2.00	-	-	-	-	-	-	-	-	-	3.00	3.00	2.00	-

Total Quality Management-18ME734															
CO1	Discuss the Principle and Application of Total Quality Management in Organizations.														
CO2	Describe the Quality, Roles of Leaders and Principles of Leadership.														
CO3	Discuss customers satisfactions and involvement in Service and Products.														
CO4	Analyze the use of Statistical Tools for Continuous Improvement of Processes.														
CO5	Apply Tools and Techniques of Total Quality Management.														
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	-	-	-	-	-	-	-	3	2	-	-	3	-	-	3
CO2	-	-	-	2	-	-	-	3	2	-	2	3	-	-	3
CO3	-	-	-	-	-	-	-	3	-	-	2	3	-	-	3
CO4	-	2	-	2	-	-	-	2	-	-	2	3	-	-	3
CO5	3	-	-	2	-	-	-	2	-	-	2	3	-	-	3
Average	3.00	2.00	-	2.00	-	-	-	2.60	2.00	-	2.00	3.00	-	-	3.00

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Design for Manufacturing-18ME731															
CO1	Outline the different phases and concepts of DFM and Process capabilities.														
CO2	Describe the Theories of assembly and Dimensioning parameters.														
CO3	Review and Modify the Design of a component for Manufacturing Process														
CO4	Review and Modify consideration for Casting and Welding.														
CO5	Illustrate the Design consideration for forging, powder metallurgy and injection moulding.														
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	2	-	-	-	-	-	-	-	-	-	-	2	3	-	2
CO2	2	-	-	-	-	-	-	-	-	-	-	2	3	-	2
CO3	-	-	-	3	-	-	-	-	-	-	-	2	3	2	2
CO4	-	-	-	3	-	-	-	-	-	-	-	2	3	2	2
CO5	-	-	-	3	-	-	-	-	-	-	-	2	3	2	2
Average	2.00	-	-	3.00	-	-	-	-	-	-	-	2.00	3.00	2.00	2.00

Mechatronics-18ME744															
CO1	Summarise the Components of Mechatronics Systems														
CO2	Describe the basic, architecture of Microprocessor and Microcontroller														
CO3	Examine the Programmable Logic Controller														
CO4	Describe the principles of Actuation System and its classification, application														
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	3	-	-	-	2	-	-	-	-	-	-	3	3	1	2
CO2	-	-	-	-	2	-	-	-	-	-	-	3	3	1	2
CO3	3	-	-	2	2	-	-	-	-	-	-	3	3	1	2
CO4	-	-	-	-	2	2	-	-	-	-	-	3	3	1	2
Average	3.00	-	-	2.00	2.00	2.00	-	-	-	-	-	3.00	3.00	1.00	2.00

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Energy Engineering 18ME81

CO1	Summarize the concepts of steam power plant.
CO2	Describe the solar and Biomass energy conversion technology
CO3	Outline the tidal, wind and geo thermal energy conversion technology
CO4	Illustrate the concepts of Ocean energy extraction and Analyze parameters of Hydroelectric power plant.
CO5	Summarize the Nuclear Energy conversion methods.

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	-	3	-	-	-	-	2	2	-	-
CO2	-	-	-	-	-	-	3	-	-	-	-	2	2	-	-
CO3	-	-	-	-	-	-	3	-	-	-	-	2	2	-	-
CO4	-	-	-	-	-	-	3	-	-	-	-	2	2	-	-
CO5	-	-	-	-	-	-	3	-	-	-	-	2	2	-	-
Average	-	-	-	-	-	-	3.00	-	-	-	-	2.00	2.00	-	-

Tribology-18ME822

CO1	Recognize and describe the fundamentals of tribology and associated parameters.
CO2	Analyze performance and design of components experiencing relative motion.
CO3	Analyze the requirements and design hydrodynamic journal and plane slider bearings for a given application.
CO4	Select proper bearing materials and lubricants for a given tribological application
CO5	Apply the principles of surface engineering for different applications of tribology.

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1	-	-	-	-	-	-	-	-	2	3	-	2
CO2	3	3	3	2	-	2	2	-	-	-	-	2	3	3	2
CO3	3	3	3	2	-	2	2	-	-	-	-	2	3	3	2
CO4	3	3	3	2	-	2	2	-	-	-	-	2	3	3	2
CO5	3	3	3	2	-	2	2	-	-	-	-	2	3	3	2
Average	3.00	2.80	2.60	2.00	-	2.00	2.00	-	-	-	-	2.00	3.00	3.00	2.00

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Professor & Head
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Internship/Professional Bodies 18MEI85															
CO1	Apply gained knowledge and skills in engineering practice														
CO2	Analyze and design solutions for engineering problems.														
CO3	Work individually, in team and communicate effectively through reports and presentations														
CO4	Demonstrate apt workplace attitude and ethics														
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	3	3	3	3	-	3	2	-	-	-	-	3	2	2	3
CO2	3	3	3	3	2	3	-	-	-	-	2	3	2	2	3
CO3	-	-	-	-	-	-	-	3	3	3	-	3	-	-	3
CO4	-	-	-	-	-	-	-	3	3	-	2	3	-	-	-
Average	3.00	3.00	3.00	3.00	2.00	3.00	2.00	3.00	3.00	3.00	2.00	3.00	2.00	2.00	3.00
Project Phase- II 18MEP83															
CO1	Identify, formulate and analyze engineering problems for the need of society.														
CO2	Design solutions for engineering problems using modern tool/technology to investigate with interpretation of data														
CO3	Analyze the impact of the engineering solutions in societal and environmental contexts for sustainable development with commit to professional ethics														
CO4	Work individually and in team, Communicate effectively through reports and presentations.														
CO5	Apply engineering, management and ethical principles for Project management and finance														
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	3	3	-	3	-	3	3	-	-	-	-	3	3	3	-
CO2	3	3	3	3	3	3	3	-	-	-	-	3	3	3	3
CO3	3	3	-	3	-	3	3	-	-	-	-	3	3	3	-
CO4	-	-	-	-	-	-	-	-	3	3	-	3	-	-	-
CO5	3	-	-	-	-	-	-	3	-	-	3	3	-	-	3
Average	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
18MES84 Technical Seminar															
CO1	Identify and explore recent trends in mechanical engineering														
CO2	Prepare effective report on the selected topic														
CO3	Prepare power point presentation (PPT), communicate and answer the queries on the topic														
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	3	3	-	3	3	2	2	3	3	3	-	3	3	3	-
CO2	-	-	-	-	3	-	-	3	3	3	-	3	3	3	-
CO3	-	-	-	-	3	-	-	3	3	3	-	3	3	3	-
Average	3.00	3.00	-	3.00	3.00	2.00	2.00	3.00	3.00	3.00	-	3.00	3.00	3.00	-

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