Course: **Calculus and Linear Algebra**

Course Code: **21MAT11**

Course Outcomes:
Upon completion of this course, students will be able to

CO.1 : Apply the knowledge of calculus to solve problems related to polar curves and its applications to determine the bending of a curve.

CO.2 : Apply the notion of partial differentiation to calculate the rate of change of multivariate functions and solve problems related to composite functions and Jacobians.

CO.3 : Apply the concept of change the order of integration and variables to evaluate multiple integrals and their usage in computing the area and the volumes.

CO.4 : Solve first order linear/nonlinear differential equations analytically using standard methods.

CO.5 : Make use of matrix theory for solving system of linear equations and compute Eigen values and Eigen vectors required for matrix diagonalization process.

Course: Engineering Physics

Course code: 21PHY12/22

Course outcomes: Upon completion of this course, students will be able to:

[CO1]. Understand the principles of quantum mechanics and compute Eigen values and Eigen function using Schrodinger's equation.

[CO2]. Understand various electrical and thermal properties of materials like conductors, semiconductors, and dielectrics using different theatrical models.

[CO3]. Apprehend Theoretical background of laser and optical fibers, construction and working of different types of lasers and optical fibers and their application in different fields.

[CO4]. Analyze the elastic properties of materials for engineering applications, understanding various relations between elastic constants.

[CO5]. Understanding the various types of oscillation theories and their implication, Understand the various measurement techniques.

Course: **Fundamentals of Electrical Engineering**
Course Code: **21FEE13/23**

Course outcomes:

Upon completion of this course, students will be able to.

CO1: Solve the problems related to DC & AC circuits.

CO2: Analyze single phase and three phase AC circuits.

CO3: Distinguish the constructional details &working principle of AC machines.

CO4: Compare the constructional details & working principle of motors.

CO5: Explain Power system scheme, electrical wiring and safety measures

Course: Elements Of Civil Engineering
Course Code: 21CIV14/24

Course outcomes:
Upon completion of this course, students will be able to.
CO1: Know basics of Civil Engineering, its scope of study, knowledge about Roads, Bridges and Dams.
CO2: Understand the basic principles of Surveying and recognize the good materials to be used for the construction work.
CO3: Comprehend the action of Forces, Moments and other loads on systems of rigid bodies.
CO4: Compute the reactive forces and the effects that develop as a result of the external loads.
CO5: Locate the Centroid and compute the moment of inertia of regular sections.

Course: **ENGINEERING GRAPHICS**
Course Code: **21EGDL15/25**

Course outcome
At the end of the course the student will be able to:
  CO 1. Prepare and understand engineering drawings.
  CO 2. Identify and apply the principles of orthographic projections of lines, planes and solids.
  CO 3. Identify and apply the principles of orthographic projections and prepare development of lateral surfaces.
  CO 4. Visualize three dimensional objects and develop isometric projections.
  CO 5. Visualize engineering components.

Course: Professional English Course - I
Code: 21PEI16

Course Outcomes: On completion of this course students will be able to
CO1: Reproduce Grammatical English and construct formal sentences.
CO2: Develops English speaking and writing skills.
CO3: Articulate English vocabulary at command and language proficiency.
CO4: Understand professional communication and improves speaking skills
CO5: Develops Vocabulary and language proficiency

Course: **Engineering Physics Laboratory**
Course code: **21PHYL17/27**

Course outcomes: Upon completion of this course, students will be able to:
  [CO1]. Understand the Stefan's Law and apprehend the concept of Fermi energy and Dielectric constant.
[CO2]. Understand the principles of operations of optical fibers, apprehend the concept of diffraction and interference (Newton's rings) experiments using light source.
 [CO3]. Determine elastic moduli and moment of inertia of given materials with the help of suggested procedures.
 [CO4]. Understand the concept of spring constant, Recognize the resonance concept using LCR circuits.
[CO5]. Understand the importance of measurement procedure, honest recording and representing the data, reproduction of final results.

Course: Basic Electrical Laboratory
Course Code: 21BEL18/28
Course outcomes:
Upon completion of this course, students will be able to
CO 1: Realize the concepts of open circuit, short circuit, KCL & KVL in a DC circuit.
CO 2: Determine the resistance, inductance & impedance, power factor of different types of loads and energy consumed in a 1-Ø AC circuit.
CO 3: Determine the phase, line quantities & power in 3-Ø star & delta connected systems.
CO 4: Evaluate the performance of transformers.
CO 5: Realize the concepts of electrical wiring, circuit protecting devices &earthing.

Course: Study Skill & Self Development
Course Code: 21SSD19/29
Course outcomes: upon completion of course, the students will be able to:

[CO1]. Aware of study skills, Improved reading speed and writing speed, Improved skills in book review
[CO2]. Improve concentration, attention, and listening skills, Improved memory and practice memory techniques, Improved coping skills with regard to exam anxiety, Improved skills in group and cooperative learning.
[CO3]. Set specific goals with regard to career and prioritize goals and move towards achieving them, Use time wisely, identify time wasters, and manage time effectively and efficiently.
[CO4]. Increased self-motivation, self-direction, Identify self-motivational drives and, Firmly utilize the motivational drives for achieving goals.
[CO5]. Improve mental health management, improve physical and mental fitness to manage the stress in bad situations.

Course: Engineering Chemistry
Course Code: 21CHE12/22

Course Outcomes: On completion of this course students will be able to:
CO-1: Demonstrate the use of electrochemical cells for production of electricity. Construction and application of the batteries.
CO-2: Identify the causes and effects of corrosion on metals and control of corrosion. Modification of surface properties of metal to develop resistance to corrosion wear and tear resistance etc by electroplating and electro less plating.
CO-3: Explain production and consumption of energy for industrialization of country and living standards of peoples. Fuel cells and utilization of solar energy for different useful form of energy
CO-4: To understand synthesis, properties and application of polymersin various engineering fields.
CO-5: Apply various instruments to analyze the sample and analysis of water sample and identify the impurities. Design the process for purification of water towards the safety of public health and environment.

Course: PROBLEM SOLVING THROUGH C PROGRAMMING
Course Code: 21PSP13/23

Course Outcomes: On completion of this course, students will be able to:
CO1: Identify and name the hardware components of Computer.
CO2: Apply programming constructs of C language to solve the real world problem
CO3: Write a program to emphasis uses of arrays by implementing solutions to problems
    like searching and sorting
CO4: Write a program to emphasis uses of structures, pointers and files in implementing
solutions
CO5: Design and Develop Solutions to problems using modular programming constructs
    using functions

Course Title   :Electronics & Communication-Fundamentals and Applications
Course Code   :21ELN14/24
Course Outcomes:
CO1: Analyze the role of active and passive electronic components in the development of rectifiers,
voltage regulators, amplifiers and oscillators.
CO2: Apply the fundamental knowledge of digital logic to realize the applications of combinational
and sequential circuits through task based learning.
CO3: Interpret the characteristics and technological advances of embedded systems associated with
sensors, actuators and communication protocols related to specific applications.
CO4: Related the analog and digital communication engineering concepts, spanning from frequency
spectrum basic modulation concepts and radio wave propagation to the applications of contemporary
communication systems.
CO5: Discuss the modes of communications from wired to wireless and appreciate the trend of
emerging technologies relating to real life examples.

Course: ELEMENTS OF MECHANICAL ENGINEERING
Course Code: 21EME15/25

Course Outcomes: At the end of the course the student will be able to:
CO1. The students will be aware of their mechanical engineering,energy and power generation
through prime movers
CO2. The students can compare the different power units of IC Engine, hybrid and electric,
demonstrate the basic concepts of refrigeration.
CO3. Demonstrate knowledge and understanding of force on materials and power transmission.
CO4. Identifying various engineering materials and the concept of basic manufacturing process.
CO5. Apply the knowledge about the concepts of digital manufacturing process, robotics and its
application.

Course: Engineering Chemistry Lab
Course Code: 21CHEL17/27
Course Outcomes: On completion of this course student knowledge in
CO-1: Carrying out titrations for the analysis of water for hardness, COD and CaO in cement.
CO-2: Estimation of concerned in the materials using Iodometric and red-ox titration.
CO-3: Apply electrochemical properties in the analysis of electrolytes using conductometric,
pH metric and potentiometric instrumental methods.
CO-4: Demonstrate the use of optical properties in the analysis of materials using

colorimetry method.
CO-5: Apply Ostwald's viscometer for determination of viscosity coefficient of liquids.

Course: **COMPUTER PROGRAMMING LABORATORY**
Course Code: 21CPL18/28

Course Outcome (Course Skill Set)

At the end of the course the student will be able to
1. Define the problem statement and identify the need for computer programming.
2. Make use of C compiler, IDE for programming, identify and correct the syntax and syntactic errors in programming.
3. Develop algorithm, flowchart and write programs to solve the given problem.
4. Demonstrate use of functions, recursive functions, arrays, strings, structures and pointers in problem solving.
5. Document the inference and observations made from the implementation.

Course: Communicative Enhancement Practice
Course Code: 21CEP19/29
Course Outcomes:
On completion of the Course, Students will be able to;
 CO1. Develops listening skills.
 CO2. Use grammatical English and essential language skills.
 CO3.Improves professional communication skills, professional reading, and writing practices.
 CO4. Develops vocabulary and language proficiency.
 CO5. Identify the nuances of phonetics, intonation, and flawless pronunciation.

Course: Advanced Calculus and Numerical methods
Course Code: 21MAT21
Course Outcomes: Upon completion of this course, students will be able to
CO.1 : Illustrate the applications of multivariate calculus to understand the Solenoidal and Irrotational vectors and exhibit the inter dependence of line, surface and volume integrals.
CO.2 :Apply Laplace Transform and Inverse Laplace Transform in solving differential/integral equation arising in network analysis, control systems and other fields of Engineering.
 CO.3 : Demonstrate various physical models through higher order differential equations and solve such linear ordinary differential equations.
CO.4 : Construct a variety of partial differential equations and solution by exact methods/method of separation of variables.
CO.5 : Apply the knowledge of numerical methods in the modelling of various physical and Engineering phenomena.

COURSE OUTCOMES

COURSE: Transform Calculus, Fourier series & Numerical Techniques (18MAT31)

On completion of this course, students will be able to:

CO301.1	Use Lapace transorm and inverse Lapcetransform in solving differential/ Integral equations arising in Network anlynasis ,controal systems and otherfild of engineering
CO301.2	Demonstrate Fourier series to study the behoviour of periodic fuctions and theier applications in system commuinactions,digital sigal processing and filed theory
CO301.3	Make us of Fourier Transforms and Z-transforms to illustrate discrate /continous fuctions arising in wave and heat propation,signals and system.
CO301.4	Solve the first and second order ODE arising in Engineering problems using single step mutistep numerical methods.
CO301.5	Determine the external of the functional using caluculus of variations and solve problems arising in dynamics of rigid bodies and vibrational analysis

COURSE OUTCOMES

COURSE: Complex Analysis, Probability and Statistical Methods (18MAT41)

On completion of this course, students will be able to:

CO401.1	Use the concepts of analytic functions and complex potentials to solve the problems arising in electromagnetic field theory.
CO401.2	Utilize conformal transformation and complex integral arising in aerofoil theory, fluid flow visualization and image processing.
CO401.3	Applying discrete and continuous probability distributions in analysing the probability models arising in engineering field.
CO401.4	Make use of the correlation and regression analysis to fit a suitable mathematical model for the statistical data.
CO401.5	Construct joint probability distributions and demonstrate the validity of testing hypothesis.

CSE- Course Outcomes (COs) 18 SCHEME FOR FIRST SEMISTER TO SIXTH SEMISTER

Course code	Course Name	CO-numbering	Statement
18CPS13/23	C PROGRAMMING FOR PROBLEM SOLVING	CO 1	To list and name the parts of a computer system
		CO 2	To Illustrate simple algorithm from different domains such as mathematics, physics.
		CO 3	To construct a programming solution to the given problem in C.
		CO 4	To identify and correct the syntax and logical errors in C programs.
		CO 5	To solve the given problem based on pointers, functions and structures using modular approach

Course code	Course Name	CO-numbering	Statement
18CPL17/27	C PROGRAMMING LAB	CO 1	Demonstrate the Basic parts of a Computer
		CO 2	Design a Flowchart and Develop an Algorithm for Different Problems.
		CO 3	Develop a well documented C program for a given problem
		CO 4	Demonstrate verification and validation of the program correctness
		CO 5	Interpret and debug the given C program

Course code	Course Name	CO-numbering	Statement
18CS32	Data Structures and Applications	CS302.1	Identify types of data structures ,primitive and non primitive , Linear and, Non Linear
		CS302.2	Construct data structures arrays, stack, queues, linked list, trees and graphs with operations
		CS302.3	Develop the Applications of various Data structures
		CS302.4	Identify different Sorting Methods, Hashing Techniques and File structures
		CS302.5	Solve computing problems using appropriate data structures

Course code	Course Name	CO-numbering	Statement
18CS33	Analog and Digital electronics	CO303.1	Design and analyze application of analog circuits using photo devices, timer IC, power supply and regulator IC and op-amp.
		CO303.2	Apply different techniques like Karnaugh Map, and Quine-McClusky Methods to simplify Boolean functions and draw the logic Circuit.
		CO303.3	Design the combinational circuits by using various logical blocks and write simple VHDL programs.
		CO303.4	Demonstrate the use of Gates and flip flops in designing different registers and counters and compare the types.
		CO303.5	Analyze the working of various A/D and D/A conversion circuits.

Course code	Course Name	CO-numbering	Statement
18CS34	Computer Organization	CO304.1	Demonstrate The basic structure of computers & machine instructions and programs, Addressing Modes, Assembly Language, Stacks, Queues and Subroutines.
		CO304.2	Identify the need for Input/output Organization such as accessing I/O Devices, Interrupts, Direct memory access, Ports, Bus.
		CO304.3	Analyze the Memory system basic Concepts and evaluating the memory system with respect to cost and performance.
		CO304.4	Analyze the Memory system basic Concepts and evaluating the memory system with respect to cost and performance.
		CO304.5	Utilize the concepts of Basic Processing Unit.

Course code	Course Name	CO-numbering	Statement
18CS35	Software Engineering	CO305.1	Apply the fundamental knowledge of Requirement Engineering Process for the development of appropriate software.
		CO305.2	Identify and analyse the appropriate design for the development of software system.
		CO305.3	Test software of varying complexity to analyse and interpret the data.

		CO305.4	Identify and apply appropriate project development plan and cost estimation techniques.
		CO305.5	Use current techniques, skills and tools necessary for solving real world problems.

Course code	Course Name	CO-numbering	Statement
18CS36	DISCRETE MATHEMATICAL STRUCTURES	CS306.1	Apply the concepts of proportional logic for truth verificaation
		CS306.2	Solve the problems involving relatinons, functions
		CS306.3	Analyse the statements using mathematical proof techniques
		CS306.4	Analyse the problems using principles of combinotorics in the context of discrete mathematics
		CS306.5	Identify the properties of graphs

Course code	Course Name	CO-numbering	Statement
18CSL37	Analog and Digital electronics Lab	CS307.1	Construct various analog circuits using op-amps and 555 timers.
		CS307.2	Design and evaluate combinational/sequential logic circuits using basic gates.
		CS307.3	Design and evaluate the working of sequential circuits.
		CS307.4	Develop VHDL code for various combinational and sequential circuits and demonstrates its working using simulation package.
		CS307.5	Design and implement analog circuits using Microsim simulation package.

Course code	Course Name	CO-numbering	Statement
18CSL38	Data Structures Lab	**CO308.1**	Demonstrate the working nature of different types of Data Structures.
		CO308.2	Demonstrate applications of Data Structures.
		CO308.3	Implement different Searching Algorithms.
		CO308.4	Choose the appropriate Data Structure for solving real world problems.

Course code	Course Name	CO-numbering	Statement
18CS42	Design and Analysis of Algorithms	CO402.1	Analyze the performance of recursive and non recursive algorithms and use of asymptotic notations.
		CO402.2	Illustrate algorithm design strategies (Divide & Conquer, Greedy technique etc)
		CO402.3	Analyze the computational complexity of algorithms designed using various design techniques
		CO402.4	Apply appropriate algorithm design technique to find solution to the problems
		CO402.5	Identify suitable algorithm design technique to cope up with the limitations of Algorithm power

Course code	Course Name	CO-numbering	Statement
18CS43	Operating Systems	CO403.1	Analyze the need of OS, responsibilities of OS, OS services and process concept.
		CO403.2	Compare different multithreading models, process scheduling techniques, process synchronization methods
		CO403.3	Appraise memory management strategies, deadlock situation, prevention, avoidance and recovery
		CO403.4	Implement virtual memory management concept, page replacement algorithms and file system.
		CO403.5	Discuss the storage structure, protection and different concepts of OS with respect to Linux case studies.

Course code	Course Name	CO-numbering	Statement
18CS44	MICROPROCESSOR AND MICROCONTROLLER	CO404.1	Identify the fundamentals of ARM based systems, The ARM Design Philosophy, Embedded System Hardware and Embedded System Software
		CO404.2	Demonstrate instruction set of ARM controller with example

		CO404.3	Outline the fundamentals of embedded systems
		CO404.4	Make use Embedded System Design Concepts
		CO404.5	Explain the real time operating system used for the embedded system

Course code	Course Name	CO-numbering	Statement
18CS45	Object Oriented Concepts	CO405.1	Identify classes, objects, members of a class and relationship among them needed for a specific problem
		CO405.2	Develop JAVA application programs using control statements
		CO405.3	Implementing programs on Inheritance and Exception handling in JAVA.
		CO405.4	Demonstrate the concepts of Multithreaded Programs in JAVA
		CO405.5	Develop the event based GUI handling principles using Swings

Course code	Course Name	CO-numbering	Statement
18CS46	DATA COMMUNICATION	CO406.1	Interpret the data communication system in different types of networks.
		CO406.2	Demonstrate various types of data conversion like DDC, ADC, DAC etc.
		CO406.3	Apply their knowledge to utilize the bandwidth efficiently as well as to deal with errors.
		CO406.4	Categorise different types of Medium Access Control and different classes of IP addresses.
		CO406.5	Distinguish between wired LANs, wireless LANs and other wireless networks.

Course code	Course Name	CO-numbering	Statement
18CSL47	Design and Analysis of Algorithm Lab	CO407.1	Demonstrate concepts of Object Oriented programming
		CO407.2	Analyze different algorithm design techniques
		CO407.3	Compare the performance of sorting algorithms
		CO407.4	Choose suitable algorithm design approach to solve a given problem.
		CO407.5	Apply algorithm design techniques to solve real world problems.

Course code	Course Name	CO-numbering	Statement
18CSL48	Microcontroller and Embedded Systems Laboratory	CO408.1	Explain ARM architecture and its features.
		CO408.2	Illustrate the ARM instruction sets using simple programs.
		CO408.3	Develop assembly language programs using ARM instruction set.
		CO408.4	Design and simulate ARM assembly programs using KEIL.
		CO408.5	Develop ARM Interface programs to interface hardware devices with ARM7TDMI/LPC2148.

Course code	Course Name	CO-numbering	Statement
18CS51	M&E for IT	C0501.1	Define the basic functions of management & importance of planning.
		C0501.2	Analyze the staffing activities & directing in an organization.
		C0501.3	Outline importance of entrepreneurship skills in industries.
		C0501.4	Formulation of project report.
		C0501.5	Evaluate the different financial institutions support towards small scale industry.

Course code	Course Name	CO-numbering	Statement

18CS52	Computer Networks and Security	CO502.1	Analyze the principles of application layer protocols.
		CO502.2	Categorize the transport layer services and explain working of UDP and TCP protocols.
		CO502.3	Describe the router architecture, IP and routing algorithms in network layer.
		CO502.4	Explain the wireless and mobile networks covering IEEE802.11 standard.
		CO502.5	Define the multimedia network applications and network support for multimedia.

Course code	Course Name	CO-numbering	Statement
18CS53	Database Management Systems	CO503.1	Discuss the overview of Database Management Systems, Languages and Architectures
		CO503.2	Identify, design and analyze database objects, enforce integrity constraints on a database using RDBMS
		CO503.3	Use Structured Query Language (SQL) for database manipulation.
		CO503.4	Design and normalize simple database systems
		CO503.5	Describe the concurrency and Recovery Techniques.

Course code	Course Name	CO-numbering	Statement
18CS54	Automata Theory and Computability	CO504.1	Apply Automata theory concept and design Finite state Machine for given Formal Laguages
		CO504.2	Construct Regular Expressions and Regular Grammars for given Regular Languages
		CO504.3	Design Context Free Grammars and Push Down Automata for given Context Free Languages
		CO504.4	Design Turing Machines for given Context Free Languages
		CO504.5	Demonstrate Linear Bounded Automata,Decidability and Decidable Languages

Course code	Course Name	CO-numbering	Statement
18CS55	Application Development Using Python	CO505.1	Acquire proficiency in handling of loops and creation of functions.
		CO505.2	Apply the methods to create and manipulate lists, tuples and dictionaries
		CO505.3	Utilize the commonly used operations involving regular expressions and file system
		CO505.4	Apply the Python Object-Oriented Programming concepts to different applications
		CO505.5	Make use of the advanced concepts like web scarping, CSV, JSON and other file formats for different applications.

Course code	Course Name	CO-numbering	Statement
18CS56	UNIX PROGRAMMING	CO506.1	Define the architecture and salient features of UNIX OS.
		CO506.2	Interpret UNIX Commands, Shell basic and shell environments.
		CO506.3	Design and develop shell programs using loops, control statements, regular expression and UNIX commands.
		CO506.4	Create UNIX File I/O and Processes.
		CO506.5	Make use of Unix System Calls to interrupt the process and to write programs using different IPCs.

Course code	Course Name	CO-numbering	Statement
18CSL57	Computer Networks Lab	CO507.1	Apply the TCP/UDP protocols to simulate on a network using NS2 Simulator
		CO507.2	Analyze the netwoking concepts GSM and CDMA using NS2 simulator.
		CO507.3	Interpret the network and transport layer algorithms like Bellman Ford and Leaky Bucket Algorithm.
		CO507.4	Evaluate the error detection techniques to detect the errors and cryptographic techniques for providing security
		CO507.5	Design and develop an application for client/server using TCP and UDP.

Course code	Course Name	CO-numbering	Statement
18CSL58	DBMS LAB	CO508.1	Apply fundamentals of SQL commands to construct a database.
		CO508.2	Analyze and Design database schema for a given problem domain.
		CO508.3	Design and implement various databases (Ex. Employee, Movies etc.)
		CO508.4	Evaluate nested queries for data manipulation.
		CO508.5	Design, Develop and Evaluate mini project using modern tools(Like Oracle, MySQL, NetBeans, Eclipse, Apache Tomcat)

Course code	Course Name	CO-numbering	Statement
18CS61	System Software & Compiler Design	CO601.1	Apply the process of Lexical Analysis to generate tokens present in the Source Program
		CO601.2	Construct Parsing Table and Parse the given input string for Top down and Bottom up Parser
		CO601.3	Design intermediate code for a given Program
		CO601.4	Design algorithms for assembler and Macroprocesor
		CO601.5	Build Algorithms for Loader and Linker

Course code	Course Name	CO-numbering	Statement
18CS62	Computer Graphics and Visualization	CO602.1	Explain applications of computer graphics, architecture of display devices.
		CO602.2	Implement standard graphics primitives using OpenGL.
		CO602.3	Perform geometrical transformations on 2D and 3D primitives.
		CO602.4	Solve problems on clipping 2D, 3D primitives and Identify classical viewing .
		CO602.5	Apply Hidden surface removal and Generate Bezier spline curves.

Course code	Course Name	CO-numbering	Statement
18CS63	WEB TECHNOLOGIES & ITS APPLICATIONS	CO603.1	Design dynamic web pages with good aesthetic sense of designing.
		CO603.2	Develop dynamic web pages with latest technical know-how's.
		CO603.3	Demonstrate understanding of web applications terminology, internet tools and other web services.
		CO603.4	Interpret HTML,JavaScript and PHP programming.
		CO603.5	Examine how to link and publish websites.

Course code	Course Name	CO-numbering	Statement
18CS641	Data Mining and Data Warehousing	CO604.1	Summarize the fundamental concepts and the problem areas associated with Data Mining & Warehousing.
		CO604.2	Apply proper data mining tasks/algorithms to solve analytical problems.
		CO604.3	Apply basic statistical methods to evaluate the data mining models
		CO604.4	Analyze the supervised and un-supervised models/algorithms systematically.
		CO604.5	Discover the information embedded in the high dimensional data mining systems.

Course code	Course Name	CO-numbering	Statement
18CSMP68	Mobile Application Development	C0601.1	Learn to setup Android application development environment
		C0601.2	Illustrate user interfaces for interacting with apps and triggering actions
		C0601.3	Interpret tasks used in handling multiple activities

		CO601.4	Identify options to save persistent application data
		CO601.5	Appraise the role of security and performance in Android applications

Course code	Course Name	CO-numbering	Statement
18CSL66	System Software Lab	CO606.1	Analyze the programs lexically and syntactically using LEX and YACC tool.
		CO606.2	Build programs to generate parsing table and machine code for a given a grammar.
		CO606.3	Evaluate the different CPU scheduling techniques used in OS.
		CO606.4	Analyze the Banker's algorithm for avoiding deadlock state.
		CO606.5	Examine page replacement algorithms for efficient memory management.

Course code	Course Name	CO-numbering	Statement
18CSL67	Computer Graphics Laboratory with mini project	CO607.1	Explain the mathematical and theoretical principles of computer graphics to draw basic objects like lines, triangles and polygons using OpenGL built-in functions.
		CO607.2	Apply the concepts of computer graphics
		CO607.3	Analyse and evaluate the use of computer graphics methods in practical applications of 2D & 3D Representations
		CO607.4	Develop computer graphics applications using OpenGL
		CO607.5	Build an animated solution to solve real world problems using OpenGL

Course code	Course Name	CO-numbering	Statement
18ME651	NON CONVENTIONAL ENERGY SOURCES (OPEN ELECTIVE)	CO6051.1	Describe the environmental aspects of non-conventional energy resources in comparison with various conventional energy systems, their prospects and limitations.
		CO6052.2	Understand the concepts of solar energy, its radiation geometry, collection, storage and application. Analyze the performance and its parameters of Liquid flat plate collators used in the solar energy
		CO6053.3	Appreciate the need of Wind Energy and the various components used in energy generation. Acquire the knowledge of tidal power and ocean energy principles, know the classifications and
		CO6054.4	Understand the concept of Biomass energy resources and their classification, types of biogas Plants applications, Acquire the knowledge of Hydrogen energy, geothermal energy principles and

Course code	Course Name	CO-numbering	Statement
18ME653	SUPPLY CHAIN MANAGEMENT	CO6053.1	Understand the frame work and scope of the Supply Chain Management
		CO6053.2	Build and Manage a competitive supply chain using strategies, models, techniques and information technology
		CO6053.3	Understand warehousing, stores management to contribute for operation and cost effectiveness along with network designing in supply chain
		CO6053.4	Plan the demand, inventory and supply optimization in the network
		CO6053.5	Understand the emerging trends and impact of IT on supply chain

CSE- Course Outcomes (COs) 17 SCHEME FOR 7TH & 8TH SEMISTER			
Course code	**Course Name**	**CO-numbering**	**Statement**
17CS71	Web Technology and its applications	CO701.1	Apply the syntax and semantics of web development tools used in web application design.
		CO701.2	Identify the need of client server model for web services.
		CO701.3	Analyze the principles of object oriented development used in the dynamic web application.
		CO701.4	Examine web development framework(Jquery, Backbone) for asynchronous web communication.
		CO701.5	Develop a web page using web development tools to realize web development and its protocol(HTTP).
Course code	**Course Name**	**CO-numbering**	**Statement**
17CS72	Advanced Computer Architectures	C0702.1	Illustrate concepts of parallel computing
		C0702.2	Explain hardware technologies of processor and memory hierarchy
		C0702.3	Illustrate opertaional principles of Bus,Cache and Shared memory organization
		C0702.4	Compare and Contrast the parellel architectures
		C0702.5	Illustrate parallel programming concepts
Course code	**Course Name**	**CO-numbering**	**Statement**
17CS73	Machine Learning	CO703.1	Explain the underlying basic theory/foundations of concept learning, applications and challenges of machine learning.
		CO703.2	Apply the supervised and un-supervised models/algorithms systematically to real world examples.
		CO703.3	Analyze and evaluate statistical models using a Bayesian learning approach
		CO703.4	Evaluate hypothesis and investigate instant based learning and reinforced learning
		CO703.5	Present a technical report/document on application of machine learning techniques.
Course code	**Course Name**	**CO-numbering**	**Statement**
17CS742	Cloud computing and its application	CO742.1	Explain cloud computing, virtualization and classify services of cloud computing
		CO742.2	Introduce the broad perceptive of cloud architecture and model
		CO742.3	Apply different cloud programming model as per need.
		CO742.4	Explore the important cloud computing driven systems such as Google Apps, Microsoft Azure and AWS and other businesses applications.
		CO742.5	Identify the benefits, challenges and applications of cloud computing
Course code	**Course Name**	**CO-numbering**	**Statement**
17CS754	Storage Area Networks	CO754.1	CLASSIFY STORAGE ARCHITECTURES
		CO754.2	ANALYZE FIBER CHANNEL NETWORK ARCHITECTURE
		CO754.3	ANALYZE BUSINESS CONTINUITY SOLUTIONS
		CO754.4	EXPLAIN THE BENEFITS OF CLOUD COMPUTING IN STORAGE AREA NETWORK
		CO754.5	IDENTIFY DIFFERENT STORAGE VIRTUALIZATION TECHNOLOGIES FOR INFORMATION SECURITY

Course code	Course Name	CO-numbering	Statement
17CSL76	MACHINE LEARNING LABORATORY	CO706.1	Explain the underlying basic theory/foundations of concept learning, applications and challenges of machine learning.
		CO706.2	Illustrate the application of decision tree learning to visualize the real world data.
		CO706.3	Learn training, verification and validation of neural network models.
		CO706.4	Explain how conditional probability and Bayes Theorem relate to the analysis of data via the Bayesian paradigm.
		CO706.5	Apply various classification methods to analyse real time data.
Course code	Course Name	CO-numbering	Statement
17CSL77	WEB TECHNOLOGY LABORATORY WITH MINI PROJECT	CO707.1	Design dynamic web pages with good aesthetic sense of designing.
		CO707.2	Develop dynamic web pages with latest technical know-how's.
		CO707.3	Demonstrate understanding of web applications terminology, internet tools and other web services.
		CO707.4	İnterpret HTML,JavaScript and PHP programming.
		CO707.5	Examine how to link and publish websites.
Course code	Course Name	CO-numbering	Statement
17CSP78	Project Phase 1 + Seminar	CO708.1	Evaluating the knowledge of contemporary issues through literature surveys
		CO708.2	Exhibit effective presentation skills
		CO708.3	Ability to work in real time environment
		CO708.4	Ability to utilize technical resources
		CO708.5	Ability to Prepare technical documents
Course code	Course Name	CO-numbering	Statement
17CS81	Internet of Things and Applications	CO801.1	Illustrate IoT Architectural Models
		CO801.2	Analyze the deployment of smart objects and the technologies to connect them to network.
		CO801.3	Choose Suitable IoT protocols for efficient network communication.
		CO801.4	Design the various techniques to analyze data and provide Security in IoT.
		CO801.5	Demonstrate real time IoT Application
Course code	Course Name	CO-numbering	Statement
17CS82	Big Data Analytics	CO802.1	Illustrate Hadoop Distributed File System and MapReduce Programming
		CO802.2	Explain the Hadoop tools and manage Hadoop with Ambari
		CO802.3	Appraise the role of Business intelligence and its applications
		CO802.4	Illustrate data mining techniques for data analytics
		CO802.5	Identify various Text mining techniques
Course code	Course Name	CO-numbering	Statement

17CS834	SYSTEM MODELLING AND SIMULATION	CS803.1	Analyze single, multichannel queuing models of a stochastic system
		CS803.2	Analyze the behaviour of dynamic system in the contest of discrete event simulation.
		CS803.3	Apply methods to generate random numbers and random variates.
		CS803.4	Examine the performance measures of queuing models.
		CS803.5	Test for the properties of random numbers for the acceptance of input model..

Course code	Course Name	CO-numbering	Statement
17CS84	Internship/ Professional Practice	CO804.1	Make use of appropriate Resources and IT tools
		CO804.2	Make effective Presentation
		CO804.3	Write effective Report
		CO804.4	Function effectively as member in multidisciplinarry environment

Course code	Course Name	CO-numbering	Statement
17CSP85	Project work phase II	CS805.1	Evaluating the knowledge of contemporary issues through literature surveys
		CS805.2	Exhibit effective presentation skills
		CS805.3	Ability to work in real time environment
		CS805.4	Ability to utilize technical resources
		CS805.5	Ability to Prepare technical documents

Course code	Course Name	CO-numbering	Statement
17CSS86	Seminar	CS806.1	Evaluating the knowledge of contemporary issues through literature surveys
		CS806.2	Exhibit effective presentation skills
		CS806.3	Ability to work in real time environment
		CS806.4	Ability to utilize technical resources
		CS806.5	Ability to Prepare technical documents

			DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING (E&CE)
Course code	**Course Name**	**CO-numbering**	**Statement**
18ELN14/24	Basic Electronics	C103.1	Understand characteristics, operation and applications of diodes. Understand the operation of photodiode, LED, Photocoupler and 7805 fixed IC voltage regulator.
		C103.2	Understand the construction, operation and characteristics of FET and SCR
		C103.3	Understand OPAMP and its applications.Astable oscillator using timer IC555.
		C103.4	Understand BJT and explain its applications. Discuss Feedback amplifiers and different types of oscillators.
		C103.5	Understand the different number systems and working of fundamental building blocks of digital circuits. understand the basic principle of operation of communication system and mobile phones.

Course code	**Course Name**	**CO-numbering**	**Statement**
18EC32	Network Theory	CO302.1	Apply differential equation knowledge of mathematics to mesh/ node analysis source transformation/source shifting and to find the solution of passive linear networks.
		CO302.2	select and apply network theorems to obtain desired parameters of passive linear networks and also test linear passive 2 port networks,
		CO302.3	Differentiate between series and parallel resonance circuit and also demonstrate using frequency response for any circuit to find performance metrics like quality factor, bandwidth..etc
		CO302.4	correlate mathematical knowledge of initial and final value theorem to analyze the behaviour of circuit elements under transient conditions.

Course code	**Course Name**	**CO-numbering**	**Statement**
18EC33	Electronic Devices	CO303.1	Understand the principles of semiconductor Physics
		CO303.2	Understand the principles and characteristics of different types of semiconductor devices
		CO303.3	Utilize the mathematical models of semiconductor junctions and MOS transistors for circuits and systems.
		CO303.4	Understand& analyse the fabrication process of semiconductor devices

Course code	**Course Name**	**CO-numbering**	**Statement**
18EC34	Digital System Design	CO304.1	Apply the fundamental concepts, terminology of logic design and different Boolean postulates and various simplification methods (K-map, Quin-MuClusky, MEV) to solve the given problem.
		CO304.2	Apply the knowledge of basic combinational components to design the other combinational circuits.
		CO304.3	Analyse the concepts of sequential circuits and design the different types of sequential circuits like registers, ripple counters.
		CO304.4	Design the various sequential circuits like synchronous counters, Mealy and Moore circuits.
		CO304.5	Design the various applications of digital circuits like code converters, ROM, PLAs, and FPGA.

Course code	Course Name	CO-numbering	Statement
18EC35	Computer Organization & Architecture	CO305.1	Illustrate the functional units of
		CO305.2	To use instruction set and addressing modes in instruction execution and compare the same with Complex instruction set computer and Reduced instruction set computer.
		CO305.3	Demonstrate the hardware and software features of a processor to communicate with its environment.
		CO305.4	Summarize trade off between size, speed and cost with Random access memory, Read only memory and virtual memory of a processor.
		CO305.5	Illustrate organization of single, multiple bus and micro programmed processor.

Course code	Course Name	CO-numbering	Statement
18EC36	Power Electronics & Instrumentation	CS306.1	Build and test circuits using power electronic devices
		CS306.2	Analyze and design controlled rectifier, DC to DC converters, DC to AC inverters and SMPS.
		CS306.3	Define instrument errors.
		CS306.4	Develop circuits for multirange Ammeters, Voltmeters and Bridges to measure passive component values and frequency.
		CS306.5	Describe the principle of operation of Digital instruments and PLCs and Use Instrumentation amplifier for measuring physical parameters.

Course code	Course Name	CO-numbering	Statement
18ECL37	Electronic Devices & Instrumentation Lab	CS307.1	Understand the characteristics of various electronic Devices and measurement of parameters.
		CS307.2	Design and Test Simple electronic circuits
		CS307.3	Use of Circuit simulation Software for the implementation and characterization of electronic circuits and devices.

Course code	Course Name	CO-numbering	Statement
18ECL38	Digital System Design Lab	**CO308.1**	Apply Boolean laws to simply the digital circuits and design simple logic circuits.
		CO308.2	Design, test and evaluate various combinational circuits such as adder, subtractor, comparator, multiplexer and demultiplexer.
		CO308.3	Construct the various flipflops and test for its functionality.
		CO308.4	Design and test the various sequential circuits such as shift register, pseudo sequence generators and counters.
		CO308.5	Simulate various sequential circuits.

Course code	Course Name	CO-numbering	Statement
18EC42	Analog Circuits	CO402.1	To design the basic BJT,MOSFET biasing circuits and analyze the small signal models.
		CO402.2	To understand the Mosfet amplifier configuration and analyze the frequency response of CS amplifier.
		CO402.3	To classify different feedback configurations and output stages.
		CO402.4	To analyze and apply Opamp with negative feedback.
		CO402.5	To analyze opamp circuits like ADC,active filters,applications of 555 timer.

Course code	Course Name	CO-numbering	Statement
18EC43	Control Systems	CO403.1	Derive a mathematical model of a given system(physical, mechanical or electrical) represented through block diagram and signal flow graph
		CO403.2	Determine the behaviour of time response and steady state errors of I and II order systems for standard test input signals
		CO403.3	Analyze the stability of a system using numerical (Rouths-Harwitz criteria)and graphical (root locus)app roach
		CO403.4	Evaluate and Correlate the stability of a system using time and frequency responses
		CO403.5	Model a control system in continuous and discrete time using state variable technique

Course code	Course Name	CO-numbering	Statement
18EC44	Engineering Statistics & Linear Algebra	CO404.1	Identify and Associate single random variable with continous and discrete distribution.
		CO404.2	To analyze bivariate or multivariate distribution and correlation between random variables.
		CO404.3	Analyze the concepts of random process,power spectral densities with linear sytems.
		CO404.4	Compute quantitative parameters for matrices,linear transformations and orthogonality of vectos and subspaces
		CO404.5	Apply the techniques of determinants, use eigen values and eigen vectors to analyze the single valued decomposition.

Course code	Course Name	CO-numbering	Statement
18EC45	Signals & Systems	CO405.1	Explain the difference between continuous and discrete time signals, basic operations performed on signals and properties of systems.
		CO405.2	Establish the mathematical relations between input and output signals for the Linear-time- invariant (LTI) systems in time-domain form and frequency-domain representations.
		CO405.3	Analyze the systems using Fourier transforms and Z transforms.
		CO405.4	Demonstrate an understanding the concept of Impulse sampling and reconstruction.
		CO405.5	Apply the concepts to real-world scenarios.

Course code	Course Name	CO-numbering	Statement
18EC46	Microcontroller	CO406.1	Explain the difference between Microprocessors & Microcontrollers, Architecture of 8051 Microcontroller and Interfacing of 8051 to external memory and Instruction set of 8051.
		CO406.2	Write 8051 Assembly level programs using 8051 instruction set.
		CO406.3	Explain the Interrupt system, operation of Timers/Counters and Serial port of 8051.
		CO406.4	Write 8051 Assembly language program to generate timings and waveforms using 8051 timers, and I/O ports to send & receive serial data using 8051 serial port and to generate an external interrupt using a switch.
		CO406.5	Interface simple switches, simple LEDs, ADC 0804, LCD and Stepper Motor to 8051 using 8051 I/O ports.

Course code	Course Name	CO-numbering	Statement
18ECL47	Microcontroller Lab	CO407.1	Enhance programming skills using assembly language and C.
		CO407.2	Write assembly language programs in 8051 for solving simple problems that manipulate input data using different instructions of 8051.
		CO407.3	Interface different input and output devices to 8051 and control them using assembly language programs. Interface different input and output devices to 8051 and control them using assembly language
		CO407.4	Interface the serial devices to 8051 and do the serial transfer using C programming.
		CO407.5	Develop applications based on Microcontroller 8051.

Course code	Course Name	CO-numbering	Statement
18ECL48	Analog Circuits Lab	CO408.1	Design Amplifier and oscillator circuits using BJT/FET and evaluate their performance charecteristics.
		CO408.2	Design analog circuits using OPAMP's for different applications
		CO408.3	Design and demonstrate the 555 timer operations in astable and monostable configurations
		CO408.4	Simulate and analyze analog circuits that uses FETs / BJT for different configurations.

Course code	Course Name	CO-numbering	Statement
18ES51	Technological Innovation Management and Entrepreneurship	C0501.1	Recall and identify the relevance of management concepts & its principles.
		C0501.2	Describe, discuss and relate management functions adopted within an organization.
		C0501.3	Realize the social responsibilities towards business and entrepreneurship.
		C0501.4	Understand the components using feasibility analysis in developing various business plan.
		C0501.5	Awareness about various sources of funding and institutions supporting entrepreneurs

Course code	Course Name	CO-numbering	Statement
18EC52	Digital Signal Processing	CO502.1	Explain the frequency domain sampling and reconstruct discrete time signal
		CO502.2	Compute DFT of a discrete time sequence using Linear Transformation Techniques
		CO502.3	Evaluate Linear Convolution of Long input sequence and Impulse response using Overlap save and add methods
		CO502.4	Construct and design of digital IIR in Direct form I, Direct form II, digital FIR in linear , Lattice Structures using windowing technique
		CO502.5	Understand the DSP processor architecture

Course code	Course Name	CO-numbering	Statement
18EC53	Principles of Communication Systems	CO503.1	Analyse and compute performance of AM and FM modulation in the presence of noise at the receiver.
		CO503.2	Analyze and compute performance of digital formatting processes with quantization noise.
		CO503.3	Multiplex digitally formatted signals at Transmitter and demultiplex the signals and reconstruct digitally formatted signals at the receiver.
		CO503.4	Design/Demonstrate the use of digital formatting in Multiplexers, Vocoders and Video transmission.

Course code	Course Name	CO-numbering	Statement
18EC54	Information Theory & Coding	CO504.1	Examine mathematically the
		CO504.2	Analyze statistical modeling of
		CO504.3	Apply source encoding algorithms to
		CO504.4	Analyze the design aspects of
		CO504.5	Design Channel encoder and

Course code	Course Name	CO-numbering	Statement
18EC55	Electromagnetic Waves	CO505.1	Solve problems on Electric force, electric field intensity due to point, linear, volume charges by applying Coulombs Law and Guass Law.
		CO505.2	Determine Energy and Potential for various charge distributions and apply continuity equation of current to calculate flow of current, total charge, charge density etc for Conductors.
		CO505.3	Apply Poisson's and Laplace equations for solving boundary value problems associated with electrostatics and magneto-statics.
		CO505.4	Analyze the applications of magneto-statics by applying Biot-Savart law, Ampere's circuital law and derive the concepts of magnetic forces and materials to characterize the magnetic circuits.
		CO505.5	Analyze Maxwell's equations for Static fields, time varying fields, EM waves in free space, conductors and Evaluate power associated with EM waves using Poynting theorem.

Course code	Course Name	CO-numbering	Statement
18EC56	Verilog HDL	CO506.1	Identifythe importance of HDLs ,Current Trends in HDL's and primary processes in the VLSI IC circuit design flow.
		CO506.2	Utilize Verilog constructsas per the IEEE 1364-2001 Verilog standard to design and verify (testbench) the digital circuits for the given specifications.
		CO506.3	Differentiate between top down and bottom –up digital design flow, Modules and Module Instances in Verilog.
		CO506.4	Analyse the functionality of Verilog code for the specified digital logic circuit as per the given specifications.
		CO506.5	Identify the significance of tasks, functions, additional features such as procedural continuous assignment statements, override parameters, and issues involved in logic synthesis.

Course code	Course Name	CO-numbering	Statement
18ECL57	DSP Lab	CO507.1	Verify sampling theorem for the given modulating and carrier frequency
		CO507.2	Evaluate Linear and Circular Convolution of two given sequences
		CO507.3	Compute correlation of given sequences and verify their properties
		CO507.4	Compute N-point DFT of a given sequence and to plot magnitude and phase spectrum
		CO507.5	Design FIR and IIR Filters to meet the given specifications

Course code	Course Name	CO-numbering	Statement
18ECL58	HDL Lab	CO508.1	Apply the Verilog HDL/VHDL constructs to model a list of combinational and sequential digital circuits in dataflow, behavioral or gate styles and simulate the same using Xilinx/Modelsim/Altera or any EDA tool.
		CO508.2	Write Synthesizable Verilog/VHDL codes to describe digital circuits and program FPGA/CPLD to experience the semi-custom VLSI design flow.
		CO508.3	Demonstrate the use of FPGA/CPLD to interface external peripherals such as stepper motor, LCD, DC Motors and validate the designs usingappropriate apparatus (like oscilloscope) for the given specifications.
		CO508.4	Demonstrate the use of Verilog HDL/VHDL constructs to generate waveforms such as sine, triangular, square for the given specifications, and validate the same by interfacing DAC to FPGA/CPLD, and displaying on an oscilloscope.

Course code	Course Name	CO-numbering	Statement
18EC61	Digital Communication	CO601.1	Associate and apply the concepts of Bandpass sampling to well specified signals and channels.
		CO601.2	Analyze and compute performance parameters and transfer rates for low pass and bandpass symbol under ideal and corrupted non band limited channels.
		CO601.3	Analyze symbol processing and performance parameters at the receiver under ideal and corrupted bandlimited channels
		CO601.4	Apply the concepts of spread spectrum modulation techniques for secure communication.

Course code	Course Name	CO-numbering	Statement

Course code	Course Name	CO-numbering	Statement
18EC62	Embedded Systems	CO602.1	Understand the architectural features and instruction set of 32-bit microcontroller ARM Cortex M3.
		CO602.2	Program ARM Cortex M3 using the various instructions and C language for different applications.
		CO602.3	Understand the basic hardware components and their selection method based on the characteristics and attributes of an embedded system.
		CO602.4	Develop the hardware software co-design and firmware design approaches.
		CO602.5	Explain the need of real time operating system for embedded system applications.

Course code	Course Name	CO-numbering	Statement
18EC63	Microwave and Antennas	CO603.1	Describe the use and advantages of
		CO603.2	Analyze various parameters
		CO603.3	Identify microwave devices for
		CO603.4	Analyze various antenna
		CO603.5	Recommend various antenna

Course code	Course Name	CO-numbering	Statement
18EC646	Python Application Programming	CO604.1	Examine Python syntax and semantics and be fluent in the use of Python flow control and functions.
		CO604.2	Demonstrate proficiency in handling Strings and File Systems.
		CO604.3	Create,run and manipulate Python Programs using core datastructures like Lists,Dictionaries and use Regular Expressions.
		CO604.4	Interpret the concepts of Object-Oriented Programming as used in Python.
		CO604.5	Implement exemplary applications related to Network Programming,WebServices.

Course code	Course Name	CO-numbering	Statement
18EC653	Programming in Java	C0601.1	Analyse the concepts of object
		C0601.2	Illustrate the java operators and Discuss the java control
		C0601.3	Explain the fundamentals of classes and objects
		C0601.4	Demonstrate the use of java packages and Discuss the
		C0601.5	Discuss the java Applets and Analyse the Streams and

Course code	Course Name	CO-numbering	Statement

Course code	Course Name	CO-numbering	Statement
18ECL66	Embedded Controller Lab	CO606.1	Understand the instruction set of ARM Cortex M3 and software tool to program both in assembly and C language.
		CO606.2	Program Cortex M3 using various instructions in assembly level language for different applications
		CO606.3	Interface external devices and I/O with ARM Cortex M3.
		CO606.4	Develop C language programs and library functions for embedded system applications.
		CO606.5	Develop Real time applications

Course code	Course Name	CO-numbering	Statement
18ECL67	Communication Lab	CO607.1	Design and test circuits for analog modulation and demodulation schemes viz AM, FM etc
		CO607.2	Determine the charecteristics and response of microwave wave guide
		CO607.3	Determine the charecteristics of microstrip antennas and devices and compute the parameters associated with it.
		CO607.4	Design and test the digital and analog modulation circuits and display the wave forms
		CO607.5	Simulate the digital modulation systems and compare the error performance of basic digital modulation schemes.

Course code	Course Name	CO-numbering	Statement
18ECMP68	Mini Project	CO608.1	Identify an Engineering problem and
		CO608.2	Design a Mini-project and create a
		CO608.3	Implement project work in laboratory
		CO608.4	Evaluate knowledge of contemporary

Course code	Course Name	CO-numbering	Statement	
17EC71	Microwave and Antennas	CO701.1	Describe the use and advantages	
		CO701.2	Analyze various parameters	
		CO701.3	Identify microwave devices for	
		CO701.4	Analyze various antenna	
		CO701.5	Recommend various antenna	

Course code	Course Name	CO-numbering	Statement

Course code	Course Name	CO-numbering	Statement				
17EC72	Digital Image Processing	C0702.1	Illustrate image formation and				
		C0702.2	Apply image processing enhancement				
		C0702.3	Distinguish restoration in presence of				
		C0702.4	Evaluate color models and				
		C0702.5	Analyse image segmentation,				

Course code	Course Name	CO-numbering	Statement				
17EC73	Power Electronics	CO703.1	Acquire the knowledge about				
		CO703.2	Describe two transistor				
		CO703.3	Design and analyze various				
		CO703.4	Design and analyze various ac				
		CO703.5	analyze operation of dc choppers,				

Course code	Course Name	CO-numbering	Statement				
17EC743	Real Time Systems	CO742.1	Define,discuss and clarify real time				
		CO742.2	various computer hardware and				
		CO742.3	Analyse the concepts of operating				
		CO742.4	Estimate scheduling strategies				
		CO742.5	document for development of RTS				

Course code	Course Name	CO-numbering	Statement				
17EC752	IOT and Wireless Sensor Networks	CO754.1	Identify the different IOT conceptual				
		CO754.2	Outline the design principles for				
		CO754.3	Explore IDEs, open sources available for the				
		CO754.4	Appreciate the need for privacy,				
		CO754.5	Assess the applicability of communication				

Course code	Course Name	CO-numbering	Statement

Course code	Course Name	CO-numbering	Statement
17ECL76	Advanced Communication Lab	CO706.1	Design & Demonstrate generation
		CO706.2	Determine the characteristics and response
		CO706.3	Determine the characteristics of Micro strip
		CO706.4	Measure Frequency, Wavelength,
		CO706.5	Digital Modulation Scheme &

Course code	Course Name	CO-numbering	Statement
17ECL77	VLSI Lab	CO707.1	Demonstrate the behavior of basic gates, buffer and transmission gate using Verilog coding.
		CO707.2	Realize the operation of flip-flops, adders, counters and SAR and verify the results.
		CO707.3	Design and draw Schematic, layout and verify LVS, DC and transient analysis of a CMOS Inverter.
		CO707.4	Design and draw Schematic, layout and verify DC, AC and transient analysis of CMOS differential amplifier, common source amplifier, common drain amplifier.
		CO707.5	Design and draw Schematic, layout and verify the simulation results of R-2R DAC, Op-Amp and SAR CMOS NAND and NOR gates.

Course code	Course Name	CO-numbering	Statement
17ECP78	Project Work Phase–I + Project work Seminar	CO708.1	Assess the current state of suitable area/field of study through systematic literature survey
		CO708.2	Identify the relevant problem statement from the literature assessment and formulate the complex engineering problem
		CO708.3	Propose feasible solution/s to the identified engineering problem in a time bound manner considering appropriate personal, societal, and professional ethical standards
		CO708.4	Collaborate with team members and Communicate effectively in written and oral form

Course code	Course Name	CO-numbering	Statement
17EC81	Wireless Cellular and LTE 4G Broadband	CO801.1	Appraise the historical evolution of
		CO801.2	Identify the essential wireless
		CO801.3	Analyze air interface protocol,

Course code	Course Name	CO-numbering	Statement

Course code	Course Name	CO-numbering	Statement
17EC82	Fiber Optics & Networks	CO802.1	Classification and working of optical fiber
		CO802.2	Describe the transmission characteristics
		CO802.3	Describe the construction and working
		CO802.4	Describe the constructional features and
		CO802.5	Illustrate the networking aspects of

Course code	Course Name	CO-numbering	Statement
17EC833	Radar Engineering	CS803.1	Demonstrate the understanding of the radar fundamentals, radar signals, Radar operating frequencies and its applications.
		CS803.2	Analyze the modified Radar range equation for the prediction of range performance and the detection of target signal in a noisy environment.
		CS803.3	Analyze the working principle of MTI and Doppler radar with its design considerations and relate the importance of microwave engineering and digital signal processing in the growth of RADAR technology.
		CS803.4	Compare Monopulse tracking and sequential lobing Radar tracking systems.
		CS803.5	Apply the fundamental knowledge of Antenna theory and communication systems for the parametric study of Radar subsystems, which includes Radar antenna, Radar Receiver, Duplexers, Receiver Protectors and Radar Displays.

Course code	Course Name	CO-numbering	Statement
17EC84	Internship/Professional Practice	CO804.1	Construct Company Profile by gathering information on history, organizational structure ,services/products offered ,key mile stones achieved for organization of the Internship
		CO804.2	Demonstrate the application of knowledge and skill sets acquired from the course and workplace in the assigned job functions
		CO804.3	Communicate and collaborate effectively and appropriately with different professionals in the work environment through written and oral means
		CO804.4	Recommend ideas to improve work effectiveness and efficiency by analyzing challenges and considering viable options
		CO804.5	Prepare technical reports in an organized manner within the time frame by duly adopting professional ethics.

Course code	Course Name	CO-numbering	Statement
17ECP85	Project Work	CS805.1	Identify an Engineering problem and
		CS805.2	Design a project for current
		CS805.3	Implement project work in laboratory
		CS805.4	Evaluate knowledge of contemporary

Course code	Course Name	CO-numbering	Statement

17ECS86	Seminar	CS806.1	Students will better understand					
		CS806.2	Students will demonstrate the ability to					
		CS806.3	Students will be able to construct a					
		CS806.4	Students will be able to access					
		CS806.5	Students will demonstrate the ability to					

BALLARI INSTITUTE OF TECHNOLOGY & MANAGEMENT - BALLARI
DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING
COURSE OUTCOMES

Course code	Course Name	CO-numbering	Statement
18ELE15/25	BASIC ELECTRICAL ENGINEERING	CO105.1	Predict the behaviour of electrical and magnetic circuits.
		CO105.2	Explain the constructional details and working principle of AC and DC machines.
		CO105.3	Determine the voltage, current and power in case of Single phase systems.
		CO105.4	Determine the voltage, current and power in case of three phase systems
		CO105.5	Explain the constructional details and working of measuring instruments, the code of practice of domestic wiring with electrical safety rules and standards.

Course code	Course Name	CO-numbering	Statement
18ELEL18/28	BASIC ELECTRICAL ENGINEERING LAB	CO108.1	Realize the concepts of open circuit, short circuit, KCL & KVL in a DC circuit.
		CO108.2	Evaluate the power factor of different types of lamps.
		CO108.3	Determine the resistance, inductance & impedance of a choke coil in a 1-Ø AC circuit.
		CO108.4	Determine the phase, line quantities & power in 3-Ø star & delta connected systems.
		CO108.5	Realize the concepts of electrical wiring, circuit protecting devices & earthing.

Course code	Course Name	CO-numbering	Statement
18EE32	ELECTRIC CIRCUIT ANALYSIS	CO302.1	Analyze DC & AC Networks by applying basic laws and transformation techniques.
		CO302.2	Evaluate complexity of network using various transformation techniques and network theorems.
		CO302.3	Solve numerical examples on series, parallel resonance and initial conditions.
		CO302.4	Synthesize typical wave forms using Laplace transformation
		CO302.5	Evaluate the performance of two port network and unbalanced three phase system.

Course code	Course Name	CO-numbering	Statement
18EE33	TRANSFORMER AND GENERATORS	CO303.1	Determine the efficiency, voltage regulation and equivalent circuit constants of a 1-phase transformer from O.C and S.C test.
		CO303.2	Compare the types of 3-phase transformer connections (bank) with respect to advantages, disadvantages and applications.
		CO303.3	Analyze the performance characteristics of D.C. generator and synchronous generators.
		CO303.4	Determine the voltage regulation of a synchronous generator by EMF, MMF and ZPF methods.
		CO303.5	Discuss the parallel operation of 1-phase transformer and synchronous generator

Course code	Course Name	CO-numbering	Statement
18EE34	ANALOG ELECTRONIC CIRCUITS	CO304.1	Examine the output response of clipper and clamper circuits
		CO304.2	Analyze different transistor biasing circuits and transistor at low frequency
		CO304.3	Derive the input and output impedances of feedback and general amplifiers
		CO304.4	Evaluate the efficiency of power amplifiers and compare various oscillators
		CO304.5	Analyze FET and MOSFET amplifiers in the common source mode with fixed bias configuration

Course code	Course Name	CO-numbering	Statement
18EE35	DIGITAL SYSTEM DESIGN	CO305.1	Discuss combinational circuits.
		CO305.2	Implement adder, subtractor, decoder, encoders, binary comparators, multiplexers, demultiplexers and code converter.
		CO305.3	Design sequential circuits
		CO305.4	Analyze Moore and Mealy models and State machine notations.
		CO305.5	Differentiate between VHDL and Verilog.

Course code	Course Name	CO-numbering	Statement
18EE36	ELECTRICAL & ELECTRONIC MEASUREMENT	CO306.1	Determine the values of Resistance,Inductance, Capacitance and magnetic circuit parameters.
		CO306.2	Deduce the Expressions for various parameters such as torque, power, power factor of 3-phase circuits.
		CO306.3	Analyse the methods of extension of Instrument ranges .
		CO306.4	Compare Electronic and Digital Instruments.
		CO306.5	Distinguish display devices and Recording devices.

Course code	Course Name	CO-numbering	Statement
18EEL37	Electrical Machines Lab-1	CO307.1	Pre-determine efficiency, voltage regulation and equivalent circuit constants of a 1-phase transformer by conducting O.C and S.C tests.
		CO307.2	Perform parallel operation of two different kVA transformers to determine the load shared by each transformer.

		CO307.3	Conduct experiments on 3-phase transformer connections (Bank) to determine the efficiency.
		CO307.4	Pre-determine voltage regulation of a 3-phase synchronous generator by EMF and MMF methods by Conducting O.C and S.C tests.
		CO307.5	Analyze the performance of synchronous generator by connecting it to the infinite bus bar.

Course code	Course Name	CO-numbering	Statement
18EEL38	ELECTRONICS LABORATORY	**CO308.1**	Test rectifier circuits with and without filter.
		CO308.2	Analyse BJT amplifier and oscillators.
		CO308.3	Realize Boolean expressions, adders and subtractors using basic gates.
		CO308.4	Design BCD to excess 3 code converter, binary to gray code converter.
		CO308.5	Design counters and sequence generators.

Course code	Course Name	CO-numbering	Statement
18EE42	Power Generation & Economics	CO402.1	Analyse block diagram pertaining to different power plants
		CO402.2	Identify the equipments employed in power plants & sub-stations
		CO402.3	Adopt suitable grounding methods of electrical equipment in power system.
		CO402.4	Analyse the economic aspects of power generation
		CO402.5	Select suitable methods for improving the power factor.

Course code	Course Name	CO-numbering	Statement
18EE43	Transmission and Distribution	CO403.1	Calculate sag at different levels of support and deduce expressions for advantages of high voltage transmission.
		CO403.2	Compare Insulator types, methods of increasing string efficiency,GMR & GMD.
		CO403.3	Estimate the values of inductance and capacitance with equilateral & unsymmetrical spacing, ABCD constants.
		CO403.4	Categorize the transmission lines
		CO403.5	Analyse AC distribution systems, advantages & Disadvantages of Corona, methods of reducing corona.

Course code	Course Name	CO-numbering	Statement
18EE44	Electric Motors	CO404.1	Determine the losses and efficiency of DC machines by direct and indirect tests.
		CO404.2	Analyse the performance characteristics of 3-phase induction motors.
		CO404.3	Discuss the speed control methods of DC and AC motors.
		CO404.4	Compare construction, operation, characteristics and applications of single phase induction motors and special motors.
		CO404.5	Analyse the performance characteristics of synchronous motor.

Course code	Course Name	CO-numbering	Statement
18EE45	ELECTRO MAGNETIC FIELD THEORY	CO405.1	Solve problems on electric force, electric field intensity due to point, linear, volume charges by applying Coulomb's law and Gauss's law.
		CO405.2	Determine energy and potential for various charge distributions and apply continuity equation of current to calculate flow of current, total charge, charge density for conductors.
		CO405.3	Apply Poisson's and Laplace's equation for solving boundary value problems associated with electrostatics and magneto-statics.
		CO405.4	Analyze the applications of magneto-statics by applying Biot-savart's law, Ampere's circuital law and derive the concepts of magnetic forces and materials to characterize the magnetic circuits.
		CO405.5	Analyze Maxwell's equations for static fields, time varying fields, EM waves in free space, conductors and evaluate power associated with EM waves using Poynting theorem.

Course code	Course Name	CO-numbering	Statement
18EE46	OPERATIONAL AMPLIFIERS AND LINEAR INTEGRATED CIRCUITS	CO406.1	Analyze the operations of Op-Amp, Regulator, Timer and PLL.
		CO406.2	Design linear circuits using Linear IC's.
		CO406.3	Construct Comparators, Converters signal processing circuits, filters and voltage regulators.
		CO406.4	Analyze the performance factors of PLL and generators
		CO406.5	Demonstrate the applications of 555 Timer and Converters.

Course code	Course Name	CO-numbering	Statement
18EEL47	ELECTRICAL MACHINE LAB-2	CO407.1	Conduct an experiment to control the speed of DC Shunt motor by armature and field control methods.
		CO407.2	Pre-determine the losses and efficiency of DC machines by conducting direct and indirect loading tests.
		CO407.3	Assess performance characteristics of DC shunt motor, 1-Ø induction motor and 3-Ø induction motor by performing load test .
		CO407.4	Analyze the performance characteristics of 1-Ø and 3-Ø induction motors by Conducting No-load and Blocked rotor tests.

		CO407.5	Perform experiment on synchronous motor to draw V-curves and Inverted V-curves for different loads.

Course code	Course Name	CO-numbering	Statement
18EEL48	OP AMP & LIC LAB	CO408.1	Design precision fill wave rectifier and RC phase shift oscillator.
		CO408.2	Analyze inverting & non inverting amplifiers using op-amp
		CO408.3	Demonstrate the operation of Schmitt trigger, comparator, ZCD, adder, subtractor, integrator, differentiator circuits using
		CO408.4	Examine the operation of R-2R ladder DAC& 2-bit Flash ADC
		CO408.5	Analyze IC555timer based pulse generator for specified pulse and voltage regulator using 78 and79 series ICs.

Course code	Course Name	CO-numbering	Statement
18EE51	Management & Entrepreneurship	C0501.1	Compare management & administration with the principles and approaches , focusing on the managerial tasks and process.
		C0501.2	Analyze about the work allocation in the organization, the modes of communication and importance of managerial coordination & control in business.
		C0501.3	Evaluate the social consideration for effective use in business applications.
		C0501.4	Distinguish the concepts of entrepreneurship and the role and importance of the entrepreneur in economic development.
		C0501.5	Communicate the concepts of project management, capital building process, project feasibility study, project appraisal and project financing.

Course code	Course Name	CO-numbering	Statement
18EE52	MICROCONTROLLER	CO502.1	Differentiate between Microprocesssor and Microcontroller.
		CO502.2	Illustrate the internal organization of microcontroller and memory organization.
		CO502.3	Demonstrate programming proficiency using various addressing modes and instructions of microcontroller.
		CO502.4	Develop assembly and embedded C programs in 8051 microcontroller.
		CO502.5	Demonstrate the interfacing of microcontroller with external pheripheral devices.

Course code	Course Name	CO-numbering	Statement
18EE53	Power Electronics	CO503.1	Analyse performance of diode rectifiers with R & RL loads.
		CO503.2	Compare the performance of various power semiconductor devices.
		CO503.3	Analyse various turn on, turn -off and protection methods of thyristors.
		CO503.4	Design various single phase & three phase power converters.
		CO503.5	Evaluate the performance of chopper and inverter circuits.

Course code	Course Name	CO-numbering	Statement
18EE54	Signals and systems	CO504.1	Analyze different types of signals and perform various operations on signals
		CO504.2	Analyze various system properties
		CO504.3	Determine the response of systems using convolution sum , convolution integral, and block diagram representation of a linear time invariant system
		CO504.4	Solve differential equations and difference equations of system to determine response
		CO504.5	Apply the continuous time Fourier transform, discrete time Fourier transform, z-Transform, to the analysis of LTI continuous and discrete-time systems.

Course Code	Course Name	CO- numbering	Statement
18EE55	ELECTRICAL MACHINE DESIGN	CO505.1	Classify the materials used in electrical machines with their design limitations.
		CO505.2	Estimate the number of cooling tubes, no load current and leakage reactance of core type transformer.
		CO505.3	Develop the output equations of transformer, DC machines and AC machines.
		CO505.4	Design the field windings, stator and rotor circuits of a DC and AC machines.
		CO505.5	Analyze the effect of short circuit ratio on performance of synchronous machines.

Course code	Course Name	CO-numbering	Statement
18EE56	HIGH VOLTAGE ENGINEERING	CO506.1	illustrate conduction & breakdown in gases,liquid and solid dielectrics
		CO506.2	analyze the generation of high voltages,currents and impulse voltages
		CO506.3	measure of impulse voltages,currents and high voltages
		CO506.4	analyze the causes for over voltages and switching surges
		CO506.5	compare effective techniques for non destructive testing of materials and electrical apparatus

Course code	Course Name	CO-numbering	Statement
18EEL57	Microcontroller Lab	CO507.1	Implement the programming skills for data transfer, arithmetic, boolean and logical operations.
		CO507.2	Develop ALP for code conversion programs.
		CO507.3	Demonstrate ALP using subroutines for generation of delays, counters, configuration of SFRs for serial communication
		CO507.4	Illustrate interfacing of stepper motor and Dc motor for controlling the speed.
		CO507.5	Simulate different waveforms using DAC interface.

Course code	Course Name	CO-numbering	Statement
18EEL58	POWER ELECTRONICS LAB	CO508.1	Perform experiment to sketch the static characteristics of semi conductor devices
		CO508.2	Analyze Triggering of the SCR by different methods.
		CO508.3	Assess the performance of single phase controlled full wave rectifier and AC voltage rectifier with R and RL loads.
		CO508.4	conduct experiment to control speed of DC motor, universal motor and stepper motor.
		CO508.5	Analyze the performance of single phase full bridge inverter connected to R load.

Course code	Course Name	CO-numbering	Statement
18EE61	CONTROL SYSTEMS	CO601.1	Develop the differential equations for given mechanical and electrical systems
		CO601.2	Apply block diagram manipulation and signal flow graph methods to obtain transfer function of systems
		CO601.3	Evaluate the stability of LTI systems using RH criterion, root locus, Bode Plot and Nyquist plot
		CO601.4	Investigate the performance of a given system in time and frequency domain
		CO601.5	Compare the different compensator configurations and controller configurations

Course code	Course Name	CO-numbering	Statement
18EE62	POWER SYSTEM ANALYSIS-I	CO602.1	Apply the concept of single line diagram and P.U system
		CO602.2	Evaluate short circuit analysis for symmetrical and unsymmetrical components in power system
		CO602.3	Apply the concept of sequence impedence and sequence network in power system
		CO602.4	Analyze 3- phase synchronous machine for different unsymmetrical faults using symmetrical component
		CO602.5	Analyze dynamics of synchronous machine,stability and EAC for different fault conditions

Course code	Course Name	CO-numbering	Statement
18EE63	DIGITAL SIGNAL PROCESSING	CO603.1	Compute DFT and IDFT of discrete time sequences using properties of DFT
		CO603.2	Evaluate DFTs using convolution methods
		CO603.3	Develop FFT algorithms for computing the DFT of Discrete time sequence.
		CO603.4	Design IIR and FIR filters
		CO603.5	Realize IIR and FIR digital filters in different structures

Course code	Course Name	CO-numbering	Statement
18EE643	COMPUTER AIDED ELECTRICAL DRAWING	C0643.1	To draw the DC and AC armature winding diagrams for given number of poles and slots or conductors.
		C0643.2	To draw single line diagrams of power stations from the station layout data.
		C0643.3	To draw sectional views of assembled transformer from design data.
		C0643.4	To draw sectional views of DC machine and its parts from design data.
		C0643.5	To draw sectional views of alternator and its parts from design data.

Course code	Course Name	CO-numbering	Statement
18EEL66	CONTROL SYSTEM LABORATORY	CO606.1	Evaluate time domain specifications of a typical second order system
		CO606.2	Analyse lead, lag and lead lag compensating networks
		CO606.3	Compare different types of controllers.
		CO606.4	Sketch the characteristics of AC,DC servomotors and synchro transmitter and receiver pairs
		CO606.5	Investigate the stability of given TF using Nyquist,Bode and Root locus plots.

Course code	Course Name	CO-numbering	Statement
18EEL67	DIGITAL SIGNAL PROCESSING LAB	CO607.1	Evaluate the impulse response of a system.
		CO607.2	Perform convolution of given sequence to evaluate the response of a system.
		CO607.3	Compute DFT and IDFT of a given sequence using the basic definition and fast method
		CO607.4	Provide a solution for a given difference equation.
		CO607.5	Design and implement IIR and FIR filters.

Course code	Course Name	CO-numbering	Statement
17EE71	POWER SYSTEM ANALYSIS-2	CO701.1	Formulate network matrices and models for solving load flow problems.
		CO701.2	Perform steady state power flow analysis of power systems and solution of swing equation for multi-machine stability by using numerical iterative techniques.
		CO701.3	Adopt a method to control voltage profile and for optimal unit commitment.
		CO701.4	Discuss optimal scheduling for thermal system, hydro-thermal system, power system security and reliability.
		CO701.5	Analyze short circuit faults in power system networks using bus impedance matrix.

Course code	Course Name	CO-numbering	Statement
17EE72	POWER SYSTEM PROTECTION	C0702.1	compare the performance of various relays.
		C0702.2	Distinguish between over current protection and distance protection
		C0702.3	Analyze different protection schemes of generator and transformer
		C0702.4	Categorize different types of circuit breakers and fuses
		C0702.5	Analyze protection against over voltages and Gas Insulated Substation

Course code	Course Name	CO-numbering	Statement
17EE73	HIGH VOLTAGE ENGINEERING	CO703.1	illustrate conduction & breakdown in gases,liquid and solid dielectrics
		CO703.2	analyze the generation of high voltages,currents and impulse voltages
		CO703.3	measure of impulse voltages,currents and high voltages
		CO703.4	analyze the causes for over voltages and switching surges
		CO703.5	compare effective techniques for non destructive testing of materials and electrical apparatus

Course code	Course Name	CO-numbering	Statement
17EE742	Utilization of Electrical Power	CO742.1	Illustrate methods and applications of electric heating for industry.
		CO742.2	Design illumination system for various applications.
		CO742.3	Analyse mechanics of train movement and performance characteristics of traction motors
		CO742.4	Discuss electric braking and electrification of traction system
		CO742.5	Analyze the configuration of electric and hybrid-electric vehicles.

Course code	Course Name	CO-numbering	Statement
17EE752	TESTING AND COMMISSIONING	CO752.1	Identify the tools and equipments used for installation and maintenance of various electrical equipments.
		CO752.2	Describe the process of plan, installation and commissioning of various electrical equipments.
		CO752.3	Differentiate the performance specifications of various electrical equipments.
		CO752.4	Explain the routine, type and special tests for various electrical equipments.
		CO752.5	Illustrate the operation of an various electrical equipments and switchgears.

Course code	Course Name	CO-numbering	Statement
17EEL76	POWER SYSTEM SIMULATION LABORATORY	CO706.1	Develop a program in MATLAB to evaluate the performance of short, medium and long transmission lines.
		CO706.2	Develop a program in MATLAB to evaluate the transient stability of a single machine connected to infinite bus bar under three phase fault in a radial power system by using swing equation.
		CO706.3	Develop programs in MATLAB to formulate bus admittance and bus impedance matrices of interconnected power systems.
		CO706.4	Use Mi-Power software package to solve power flow problem for simple power systems and to study symmetrical and unsymmetrical faults in radial power systems.
		CO706.5	Use Mi-Power software package to study optimal generation scheduling problems for thermal power plants and the power angle characteristics of salient and non-salient pole alternator.

Course code	Course Name	CO-numbering	Statement
17EEL77	RELAY & HIGH VOLTAGE LABORATORY	CO707.1	Demonstrate the operation of microprocessor based and Electro mechanical type relays at fault conditions such as over current, over voltage and under voltage and plot their characteristics at different T.S.M's and P.S.M's
		CO707.2	Demonstrate operation of negative sequence relay, bias characteristics of differential relay.
		CO707.3	Demonstrate feeder and motor protection scheme and fault studies.
		CO707.4	Determine breakdown strength of gaseous and liquid insulators for HVAC and HVDC.
		CO707.5	Perform field mapping using electrolytic tank

Course code	Course Name	CO-numbering	Statement
17EEP78	Project Work phase-I and Project work seminar	CO708.1	Identify real world electrical engineering problems through survey and review of literature.
		CO708.2	Apply fundamental knowledge of mathematics, science and engineering principles in designing the system components with consideration of environmental factors, economy, safety and societal needs
		CO708.3	Identify a suitable engineering technology /software tool/data interpretation for carrying out projects.
		CO708.4	Demonstrate the knowledge, skills and attitude of professional engineers.
		CO708.5	communicate effectively and develop technical report s ethically.

Course code	Course Name	CO-numbering	Statement
17EE81	POWER SYSTEM OPERATION	CO801.1	Highlight the importance of SCADA and Unit Commitment in power system.

Course code	Course Name	CO-numbering	Statement
	AND CONTROL	CO801.2	Discuss the issues of hydrothermal scheduling and solutions to hydro thermal problems
		CO801.3	Model the AVR and ALFC loop for single area, multi-control area and interconnected system
		CO801.4	Analyze the need of reactive power and voltage stability in power system.
		CO801.5	Distinguish the different methods of state estimation and power system reliability.

Course code	Course Name	CO-numbering	Statement
17EE82	INDUSTRIAL DRIVES AND APPLICATIONS	CO802.1	Analyze the dynamics and operational modes of electrical drives
		CO802.2	Determine the ratings of the motors based on duty cycle and thermal model of heating and cooling
		CO802.3	Compare the performance of DC motor drives fed by different converters
		CO802.4	Analyze the performance of AC motor drives under different operating conditions and Techniques
		CO802.5	Select the elctric drives based on the industrial applications

Course code	Course Name	CO-numbering	Statement
17EE833	Integration of Distributed Generation	CO833.1	Review the different reasons for new type of power production in the power system
		CO833.2	Analyze the effects of integration of distributed generation on the performance the system.
		CO833.3	Examine increased risk of overloading and losses of DG integration
		CO833.4	Analyze impact of distributed generation on voltage magnitude variation
		CO833.5	Analyze various power quality disturbances developed due to DG integration.

Course code	Course Name	CO-numbering	Statement
17EE84	Internship	CO804.1	Apply knowledge of the industry & skills learnt to classroom work.
		CO804.2	Acquire practical experience in industry
		CO804.3	Recognize the areas for career and skill development
		CO804.4	Develop the skills to enable lifelong learning
		CO804.5	Develop oral communication skills and develop technical reports ethically

Course code	Course Name	CO-numbering	Statement
17EEP85	PROJECT WORK -II	CO805.1	Formulate real world electrical engineering problems through survey and review of literature.
		CO805.2	Develop project with consideration of environmental factors, economy, safety and societal needs.
		CO805.3	Apply appropriate technology/modern tools
		CO805.4	Demonstrate the leadership skills and ability to work individually as well as in team
		CO805.5	Develop oral Communication skills and write the project report ethically

Course code	Course Name	CO-numbering	Statement
17EES86	Seminar	CO806.1	Identify topic of current, real-time issues in the field of electrical engineering. Through survey and review of literature
		CO806.2	Attain the knowledge of topic selected through independent and collaborative learning.
		CO806.3	Explore concepts in social and academic contexts .
		CO806.4	Apply principles of ethics and respect in interaction with others
		CO806.5	Communicate effectively to audience and develop technical reports ethically

DEPARTMENT OF CIVIL ENGINEERING
COURSE OUTCOMES

Course code	Course Name	CO-numbering	Statement
18CV14/24	nts of civil Engineering and Engineering Mec	C104.1	Mention the Application of various fields of Civil Engineering.
		C104.2	Compute the resultant of given force system subjected to various loads.
		C104.3	Comprehend the action of force moment and other loads on system of rigid bodies.
		C104.4	Locate the Centroid and compute the Moment of Inertia of regular and built-up sections.
		C104.5	Express the relationship between the motion of bodies and analze the bodies in motion.

Course code	Course Name	CO-numbering	Statement
18CV32	STRENGTH OF MATERIALS	C302.1	Apply the basic concepts of the stresses and strains for different materials and strength of structural elements.
		C302.2	To know the development of internal forces and resistance mechanism for one dimensional and two dimensional structural elements.
		C302.3	To analyse and understand different internal forces and stresses induced due to representative loads on structural elements.
		C302.4	To analyse and understand principal stresses due to the combination of two dimensional stresses on an element and failure mechanisms in materials.
		C302.5	To evaluate the behavior of torsional members, columns and struts.

Course code	Course Name	CO-numbering	Statement
18CV33	FLUID MECHANICS	C303.1	Apply the basic knowledge of fluid mechanics on fluid properties & sove problems on fluid pressure
		C303.2	solve problems on hydrostatics & fluid dynamics including practical applications
		C303.3	Evaluate the rate of flow through weirs & venturimeter
		C303.4	Evaluate the discharge through pipes using bernoulli's principal,discharge through notches
		C303.5	Evaluate the discharge through notches

Course code	Course Name	CO-numbering	Statement
18CV34	Building Materials and Construction	C304.1	Choose suitable building materials and test to be conducted.
		C304.2	Examine the soil properties to select suitable foundation
		C304.3	Classify the different Construction methods for building elements.
		C304.4	Design the stairs and also knowing about the doors, windows and formwork requirements
		C304.5	Relate the various materials required for building finishes.

Course code	Course Name	CO-numbering	Statement
18CV35	Basic Surveying	C305.1	Posses a sound knowledge of fundamental principles Geodetics
		C305.2	Measurement of horizontal plane, linear and angular dimensions to arrive at solutions to basic surveying problems.
		C305.3	Measurement of vertical plane, linear and angular dimensions to arrive at solutions to basic surveying problems.
		C305.4	Capture geodetic data to process and perform analysis for survey problems
		C305.5	Analyse the obtained spatial data and compute areas and volumes. Represent 3D data on plane figures as contours

Course code	Course Name	CO-numbering	Statement
18CV36	ENGINEERING GEOLOGY	C306.1	Understanding the earth and mineralogy concept
		C306.2	Identify kinds of rocks , asses their properties , Explain various terms in structural geology and rock mechanics

Course code	Course Name	CO-numbering	Statement
		C306.3	Explain aspects of landforms in construction and concept of earthquakes
		C306.4	Assess various structural features and geological tools in ground water Exploration, understanding hydrological cycle.
		C306.5	Apply remote sensing and GIS applications in civil engineering practice and concept of natural disaster

Course code	Course Name	CO-numbering	Statement
18CVL37	Computer Aided Building Planning & Drawing	C307.1	Use of different commands of AUTO CAD Software.
		C307.2	Create layout plan, sanction drawings, working drawing using concept of layers.
		C307.3	Select the tools in AUTO CAD software to draw the various building components.
		C307.4	Plan and design of residential or public building as per the given requirement.
		C307.5	Preparing the drawings and detailing of RCC structural elements and other civil related drawing.

Course code	Course Name	CO-numbering	Statement
18CVL38	Building Materials Testing Laboratory	C308.1	Identify Define materials properties and differentiate ideal construction materials
		C308.2	Know the importance of elastic constants such as youngs modulus,rigidity modulus and bulk modulus.
		C308.3	Reproduce the basic knowledge of mathematics and engineering in finding the strength in tension, compression, shear and torsion.
		C308.4	Identify, formulate and solve engineering problems of structural elements subjected to flexure.
		C308.5	Evaluate the impact of engineering solutions on the society and also will be aware of contemporary issues regarding failure of structures due to unsuitable materials.

Course code	Course Name	CO-numbering	Statement
18CV42	Analysis of Determinate Structures	C402.1	Evaluate the forces i n determinate trusses by method of joints and sections.
		C402.2	Evaluate the deflection of cantilever, simply supported and overhanging beams by different methods
		C402.3	Apply the energy principles and energy theorems and its applications to determine the deflections of trusses and bent frames
		C402.4	Determine the stress resultants in arches and cables
		C402.5	Understand the concept of influence lines and construct the ILD diagram for the moving loads.

Course code	Course Name	CO-numbering	Statement						
18CV43	Applied Hydraulics	C403.1	Apply dimensional analysis to develop mathematical modeling						
		C403.2	compute the parametric	compute the parametric	compute the parametric	compute the parametric	compute the parametric	compute the parametric	compute the parametric values in prototype by analyzing the
		C403.3	Design the open	Design the open	Design the open	Design the open	Design the open	Design the open	Design the open channels of various cross sections including
		C403.4	Apply Energy	Apply Energy	Apply Energy	Apply Energy	Apply Energy	Apply Energy	Apply Energy concepts to flow in open channel sections, Calculate
		C403.5	Design turbines for	Design turbines for	Design turbines for	Design turbines for	Design turbines for	Design turbines for	Design turbines for the given data, and to know their operation

Course code	Course Name	CO-numbering	Statement						
18CV44	Concrete Technology	C404.1	Choose the materials	Choose the materials	Choose the materials	Choose the materials	Choose the materials	Choose the materials	Choose the materials used to make concrete; including their
		C404.2	Demonstrate the tests	Demonstrate the tests	Demonstrate the tests	Demonstrate the tests	Demonstrate the tests	Demonstrate the tests	Demonstrate the tests relevant to the application of concrete at
		C404.3	Identify the durability	Identify the durability	Identify the durability	Identify the durability	Identify the durability	Identify the durability	Identify the durability properties of concrete.
		C404.4	Evaluate properties of	Evaluate properties of	Evaluate properties of	Evaluate properties of	Evaluate properties of	Evaluate properties of	Evaluate properties of concrete in fresh and hardened state.
		C404.5	Design the concrete mix	Design the concrete mix	Design the concrete mix	Design the concrete mix	Design the concrete mix	Design the concrete mix	Design the concrete mix as per IS code specifications

Course code	Course Name	CO-numbering	Statement
18CV45	Advanced Surveying	C405.1	Apply the knowledge of geometric principles to arrive at surveying problems

		C405.2	Select modern instruments to obtain geo-spatial data and analyse the same to appropriate Engineering problems.
		C405.3	Analyse survey problems with the use of electronics instrumnents.
		C405.4	Design the different types of curves for deviating type of alignmnets.
		C405.5	Design of transition and vertical curves

Course code	Course Name	CO-numbering	Statement
18CV46	Water Supply & Treatment Engineering	C406.1	Adopt average and peak water demand for a community in water resource management.
		C406.2	Identify available sources of water, quantitatively & qualitatively and make apropriate choice for a community.
		C406.3	Examine the water quality and environmental significance of various parameters and plan suitable tretment system.
		C406.4	Design a comprehensive water treatment and distribution system to purify and distrribute water to the required water quality standards
		C406.5	Design a water supply system to purify and distrribute water to the required water quality standards

Course code	Course Name	CO-numbering	Statement
18CVL47	Engineering Geology Laboratory	C407.1	Identify different kinds of minerals,rocks and maps
		C407.2	identify various minerals and rock properties
		C407.3	apply and solve structural problems related to dip and strike
		C407.4	analyse interpretation of geological maps and satellite imageries
		C407.5	conduct experiment on electrical resistivity method for groundwater exploration

Course code	Course Name	CO-numbering	Statement
18CVL48	l Mechanics and Hydraulic Machines Labora	C408.1	Apply the basic fundamentals to find the effect of fluid properties on a flow system
		C408.2	Analyse variety of a fluid flow and mesauring devices
		C408.3	Conduct experiments in pipe flows and open channel flows
		C408.4	Select and analyse an appropriate turbines with respect to given situtation in power plants
		C408.5	To estimate performance parameter of a given centrifugal and reciprocating pump

Course code	Course Name	CO-numbering	Statement
18CV51	onstruction Management & Entrepreneurshi	C501.1	List and explain the different characteristics ,functions, purpose of management, types of organization, project plans, prepare WBS structures, Gantt chart, network diagrams.
		C501.2	Basic concepts of resource management, classify different types of construction equipments, estimate various costs, explain material management.
		C501.3	Explain the concept of quality control, quality standards, factors affecting quality, ISO standards, TQM, concepts of HSE, ethics related to construction management.
		C501.4	Solve problems related to interests rates, payments & comparison of alternatives.
		C501.5	Describe entrepreneurship, MSME & different schemes of entrepreneurship, types of business plans and planning process, explain international opportunities & investment.

Course code	Course Name	CO-numbering	Statement
18CV52	LYSIS OF INDETERMINATE STRUCTU	C502.1	Apply the knowledge of mathematics and engineering in calculating slope, deflection, bending moment and shear force using slope deflection method
		C502.2	Formulate and solve problems in Moment distribution method
		C502.3	Analyze structural system and interpret data by kanis method
		C502.4	Analyze the beams & indeterminate frames by stiffness matrix method
		C502.5	Evaluate flexibility methods to solve engineering problems

Course code	Course Name	CO-numbering	Statement

18CV53	ESIGN OF RC STRUCTURAL ELEMENT	C503.1	Apply the concepts of design philosophy, and principles of limit state in the analysis of RC structures.
		C503.2	Analyse the forces and moments acting on RC elements using limit state method
		C503.3	Design the singly, doubly and flange RC beam sections for shear and torsion as per IS Code 456-2000
		C503.4	Design slabs and staircases by using the limit state concepts as per IS Code 456-2000.
		C503.5	Design of column and footing for different loading conditions.

Course code	Course Name	CO-numbering	Statement
18CV54	Basic Geotechnical Engineering	C504.1	Identify and classify the soil based on index properties
		C504.2	Describe the soil structure and compaction characterstics of soils
		C504.3	Explain the permeability of soil and ground water seepage.
		C504.4	Solve practical problems related to estimation of consolidation settlement of soil deposits also time required for the same
		C504.5	Estimate shear strength parameters of different types of soils using the data of different shear tests

Course code	Course Name	CO-numbering	Statement
18CV55	Municipal Wastewater Engineering	C505.1	Apply the methods of
		C505.2	Acqurie capability to
		C505.3	Evaluate degree of
		C505.4	Identify the waste
		C505.5	Inspect sewage and

Course code	Course Name	CO-numbering	Statement
18CV56	Highway Engineering	C506.1	Identify the different modes of transportation, type of roads and pattern and phasing development in India.
		C506.2	Apply various engineering surveys to select ideal allignment to prepare drawings and report for new and realligned projects.
		C506.3	Design road gerometrics, structural components of pavement and drinage.
		C506.4	Examine the engineering properties of materials and suggest suitability of the same for construction of different components of flexibele and rigid pavements
		C506.5	Estimate highway economics by different methods and knowledge of highway finance.

Course code	Course Name	CO-numbering	Statement
18CVL57	Surveying Practice	C507.1	Apply the basic principles of engineering surveying for linear measurements.
		C507.2	Apply the basic principles of engineering surveying for angular measurements.
		C507.3	Comprehend effectively field procedures required for a professional surveyor
		C507.4	Use techniques, skills and conventional surveying instruments necessary for horizontal plane measurements.
		C507.5	Use techniques, skills and conventional surveying instruments necessary for vertical plane measurements.

Course code	Course Name	CO-numbering	Statement
18CVL58	Concrete and Highway Materials Laboratory	C508.1	Conduct appropriate laboratory experiments and interpret the results.
		C508.2	Determine the quality and suitability of cement
		C508.3	Design appropriate concrete mix and Determine strength and quality of concrete.
		C508.4	Examine the road aggregates and bitumen for their suitability as road material.
		C508.5	Test the soil for its suitability as sub grade soil for pavements.

Course code	Course Name	CO-numbering	Statement
18CV61	Design of Steel StructuralElements	C601.1	Apply the basic concepts of limit state method in steel structures.
		C601.2	Recognize the design philosophy of steel structures also design structural steel joints
		C601.3	Design of steel members subjected to compression as per codel provision
		C601.4	Analyze and design of tension members & column bases.
		C601.5	Design of beams as per IS code specifications.

Course code	Course Name	CO-numbering	Statement
18CV62	Applied GeotechnicalEngineering	C602.1	Identify the different geotechnical site investigation methods for different civil engineering projects
		C602.2	Analyze the Stresses in soils due to different load conditions
		C602.3	Estimate factor of safety against failure of slopes and to compute lateral pressure distribution behind earth retaining structures
		C602.4	Design shallow foundation of soil and achieve proficiency in proportioning shallow isolated and combined footings for uniform bearing pressure
		C602.5	Capable of estimating load carrying capacity of single and group of piles

Course code	Course Name	CO-numbering	Statement
18CV63	Hydrology and IrrigationEngineering	C603.1	Understand the importance of hydrology and Irrigation its components.
		C603.2	Measure precipitation and analyse the data and analyse the losses in precipitation.
		C603.3	Estimating runoff from deriving unit hydrographs for various durations and construction of S-curve
		C603.4	Discuss the benefits and methods of Irrigation, Finding the quantity of irrigation water and frequency of irrigation for various crops.
		C603.5	Design the canal and computation of the reservoir capacity.

Course code	Course Name	CO-numbering	Statement						
18CV645	Railway, Harbours, Tunnelling & Airports	C604.1	Identify the variours						
		C604.2	Identify the different						
		C604.3	Sketch the different						
		C604.4	Execute and schedule the						
		C604.5	Design the length,						

Course code	Course Name	CO-numbering	Statement
18CV65	ional Energy Resources (Mechanical Dept)	C605.1	
		C605.2	
		C605.3	
		C605.4	
		C605.5	

Course code	Course Name	CO-numbering	Statement
18CVL66	Software ApplicationLaboratory	C606.1	Apply the fundamental concepts in the analysis and scheduling of different structural elements.
		C606.2	Analysis of plan trusses, continous beams and 3D framed structures usind Staad Pro.
		C606.3	Scheduling of building using microsoft project software.
		C606.4	Understanding the concept of spreadsheet to achieve various calculations in civil engineering field.

		C606.5	Prepare a map's using GIS software.

Course code	Course Name	CO-numbering	Statement
18CVL67	EnvironmentalEngineering Laboratory	C607.1	Identify the different equipments & safety standards of water & wastewater.
		C607.2	Conducting experiments & estimating the concentration of different parameters
		C607.3	Distinguish the characteristics of Water and Wastewater.
		C607.4	Compare the test results with water & wastewater standards to draw suitable conclusion.
		C607.5	Able to demonstrate various testing procedures for water & waste water.

Course code	Course Name	CO-numbering	Statement
18CVEP	Extensive Survey project	C608.1	Identify the topography and different surveys required for various civil engineering projects.
		C608.2	Apply the various equipment and methods of survey for different civil engineering projects.
		C608.3	Analyse the field data and prepare the drawings based on the survey field work.
		C608.4	Design the various elements of water tank, water supply and highway engineering project.
		C608.5	Evaluate and calculate the bill of quantities for various works based on the survey and drawings prepared.

Course code	Course Name	CO-numbering	Statement
17CV71	Municipal Wastewater Engineering	C701.1	Apply the methods of sewage disposal system in municipal & industrial waste water.
		C701.2	Acqurie capability to design sewer and sewer treatment plant.
		C701.3	Evaluate degree of treatment and type of treatment for disposal,reuse and recycle.
		C701.4	Identify the waste streams and design the industrial waste water treatment plant.
		C701.5	Inspect sewage and industrail effluent issues.

Course code	Course Name	CO-numbering	Statement
17CV72	Design of RCC and Steel Structures	C702.1	Aquires the basic knowledge of combined footing using codal provissions.
		C702.2	Apply the knowledge of retaining wall using codal provissions
		C702.3	Able to Analyse the gantry girder using codal provissions.
		C702.4	Able to Analyse design the plate girder using codal provissions
		C702.5	Analyse the truss for different loading condition using codal provissions.

Course code	Course Name	CO-numbering	Statement
17CV73	HYDROLOGY AND IRRIGATION	C703.1	To know the importance of hydrology and Irrigation its components.
		C703.2	Measure precipitation and analyse the data and analyse the losses in precipitation.
		C703.3	Estimating runoff from deriving unit hydrographs for various durations and construction of S-curve
		C703.4	Discuss the benefits and methods of Irrigation, Finding the quantity of irrigation water and frequency of irrigation for various crops.
		C703.5	Design the canal and computation of the reservoir capacity

Course code	Course Name	CO-numbering	Statement
17CV744	Ground Water Hydraulics	C704.1	Characterize the properties of ground water & aquifer
		C704.2	Quantify the ground water flow
		C704.3	Analyse the flow of water in wells (well hydraulics)

Course code	Course Name	CO-numbering	Statement
		C704.4	Locate the occurrence of ground water and augment ground water resource
		C704.5	Apply ground water development method

Course code	Course Name	CO-numbering	Statement
17CV75	Repair and Rehabilitation & Retrofitting	C705.1	Apply Suitable Methods To Find The Deterioration Of Concrete Structures
		C705.2	Assess The Damage For Different Type Of Structure In Different Conditions.
		C705.3	Examine The Various Effects Of Environment Its Durability And Serviceability
		C705.4	Summarise The Principles Of Repair And Rehabilitation Of Structures
		C705.5	Recognise Ideal Materials For Different Repair And Retrofitting Technique.

Course code	Course Name	CO-numbering	Statement
17CVL76	EnvironmentalEngineering Laboratory	C706.1	Identify the different equipments & safety standards of water & wastewater.
		C706.2	Conducting experiments & estimating the concentration of different parameters
		C706.3	Distinguish the characteristics of Water and Wastewater.
		C706.4	Compare the test results with water & wastewater standards to draw suitable conclusion.
		C706.5	Able to demonstrate various testing procedures for water & waste water.

Course code	Course Name	CO-numbering	Statement
17CVL77	Computer Aided Detailing of Structures	C707.1	Idetntify the autocad commands for detailing of structures
		C707.2	Apply the basic fundamentals of rcc and steel in structural drawings as per codal provisions
		C707.3	Select the tools in autocad software to draw the structural drawings of various RCC components
		C707.4	Prepare structural drawings of various steel connections by using autocad software
		C707.5	Presenting the reinforcement and other details of various structural elementsfor the purpose of field execution

Course code	Course Name	CO-numbering	Statement
17CV81	Quantity survey & Contract Management	C801.1	Apply engineering fundamentals to estimate and workout the quantities of civil engineering projects
		C801.2	Analyse the quantity of materials required for civil engineering works such as roads, manhole, septic tank as per specifications
		C801.3	Estimate the cost of expenditure of different items of works
		C801.4	Prepare contracts and tenders in construction practices.
		C801.5	Prepare detailed report considering estimation and valuation process.

Course code	Course Name	CO-numbering	Statement
17CV82	Design of Prestressed Concrete	C802.1	Apply the basic knowledge and understand the requirement of PSC members for present scenario.
		C802.2	Describe the methods of casting PSC members.
		C802.3	Analyse the stresses encountered in PSC element during transfer and at working, losses and efficiency
		C802.4	Apply the IS standards for designing the PSC elements
		C802.5	Design PSC beam for different requirements.

Course code	Course Name	CO-numbering	Statement
17CV833	PAVEMENT DESIGN	C803.1	List the characteristics, components and basic concepts of pavement.
		C803.2	Analyse stresses, strain and deflection by Boussinesq's, Burmister's and Westergaard's theory.

		C803.3	Design rigid pavement and flexible pavement confirming to IRC 58-2002 and IRC 37-2001.
		C803.4	Describe the different types of failures in flexible and rigid pavement and maintenance works.
		C803.5	Evaluate the functional and structural condition of pavement.

Course code	Course Name	CO-numbering	Statement
17CV84	INTERNSHIP	C804.1	Apply knowledge of the industry & skills learnt to classroom work.
		C804.2	Acquire practical experience in industry.
		C804.3	Recognize the areas for career and skill development.
		C804.4	Develop the skills to enable life long learning.
		C804.5	Develop oral communication skills and develop technical reports ethically.

Course code	Course Name	CO-numbering	Statement
17CVP85	PROJECT WORK	C805.1	Identify real world civil engineering problems through survey and review of literature.
		C805.2	Design and develop project with consideration of environmental factors, economy, safety and societal needs.
		C805.3	Apply appropriate technology/modern tools
		C805.4	Demonstrate the leadership skills and ability to work individually as well as in team.
		C805.5	Develop oral Communication skills and write the project report ethically.

Course code	Course Name	CO-numbering	Statement
17CVS86	SEMINAR	C806.1	Identify topic of current, real-time issues in the field of Civil engineering. Through survey and review of literature
		C806.2	Attain the knowledge of topic selected through independent and collaborative learning.
		C806.3	Explore concepts in social and academic contexts
		C806.4	Apply principles of ethics and respect in interaction with others.
		C806.5	Communicate effectively to audience and develop technical reports ethically

BALLARI INSTITUTE OF TECHNOLOGY & MANAGEMENT - BALLARI
DEPARTMENT OF MECHANICAL ENGINEERING
COURSE OUTCOMES

Course code	Course Name	CO-numbering	Statement
18ME15/25	Elements of Mechanical Engineering	CO-1	Learn the fundamental concepts of energy, its sources and conversion.
		CO-2	Comprehend the basic concepts of thermodynamics
		CO-3	Understand the concepts of boilers, turbines, pumps, internal combustion engines and refrigeration
		CO-4	Distinguish different metal joining techniques.
		CO-5	Enumerate the knowledge of working with conventional machine tools, their specifications.

Course code	Course Name	CO-numbering	Statement
18EGDL15/25	Computer Aided Engineering drawing	CO-1	Understand the concept of projection and acquire visualization skills to prepare engineering drawings using BIS convention
		CO-2	Apply the knowledge of projections to draw orthographic views of points and lines through sketching and using CAD software
		CO-3	Apply the knowledge of projections to draw orthographic views of planes through sketching and using CAD software
		CO-4	Apply the knowledge of projections to draw orthographic views of solids through sketching and using CAD software
		CO-5	Able to visualize and draw the sections of solids and Isometric views of solids through sketching and using CAD software

Course code	Course Name	CO-numbering	Statement
18ME32	Mechanics of Materials	CO-1	Understand simple, compound, thermal stresses and strains their relations, Poisson's ratio, Hooke's law, mechanical properties including elastic constants and their relations. Determine stresses, strains and deformations in bars with varying circular and rectangular cross-sections subjected to normal and temperature loads
		CO-2	Determine plane stress, principal stress, maximum shear stress and their orientations using analytical method and Mohr's circle. Determine the dimensions of structural members including beams, bars and rods using Energy methods and also stress distribution in thick and thin cylinders
		CO-3	Draw SFD and BMD for different beams including cantilever beams, simply supported beams and overhanging beams subjected to UDL, UVL, Point loads and couples.Determine dimensions, bending stress, shear stress and its distribution in beams of circular, rectangular, symmetrical I and T sections
		CO-4	Determine the dimensions of shafts based on torsional strength, rigidity and flexibility and also to determine elastic stability of columns using Rankin's and Euler's theory.
		CO-5	Understand the concept of strain energy and compute strain energy for applied loads and apply the theories of failures

Course code	Course Name	CO-numbering	Statement
18ME33		CO-1	Explain thermodynamic systems, properties, Zeroth law of thermodynamics, temperature scales and energy interactions.
		CO-2	Determine heat, work, internal energy, enthalpy for flow &non-flow process using First and Second Law of Thermodynamics.

	Basic Thermodynamics	CO-3	Interpret behaviour of pure substances and its applications to practical problems
		CO-4	Determine change in internal energy, change in enthalpy and change in entropy using TD relations for ideal gases.
		CO-5	Calculate Thermodynamics properties of real gases at all ranges of pressure, temperatures using modified equation of state including Vander Waals equation, Redlich Wong equation and Beattie-Bridgeman equation

Course code	Course Name	CO-numbering	Statement
18ME34	Material science	CO-1	Understand the mechanical properties of metals and their alloys
		CO-2	Analyze the various modes of failure and understand the microstructures of ferrous and nonferrous materials
		CO-3	Describe the processes of heat treatment of various alloys.
		CO-4	Acquire the Knowledge of composite materials and their production process as well as applications.
		CO-5	Understand the properties and potentialities of various materials available and material selection procedures

Course code	Course Name	CO-numbering	Statement
18ME35 A	Metal casting &Forming	CO-1	To enrich the knowledge pertaining to relative motion and mechanics required for various machine tools.
		CO-2	To introduce students to different machine tools to produce components having different shapes and sizes
		CO-3	To develop the knowledge on mechanics of machining process and effect of various parameters on machining
		CO-4	To acquaint with the basic knowledge on fundamentals of metal forming processes
		CO-5	To study various metal forming processes.

Course code	Course Name	CO-numbering	Statement
18ME35 B	Metal casting & welding	CO-1	Describe the casting process, preparation of Green, Core, dry sand molds and Sweep, Shell, Investment and plaster molds. Explain the Pattern, Core, Gating, Riser system and Jolt, Squeeze, Sand Slinger Molding Machines.
		CO-2	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.
		CO-3	Explain the Solidification process and Casting of Non-Ferrous Metals.
		CO-4	Describe the Metal Arc, TIG, MIG, Submerged and Atomic Hydrogen Welding processes used in manufacturing. Explain the Resistance, Explosive, Thermit, Laser and Electron Beam Special type of welding process used in manufacturing.
		CO-5	Describe the Metallurgical aspects in Welding and inspection for the quality assurance of product made of casting and joining process.

Course code	Course Name	CO-numbering	Statement
18ME36 B	MMM	CO-1	Understand the concepts of Metrology, Standards, Calibration and apply knowledge of Linear, Angular measurements
		CO-2	Understand the various types of comparators and their applications along with system of Limits, tolerance and gauging principles
		CO-3	Describe Screw thread, Gear terminology and their measurements using different methods
		CO-4	Explain measuring system, its components, transducers, Primary, Intermediate Transducing devices
		CO-5	Describe Terminating and Mechanical measurements --Force, Temperature, Pressure and Strain measuring devices

Course code	Course Name	CO-numbering	Statement
18ME36A	Computer Aided Machine Drawing	CO-1	Identify the national and international standards pertaining to machine drawing.
		CO-2	Understand the importance of the linking functional and visualization aspects in the preparation of the part drawings
		CO-3	Apply limits and tolerances to assemblies and choose appropriate fits for given assemblies.
		CO-4	Interpret the Machining and surface finish symbols on the component drawings.
		CO-5	Preparation of the part or assembly drawings as per the conventions.

Course code	Course Name	CO-numbering	Statement
18MEL37A	Material Testing Lab	CO-1	Acquire experimentation skills in the field of material testing
		CO-2	Develop theoretical understanding of the mechanical properties of materials by performing experiments
		CO-3	Apply the knowledge to analyze a material failure and determine the failure inducing agent/s
		CO-4	Apply the knowledge of testing methods in related areas
		CO-5	Know how to improve structure/behavior of materials for various industrial applications

Course code	Course Name	CO-numbering	Statement
18MEL37B	MMM Lab	CO-1	To calibrate pressure gauge, lvdt, thermocouple, load cell, micrometer
		CO-2	To measure angle using, sine bar, sine center, bevel protractor, alignment using autocollimator
		CO-3	To demonstrate measurements using toolmakers microscope, optical projector, optical flates
		CO-4	To measure screw thread parameters, gear tooth profile using 2- wire method, vernier gear tooth micrometer

Course code	Course Name	CO-numbering	Statement
		CO-5	To measure surface roughness using comparator and to measure cutting tool forces using lathe, drill tool dynamometers

Course code	Course Name	CO-numbering	Statement
18MEL38A	Machine Shop	CO-1	Identify the national and international standards pertaining to machine drawing.
		CO-2	Understand the importance of the linking functional and visualization aspects in the preparation of the part drawings
		CO-3	Apply limits and tolerances to assemblies and choose appropriate fits for given assemblies.
		CO-4	Interpret the Machining and surface finish symbols on the component drawings.
		CO-5	Preparation of the part or assembly drawings as per the conventions.

Course code	Course Name	CO-numbering	Statement
18MEL38B	Foundary and Forging Lab	CO-1	Identify the national and international standards pertaining to machine drawing.
		CO-2	Understand the importance of the linking functional and visualization aspects in the preparation of the part drawings
		CO-3	Apply limits and tolerances to assemblies and choose appropriate fits for given assemblies
		CO-4	Interpret the Machining and surface finish symbols on the component drawings.
		CO-5	Preparation of the part or assembly drawings as per the conventions.

Course code	Course Name	CO-numbering	Statement
18ME42	Applied Thermodynamics	CO-1	Apply thermodynamic concepts to analyze the performance of gas power cycles.
		CO-2	Understand combustion of fuels and combustion processes in I C engines including alternate fuels and pollution effect on environment. Apply thermodynamic concepts to analyze turbo machines.
		CO-3	Determine performance parameters of refrigeration and air-conditioning systems. Understand the principles and applications of refrigeration systems.
		CO-4	Analyze air-conditioning processes using the principles of psychrometry and Evaluate cooling and heating loads in an air-conditioning system
		CO-5	Understand the working, applications, relevance of air and identify methods for performance improvement

Course code	Course Name	CO-numbering	Statement

18ME43		CO-1	
			Identify and calculate the key fluid properties used in the analysis of fluid behaviour
		CO-2	
			Understand the force of buoyancy and explain the principles of pressure, buoyancy and floatation
	Fluid Mechanics	CO-3	To understand the flow characteristic and dynamics of flow field for various engineering applications and discuss laminar and turbulent flow and appreciate their differences also to understand why designing for minimum loss of energy in fluid flows is so important
		CO-4	Explain the concept of boundary layer in fluid flow and apply dimensional analysis to form dimensionless numbers in terms of input output variables and to apply it to experimental modelling
		CO-5	
			Illustrate and explain the basic concept of compressible flow and CFD

Course code	Course Name	CO-numbering	Statement
18ME44		CO-1	
			Understand and identify the working of mechanisms and their applications.
		CO-2	Analyse the mechanisms with their velocity and acceleration diagrams through graphical approach.
	Kinematics of Machines	CO-3	
			Function on multi disciplinary teams.
		CO-4	
			Analyse the mechanisms with their velocity and acceleration through analytical approach.
		CO-5	
			Design the working profile of cam and analyse its outcome.

Course code	Course Name	CO-numbering	Statement
18ME45A		CO-1	To enrich the knowledge pertaining to relative motion and mechanics required for various machine tools.
		CO-2	To introduce students to different machine tools to produce components having different shapes and sizes
	Metal casting & Formimg	CO-3	To develop the knowledge on mechanics of machining process and effect of various parameters on machining
		CO-4	To acquaint with the basic knowledge on fundamentals of metal forming processes
		CO-5	To study various metal forming processes.

Course code	Course Name	CO-numbering	Statement
18ME45B		CO-1	Describe the casting process, preparation of Green, Core, dry sand molds and Sweep, Shell, Investment and plaster molds. Explain the Pattern, Core, Gating, Riser system and Jolt, Squeeze, Sand Slinger Molding Machines.
		CO-2	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.
	Metal casting &Welding	CO-3	Explain the Solidification process and Casting of Non-Ferrous Metals.
		CO-4	Describe the Metal Arc, TIG, MIG, Submerged and Atomic Hydrogen Welding processes used in manufacturing. Explain the Resistance, Explosive, Thermit, Laser and Electron Beam Special type of welding process used in manufacturing.
		CO-5	Describe the Metallurgical aspects in Welding and inspection for the quality assurance of product made of casting and joining process.

Course code	Course Name	CO-numbering	Statement
18ME46A	CAMD	CO-1	Identify the national and international standards pertaining to machine drawing.
		CO-2	Understand the importance of the linking functional and visualization aspects in the preparation of the part drawings
		CO-3	Apply limits and tolerances to assemblies and choose appropriate fits for given assemblies.
		CO-4	Interpret the Machining and surface finish symbols on the component drawings.
		CO-5	Preparation of the part or assembly drawings as per the conventions.

Course code	Course Name	CO-numbering	Statement
18ME46B	MMM	CO-1	Understand the concepts of Metrology, Standards, Calibration and apply knowledge of Linear, Angular measurements
		CO-2	Understand the various types of comparators and their applications along with system of Limits, tolerance and gauging principles
		CO-3	Describe Screw thread, Gear terminology and their measurements using different methods
		CO-4	Explain measuring system, its components, transducers, Primary, Intermediate Transducing devices
		CO-5	Describe Terminating and Mechanical measurements --Force, Temperature, Pressure and Strain measuring devices

Course code	Course Name	CO-numbering	Statement
18MEL47A	MT Lab	CO-1	Acquire experimentation skills in the field of material testing
		CO-2	Develop theoretical understanding of the mechanical properties of materials by performing experiments
		CO-3	Apply the knowledge to analyze a material failure and determine the failure inducing agent/s
		CO-4	Apply the knowledge of testing methods in related areas
		CO-5	Know how to improve structure/behavior of materials for various industrial applications

Course code	Course Name	CO-numbering	Statement
18MEL47B	MMM Lab	CO-1	To calibrate pressure gauge, lvdt, thermocouple, load cell, micrometer
		CO-2	To measure angle using, sine bar, sine center, bevel protractor, alignment using autocollimator
		CO-3	To demonstrate measurements using toolmakers microscope, optical projector, optical flates

		CO-4	To measure screw thread parameters, gear tooth profile using 2- wire method, vernier gear tooth micrometer
		CO-5	To measure surface roughness using comparator and to measure cutting tool forces using lathe, drill tool dynamometers

Course code	Course Name	CO-numbering	Statement
18MEL48A	Machine shop	CO-1	Identify the national and international standards pertaining to machine drawing.
		CO-2	Understand the importance of the linking functional and visualization aspects in the preparation of the part drawings
		CO-3	Apply limits and tolerances to assemblies and choose appropriate fits for given assemblies.
		CO-4	Interpret the Machining and surface finish symbols on the component drawings.
		CO-5	Preparation of the part or assembly drawings as per the conventions.

Course code	Course Name	CO-numbering	Statement
18MEL48B	F& F Lab	CO-1	Identify the national and international standards pertaining to machine drawing.
		CO-2	Understand the importance of the linking functional and visualization aspects in the preparation of the part drawings
		CO-3	Apply limits and tolerances to assemblies and choose appropriate fits for given assemblies
		CO-4	Interpret the Machining and surface finish symbols on the component drawings.
		CO-5	Preparation of the part or assembly drawings as per the conventions.

Course code	Course Name	CO-numbering	Statement
18ME51	Manegement and Economics	CO-1	Understand needs, functions, roles, scope and evolution of Management
		CO-2	Understand importance, purpose of Planning and hierarchy of planning and also54nalyse its types.
		CO-3	Discuss Decision making, Organizing, Staffing, Directing and Controlling.
		CO-4	Select the best economic model from various available alternatives
		CO-5	Understand various interest rate methods and implement the suitable one, Estimate various depreciation values of commodities,Prepare the project reports effectively.

Course code	Course Name	CO-numbering	Statement

18ME52		CO-1	Apply the design standards and codes to analyze the stresses induced in the various components having different cross-section based on the type of load and their direction.
		CO-2	Analyse and design components subjected to impact, dynamic and fatigue loads together with stress concentration effects.
	Design of Machine Elements-I	CO-3	Design and analyze the shafts subjected to fluctuating and combined loads, keys, couplings as well as cotter and knuckle joints.
		CO-4	Analyse and design riveted joints, brackets and welded joints subjected to ecccentric load and also to demonstrate the engineering solutions related to the design problems encountered.
		CO-5	Analyse and design threaded fasteners subjected to static and dynamic loading together with eccentric loads; design of power screws

Course code	Course Name	CO-numbering	Statement
18ME53		CO-1	Gain the knowledge static and dynamic equilibrium conditions of mechanisms subjected to forces and couple, with and without friction. and analyse the mechanisms for static and dynamic equilibrium.
		CO-2	Remember the balancing principles of rotating and reciprocating masses and analyse the balancing of the same.
	Dynamics of Machines	CO-3	Remember principles and analysis of governors and gyroscopes and apply them for suitable applications.
		CO-4	Remember the vibrations characteristics of single degree of freedom systems and apply to suitable applications
		CO-5	Characterise the single degree freedom systems subjected to free and forced vibrations with and without damping.

Course code	Course Name	CO-numbering	Statement
18ME54		CO-1	Model studies and thermodynamics analysis of turbomachines
		CO-2	Analyse the energy transfer in Turbo machine with degree of reaction and utilisation factor.
	Turbomachines	CO-3	Classify, analyse and understand various type of steam turbine.
		CO-4	Classify, analyse and understand various type of hydraulic turbine.
		CO-5	Understand the concept of radial power absorbing machine and the problems involved during its operation.

Course code	Course Name	CO-numbering	Statement
18ME55		CO-1	Identify and analyse the functional requirements of a fluid power transmission system for a given application
		CO-2	Visualize how a hydraulic/pneumatic circuit will work to accomplish the function.
	Fluid Power Engineering	CO-3	Design an appropriate hydraulic or pneumatic circuit or combination circuit like electro-hydraulics, electro-pneumatics for a given application.
		CO-4	Select and size the different components of the circuit
		CO-5	Develop a comprehensive circuit diagram by integrating the components selected for the given application.

Course code	Course Name	CO-numbering	Statement
18ME56	Operation Management	CO-1	Explain the concept and scope of operations management in a business context
		CO-2	Recognize the role of Operations management among various business functions and its role in the organizations' strategic planning and gaining competitive advantage
		CO-3	Analyze the appropriateness and applicability of a range of operations management systems/models in decision making.
		CO-4	Assess a range of strategies for improving the efficiency and effectiveness of organizational operations.
		CO-5	Evaluate a selection of frameworks used in the design and delivery of operations

Course code	Course Name	CO-numbering	Statement
18MEL57	Fluid Mechanics Lab	CO-1	Perform experiments to determine the coefficient of discharge of flow measuring devices.
		CO-2	Conduct experiments on hydraulic turbines and pumps to draw characteristics
		CO-3	Test basic performance parameters of hydraulic turbines and pumps and execute the knowledge in real life situations
		CO-4	Determine the energy flow pattern through the hydraulic turbines and pumps
		CO-5	Exhibit his competency towards preventive maintenance of hydraulic machines

Course code	Course Name	CO-numbering	Statement
18MEL58	Energy Lab	CO-1	Perform experiments to determine the properties of fuels and oils.
		CO-2	To determine calorific value of fuel and viscosity of given fuel/oils
		CO-3	To determine the valve timing diagram of petrol and diesel engines.
		CO-4	Conduct experiments on engines and draw characteristics and Test basic performance parameters of I.C. Engine and implement the knowledge in industry
		CO-5	Identify exhaust emission, factors affecting them and report the remedies.

Course code	Course Name	CO-numbering	Statement
18ME61		CO-1	Understand the concepts behind formulation methods in FEM
		CO-2	Identify the application and characteristics of FEA elements such as bars, beams, plane and iso-parametric elements.

	Finite Element Methods	CO-3	Develop element characteristic equation and generation of global equation.
		CO-4	Able to apply suitable boundary conditions to a global equation for bars, trusses, beams, circular shafts and slove them displacements, stress and strain induced
		CO-5	Able to apply suitable boundary conditions to a global equation for heat transfer, fluid flow,axi symmetric and dynamic problems and slove them displacements, stress and strain induced

Course code	Course Name	CO-numbering	Statement
18ME62	Design of Machine elements II	CO-1	Analyze & design curved beams, compound cylinders along with behavior of stresses and power transmission elements
		CO-2	Analyze & design power transmission elements such as belt rope and chain drives. Analyze & design helical compression & tension springs with respect to static & dynamic axial loads
		CO-3	Analyze & design spur, helical and bevel gears with respect to tooth bending strength, endurance strength and wear conditions.
		CO-4	Analyze & design worm gears as well as various types of brakes and clutches and check for heat generation and dissipation
		CO-5	Understand the principle operation of journal and rolling contact bearings and the roperties of lubricants and calculate the friction coeffecient based on heat generation and dissipation as well as static, dynamic and load -life caluclations of roller bearings

Course code	Course Name	CO-numbering	Statement
18ME63	Heat Transfer	CO-1	Understand the modes of heat transfer and apply the basic laws to formulate engineering systems
		CO-2	Understand and apply the basic laws of heat transfer to extended surface, composite material and unsteady state heat transfer problems
		CO-3	Analyze heat conduction through numerical methods and apply the fundamental principle to solve radiation heat transfer problems.
		CO-4	Analyze heat transfer due to free and forced convective heat transfer
		CO-5	Understand the design and performance analysis of heat exchangers and their practical applications, Condensation and Boiling phenomena

Course code	Course Name	CO-numbering	Statement
18ME641	Non-traditional Machining	CO-1	Select a suitable machining process to produce different shapes of required accuracy.
		CO-2	Evaluate the effects of different processes parameters.
		CO-3	Analysis and apply the various metal machining techniques to produce different shapes.
		CO-4	Participate and succeed in competitive examinations.
		CO-5	machning process applications

Course code	Course Name	CO-numbering	Statement
18ME642	Refrigeration and Air-conditioning	CO-1	Study the basic definition, ASHRAE Nomenclature for refrigerating systems
		CO-2	Understand the working principles and applications of different types of refrigeration systems
		CO-3	Study about Vapour Absorption and other Refrigeration Systems
		CO-4	Study about the properties refrigerants and its characteristics
		CO-5	Study the working of air conditioning systems and their applications

Course code	Course Name	CO-numbering	Statement
18MEL67	Heat Transfer Lab	CO-1	Determine the thermal conductivity of a metal rod and overall heat transfer coefficient of composite slabs.
		CO-2	Determine convective heat transfer coefficient for free and forced convection and correlate with theoretical values
		CO-3	Evaluate temperature distribution characteristics of steady and transient heat conduction through solid cylinder experimentally
		CO-4	Determine surface emissivity of a test plate and Stefan Boltzmann constant
		CO-5	Estimate performance of a refrigerator and effectiveness of a fin and Double pipe heat exchanger

Course code	Course Name	CO-numbering	Statement
18MEMP68	Mini Project	CO-1	Present the mini-project and be able to defend it
		CO-2	Make links across different areas of knowledge and to generate, develop and evaluate ideas and information so as to apply these skills to the project task
		CO-3	Habituated to critical thinking and use problem solving skills
		CO-4	Communicate effectively and to present ideas clearly and coherently in both the written and oral forms
		CO-5	Work in a team to achieve common goal.

Course code	Course Name	CO-numbering	Statement
17ME71	Energy Engineering	CO-1	Summarize the basic concepts of thermal energy systems,
		CO-2	Identify renewable energy sources and their utilization.
		CO-3	Understand the basic concepts of solar radiation and analyze the working of solar PV and thermal systems.
		CO-4	Understand principles of energy conversion from alternate sources including wind, geothermal, ocean, biomass, biogas.

Course code	Course Name	CO-numbering	Statement
		CO-5	Understand the concepts and applications of fuel cells, thermoelectric convertor and MHD generator and concept of green energy and zero energy

Course code	Course Name	CO-numbering	Statement
17ME72	Fluid power systems	CO-1	Identify and analyse the functional requirements of a fluid power transmission system for a given application.
		CO-2	Visualize how a hydraulic/pneumatic circuit will work to accomplish the function.
		CO-3	Design an appropriate hydraulic or pneumatic circuit or combination circuit like electro-hydraulics, electro-pneumatics for a given application.electro-pneumatics for a given application.
		CO-4	Select and size the different components of the circuit, electro-pneumatics for a given application.
		CO-5	Develop a comprehensive circuit diagramby integrating the components selected for the given application.

Course code	Course Name	CO-numbering	Statement
17ME73	Control Engineering	CO-1	Recognize control system and its types,control actions
		CO-2	Determine the system governing equations for physical models(Electrical, Thermal,Mechanical, Electro Mechanical)
		CO-3	Calculate the gain of the system using block diagram and signal flow graph
		CO-4	Illustrate the response of 1st and 2nd order systems
		CO-5	Determine the stability of transfer functions in complex domain and frequency domain and Employ state equations to study the controllability and observability

Course code	Course Name	CO-numbering	Statement
17ME742	Tribology	CO-1	Understand the fundamentals of tribology and associated parameters. behaviour of solid bodies.
		CO-2	Apply concepts of tribology for the performance analysis and design of components experiencing relative motion.
		CO-3	Analyse the requirements and design hydrodynamic journal and plane slider bearings for a given application
		CO-4	Select proper bearing materials and lubricants for a given tribological application.
		CO-5	Apply the principles of surface engineering for different applications of tribology

Course code	Course Name	CO-numbering	Statement
17ME753		CO-1	Illustrate various components of Mechatronics systems.

	Mechatronics	CO-2	Illustrate various components of microprocessor & microcontroller sytems with its terminologies
		CO-3	Analyze the organization of INTEL 8085 data address buses, programming 8085 processor
		CO-4	Assess various control systems used in automation
		CO-5	Develop mechanical, hydraulic, pneumatic and electrical control systems.

Course code	Course Name	CO-numbering	Statement
17MEL76	Design Lab	CO-1	To understand the working principal of machine elements such as governors, gyroscopes etc.
		CO-2	To identify forces and couples in rotating mechinacal system components as well as natural frequency, logarithmicdecrement ,damping ratio and damping coefficient in a SDFvibrating systems.
		CO-3	To identify vibrations in machine elements and design appropriate damping methods and to determine the critial speed of a rotating shaft.
		CO-4	To identify the minimum film thickness, load carrying capacity, frictional torque and pressure distribution of journal bearing.
		CO-5	To measure strain in various machines elements using strain gauges and determining strain induced in a structral member using the principle of photo-elasticity.

Course code	Course Name	CO-numbering	Statement
17MEL77	CIM Lab	CO-1	Generate CNC Lathe part program for Turning, Facing, Chamfer, Grooving, Step turning, Taper turning, circular interpolation etc.
		CO-2	Generate CNC Mill part programming for point to point motions, line motions, circular interpolation, contour motion, pocket milling-circular, rectangular, mirror commands etc
		CO-3	Use canned cycles for drilling, peck drilling, Boring, Tapping, Turning , Facing, Taper turning thread cutting etc
		CO-4	Simulate tool path for different machining operations of small components using CNC Lathe & CNC Milling machine
		CO-5	Use high end CAM packages for machining complex parts ; use state of art cutting tools and related cutting parameters;optimize cycle time .

Course code	Course Name	CO-numbering	Statement
17MEP78	Project Phase I	CO-1	Interpret various Engineering problems
		CO-2	Design and carryout a project for current industrial standards
		CO-3	Demonstrate an ability to work in laboratory and industrial site on multidisciplinary tasks in teams
		CO-4	Observe experimentally the impact of engineering solutions on society and need for sustainable development.
		CO-5	Evaluate knowledge of contemporary issues and able to apply effectively for project management

Course code	Course Name	CO-numbering	Statement
17ME81	Operation Research	CO-1	Understanding the basics of decision making and solving the LPP by various methods
		CO-2	Finding the optimal solution for transportation and assignment problem
		CO-3	Solving the project evaluation and network problems, queving theory, service pattern and arrival pattern
		CO-4	Finding the optimal strategy of a player using various dominance rule and by graphical method, sequencing of various jobs on various machines and graphical method
		CO-5	To introduce the concepts of surface engineering and its importance in tribology.

Course code	Course Name	CO-numbering	Statement
17ME82	Additive manufacturing	CO-1	Understand the different process of additive manufacturing using Polymer and Powder.
		CO-2	Describe the various drives and System devices during additive manufacturing
		CO-3	Understand the different process of additive manufacturing using Nano Materials.
		CO-4	Analyse the different Characterization techniques.
		CO-5	Describe the various NC, CNC machine programming and Automation techniques.

Course code	Course Name	CO-numbering	Statement
17ME832	Experimental Stress analysis	CO-1	Explain characterize the elastic behaviour of solid bodies
		CO-2	Describe stress strain analysis of mechanical systems using electrical resistance strain gauge
		CO-3	Discuss skills for experimental investigations an accompanying laboratory course is desirable
		CO-4	Discuss experimental investigations by predictions by other methods
		CO-5	Describe various coating technics

Course code	Course Name	CO-numbering	Statement
17ME84	Internship	CO-1	To expand thinking and broaden the knowledge and skills acquired through course work in the field.
		CO-2	To relate to, interact with, and learn from current professionals in the field.
		CO-3	To gain a greater understanding of the duties and responsibilities of a professional.

		CO-4	To understand and adhere to professional standards in the field.
		CO-5	To develop the initiative and motivation to be a self-starter and work independently

Course code	Course Name	CO-numbering	Statement
17ME85	Project Phase II	CO-1	Interpret various Engineering problems
		CO-2	Design and carryout a project for current industrial standards
		CO-3	Demonstrate an ability to work in laboratory and industrial site on multidisciplinary tasks in teams
		CO-4	Observe experimentally the impact of engineering solutions on society and need for sustainable development.
		CO-5	Evaluate knowledge of contemporary issues and able to apply effectively for project management

Course code	Course Name	CO-numbering	Statement
17MES86	Seminar	CO-1	Understand the role that effective presentations have in public/professional contexts and gain experience in formal/ informal presentation
		CO-2	demonstrate the ability to discern the assignment's intended audience and objectives and respond appropriately
		CO-3	construct a paper consistent with expectations of the discipline, including an appropriate organization, style, voice and tone
		CO-4	access information in a variety of ways appropriate to a discipline, including locating and using library collections and services and other search tools and databases.
		CO-5	demonstrate the ability to collaborate with others as they work on intellectual projects (reading, writing, speaking, researching...)

BALLARI INSTITUTE OF TECHNOLOGY & MANAGEMENT, BALLARI
DEPARTMENT OF MANAGEMENT STUDIES
COURSE OUTCOMES

DEPARTMENT OF MANAGEMENT STUDIES - COURSE OUTCOMES FOR THE ACADEMIC YEAR 2020-2021

1ST SEMESTER	2020 YEAR SCHEME		
Course code	**Course Name**	**CO Numbering**	**Statement**
20MBA11	agement Organizational & Beh	CO101.1	Apply the concepts & principles of management and organization Behavior
		CO101.2	Apply and acquire the conceptual knowledge of Management, various functions of Management and theories in Organizational Behaviour.
		CO101.3	AAnalyze the various methods to solve the real world situations
		CO101.4	Develop a greater understanding about Management and Behavioural aspects to analyse the concepts related to individual behavior, attitude, perception and personality..
		CO101.5	Demonstrate exposure on recent trends in management to overcome stress.

Course code	**Course Name**	**CO Numbering**	**Statement**
20MBA12	Managerial Economics	CO102.1	Apply Economic Principles in Management Decision Making
		CO102.2	Apply the micro economic concepts for effective functioning of a firm and Industry
		CO102.3	Assess and forecast demand
		CO102.4	Apply the concepts of production and cost for optimization of production
		CO102.5	Design competitive strategies like pricing, product differentiation etc and marketing according to the market structure

Course code	**Course Name**	**CO Numbering**	**Statement**
20MBA13	Accounting for Managers	CO103.1	Apply theoretical knowledge and its application in real time accounting
		CO103.2	Capable of preparing financial statement of companies.
		CO103.3	Apply the cost volume analysis for decision making
		CO103.4	Independently undertake financial statement analysis and take decisions
		CO103.5	Comprehend emerging trends in accounting and computerization of accounting systems.

Course code	**Course Name**	**CO Numbering**	**Statement**
20MBA14	Business Statistics	CO104.1	Apply the basic concepts of descriptive statistic techniques to visualise data systematically.
		CO104.2	Analyse the business situations with appropriate use of decision making techniques
		CO104.3	Evaluate the business scenarios to predict solution by using time series techniques.
		CO104.4	Design the process of decision making with inferential statistical tools.
		CO104.5	Construct the data patterns using MS Excel package with statistical significance.

Course code	**Course Name**	**CO Numbering**	**Statement**
20MBA15	Marketing Management	CO105.1	Have an ability to access the business scenario and apply the fundamental concepts of marketing to aid business solutions.
		CO105.2	Analyse various models of consumer buying behavior for better visualization of customer traits.
		CO105.3	Formulate the marketing plans by evaluating the various factors of business situation.
		CO105.4	Design the implementation of commercial and distribution aspects of products and service.
		CO105.5	Communicate the viable marketing campaign by appropriate marketing strategy.

Course code	**Course Name**	**CO Numbering**	**Statement**
20MBA16	Managerial Communication	CO106.1	To apply the communication skills for the business correspondence.
		CO106.2	To analyze various types of business presentation and adopt appropriate oral communication.
		CO106.3	To evaluate various business letters for communication and structure the appropriate writing skills.
		CO106.4	To draft business reports to meet the challenges of competitive environment.
		CO106.5	To develop interpersonal communication skills in various business situations for creating business values.

2ND SEMESTER	2020 YEAR SCHEME		
Course code	**Course Name**	**CO Numbering**	**Statement**
20MBA21	Human Resource Management	CO201.1	Apply the concepts, functions and theories of HRM in an organization
		CO201.2	Analyze the effectiveness of recruitment & selection procedure
		CO201.3	Analyse the compensation and employment relations at workplace
		CO201.4	Identify the various human resource innovations and trends in the field of HR.
		CO201.5	Develop a greater understanding about HR practices

Course code	**Course Name**	**CO Numbering**	**Statement**
20MBA22	Financial Management	CO202.1	Understand the basic financial concepts
		CO202.2	Analyse the time value of money in financial markets
		CO202.3	Evaluate the investment decisions
		CO202.4	Analyze the capital structure and dividend decisions
		CO202.5	Estimate working capital requirements.

Course code	Course Name	CO Numbering	Statement
20MBA23	Research Methodology	CO203.1	Develop understanding on various kinds of research, objectives of doing research, research process, research designs and sampling
		CO203.2	Have adequate knowledge on measurement & scaling techniques as well as the quantitative data analysis.
		CO203.3	Know prerequisites of evolution of research methodology and its significance to the management of modern organizations.
		CO203.4	Apply a range of quantitative / qualitative research techniques to business and day to day management problems
		CO203.5	Analysis of data, interpretation and report writing that would enable critical thinking skills.

Course code	Course Name	CO Numbering	Statement
20MBA24	Operation Research	CO204.1	Apply the basic concepts of operations research to visualise data systematically.
		CO204.2	Analyze the business situations with appropriate use of decision making techniques
		CO204.3	Evaluate the business scenarios to predict solution by using assignment models
		CO204.4	Design the process of decision making with theory of games.
		CO204.5	Construct network diagrams using network analysis tools.

Course code	Course Name	CO Numbering	Statement
20MBA25	Strategic Management	CO205.1	Apply concepts and models of strategic management.
		CO205.2	Develop the knowledge of formulating a strategy and gain steps to competitive advantage.
		CO205.3	Analyse the competitive situation using strategic models in dealing with business environment.
		CO205.4	Evaluate strategic drive to overcome business challenges in industry and organization culture.
		CO205.5	To communicate the levels of strategy and controlling measures for decision making.

Course code	Course Name	CO Numbering	Statement
20MBA26	Entrepreneurship Development	CO206.1	Apply the concept of entrepreneurship to various business plans.
		CO206.2	Analyze the feasibility of different stages in business planning process.
		CO206.3	Evaluate the various sources of funding to support entrepreneurship.
		CO206.4	Develop the key elements of entrepreneurship in relation to family business organizations.
		CO206.5	Comprehend the various rules, legislations and their applicability in entrepreneurial development.

3RD SEMESTER	2018 YEAR SCHEME		
Course code	Course Name	CO Numbering	Statement
18MBAHR301	Recruitment & Selection	CO301.1	Apply the knowledge of job analysis and various techniques of job analysis in recruitment and selection process.
		CO301.2	Analyse the various sources of recruitment.
		CO301.3	Evaluate the procedure practiced for screening candidates.
		CO301.4	Construct various selection tests to evaluate ability of candidates in selection process.
		CO301.5	Design various documentations to execute selection process.

Course code	Course Name	CO Numbering	Statement
18MBAHR302	HR Analytics	CO302.1	Develop broad understanding of theoretical frame work by value creation through demonstration of hr analytics
		CO302.2	Ability to evaluate various performance indicators in the HR domain
		CO302.3	Able to formulate data creation procedures for the better decision making
		CO302.4	Ability to conduct activities in assessing the study of HR contacts in any organization
		CO302.5	To create hr scorecard for measuring various functions

Course code	Course Name	CO Numbering	Statement
18MBAHR302	Compensation & Reward System	CO303.1	Apply the various conceptual frame works & models for effective planning in compensation management
		CO303.2	Analyse the various methods & techniques in calculating compensation of employees
		CO303.3	Evaluate the various forces & factors in determining the compensation benefits
		CO303.4	Create & implement performance based wages & incentive plans
		CO303.5	Design an legislative frame work for strategic implementation of compensation plans

Course code	Course Name	CO Numbering	Statement
18MBAMM301	Consumer Behavior	CO307.1	Comprehend the concept of Consumer Behaviour and Consumerism
		CO307.2	Apply the influences of factors affecting in Consumer behaviour decision making models
		CO307.3	Evaluate the internal dynamics such as personality, perception ,learning ,motivation and attitude
		CO307.4	Relate external influence like social class, culture and groups
		CO307.5	Analyse the process of consumer diffusion of innovation

Course code	Course Name	CO Numbering	Statement
18MBAMM302	Retail Management	CO308.1	Visualize and apply the contemporary retail management, issues, and strategies to scenario for retail application.

		CO308.2	Comprehend and Analysing the strategic significance components in functionalizing the retail organization.
		CO308.3	Evaluating the various methods and techniques of Retail operations and Store management.
		CO308.4	Develop comprehensive research plans by accessing the national and international Retail scenario for business decisions.
		CO308.5	Effectively communicate the Audit and ethics in Retail Management.

Course code	Course Name	CO Numbering	Statement
18MBAMM303	Services Marketing	CO309.1	Able to utilize the concepts of the services marketing with the overview of customer behavior towards service industry
		CO309.2	Able to analyse the customer expectation by appropriate tools and frame works
		CO309.3	Able to evaluate and develop the service outcomes with appropriate leadership strategies
		CO309.4	Able to design the service process with focus on employees and customer relationships.
		CO309.5	Ability to communicate service contents by appropriate element of service infrastructure over viewing the service scape and physical evidence.

Course code	Course Name	CO Numbering	Statement
18MBAFM301	Banking and Financial Services	CO3010.1	Analyse the functioning of RBI & Commercial Banks by illustrating their products and services.
		CO3010.2	Analyse the activities of merchant banking & Underwriting.
		CO3010.3	Evaluate the microfinance models & assess leasing and hire-purchase concept.
		CO3010.4	Analyse the performance of credit rating & develop a model for venture capital.
		CO3010.5	Evaluate the types of mutual funds & develop debt securitization model.

Course code	Course Name	CO Numbering	Statement
18MBAFM302	Investment Management	CO3011.1	Assess the capital market and various instruments for investment
		CO3011.2	Evaluate risk & return associated with Investments
		CO3011.3	Analyse Company, Industry and Economy framework for Investment management
		CO3011.4	Apply the theories, tools and techniques of portfolio management
		CO3011.5	Evaluate equity and dividend valuation models

Course code	Course Name	CO Numbering	Statement
18MBAFM303	Direct Taxation	CO3012.1	Apply the concepts of Income tax with a comprehensive reading
		CO3012.2	Analyse the different income heads of taxable incomes in Income Tax
		CO3012.3	Evaluate the exemptions and deductions available for different assesses while computing the total income
		CO3012.4	Analyse the corporate tax system
		CO3012.5	Develop the Total income statement of individual assesses

Course code	Course Name	CO Numbering	Statement
18MBAFM304	Advanced Financial Management	CO3013.1	Apply the concept of capital structure and capital structure theories
		CO3013.2	Evaluate the dividend policy of the firm
		CO3013.3	Apply the techniques of inventory and receivable management
		CO3013.4	Develop the techniques of managing different component of working capital in an organization
		CO3013.5	Forecasting cash flows by applying cash management models

Course code	Course Name	CO Numbering	Statement
18MBAFM305	Cost Management	CO3014.1	Apply the cost methods and techniques to solve real time problems of the industries
		CO3014.2	Demonstrate knowledge regarding overheads, apportionment and its application
		CO3014.3	Analyse the various costs by using marginal costing techniques and make decisions
		CO3014.4	Evaluate various budgets and compare costs using budgetary control and standard costing techniques
		CO3014.5	Apply the emerging trends in costing like ABC and compare with traditional costing to help in cost audit

Course code	Course Name	CO Numbering	Statement
18MBAFM306	Project Appraisal Planning & Control	CO3015.1	Apply concepts of project planning in project appraisal.
		CO3015.2	Analyse & appraise the implementation of project with the help of various tools and techniques.
		CO3015.3	Assess financial & social risks concerned with project implementation.
		CO3015.4	Evaluate the project constraints by assessing the qualitative & quantitative factors in capital budgeting.
		CO3015.5	Create an implementation plan for a project.

Course code	Course Name	CO Numbering	Statement
18MBAOS307	Organization Study	CO3016.1	Ability to apply and demonstrate the knowledge for contemplating within the relevant industry.
		CO3016.2	Ability to analyse underlying issues and challenges of an organization.
		CO3016.3	Ability to apprentice the workflow of organisational functions by the appropriate models of management.
		CO3016.4	Communicate and collaborate through appropriate interpersonal skills for presentation of the study.
		CO3016.5	Ability to articulate the pragmatic experience for societal benefits.

4TH SEMESTER	2018 YEAR SCHEME	

Course code	Course Name	CO Numbering	Statement
18MBAHR401	Public Relations	CO401.1	To apply fundamental tools of public relation practice
		CO401.2	To analyse various emerging trends in public relations
		CO401.3	To analyse the importance of employee communication and organization change
		CO401.4	To evaluate of importance of community and media relations
		CO401.5	To create the fundamental guidelines of handling issues and crisis management plan in the organization

Course code	Course Name	CO Numbering	Statement
18MBAHR402	Organizational Leadership	CO402.1	Apply the knowledge of leadership theories and traits in real world/situation.
		CO401.2	Analyse various leadership styles, behaviour and motivation in an organization.
		CO401.3	Apply fundamental concepts of team leadership in an organization.
		CO401.4	Evaluate leader-follower relationship in an organization to establish high performance culture in an organization.
		CO401.5	Effectively use their skills for self-grooming on leadership traits ethics that influences them to effectively work in groups to achieve organizational goals

Course code	Course Name	CO Numbering	Statement
18MBAHR403	International Human Resource Management	CO403.1	Apply concepts of HRM for IHRM platform
		CO403.2	Apply concepts and knowledge in deployment, expatriate on international assignments
		CO403.3	Analyse the impact of contemporary issues and global imperatives on Human Resource concepts, policies and practices
		CO403.4	Evaluate the effects of different human resource and international industrial relations
		CO403.5	Develop international industrial relation strategies

Course code	Course Name	CO Numbering	Statement
18MBAMM401	Sales Management	CO407.1	To apply the fundamental principles of sales management, used in appropriate selling situations in selling process
		CO407.2	To analyse the various selling skills and techniques to develop effective sales administration through sales territories.
		CO407.3	To evaluate the use of various plan of compensation and control techniques.
		CO407.4	To communicate various motivation concepts for effective implementation of sales management plans.
		CO407.5	To design and monitor the effective sales Process with use of human and IT trails.

Course code	Course Name	CO Numbering	Statement
18MBAMM402	egrated Marketing Communicat	CO408.1	Apply comprehensive IMC framework models and principles of IMC program.
		CO408.2	Analyse various components of IMC and make appropriate media planning.
		CO408.3	Evaluate the components of IMC for strategic advantage and effective advertising.
		CO408.4	Create and measure effective advertisement with strategic intent.
		CO408.5	Design the IMC program by considering the global scenario using technology.

Course code	Course Name	CO Numbering	Statement
18MBAMM403	igital and Social Media Marketi	CO409.1	Demonstrate the understanding of Digital marketing and media concepts
		CO409.2	Acquire knowledge about digital Marketing and its research
		CO409.3	Demonstration the digital marketing framework in the real world market
		CO409.4	Evaluate the role of SEO, online and mobile advertising and its optimization and display of ad campaigns.
		CO409.5	Analyse the strategies of E-CRM and social media channels

Course code	Course Name	CO Numbering	Statement
18MBAFM401	Mergers, Acquisitions & Corporate Restructuring	CO4010.1	Analyse Mergers and Acquisitionswith its different classifications, strategies, theories and synergy
		CO4010.2	Evaluate financial implication of Mergers and Acquisitions
		CO4010.3	Analyse the results after financial evaluation of Mergers and Acquisitions
		CO4010.4	Assess the different types of Mergers and Acquisitions, takeover and antitakeover strategies
		CO4010.5	Evaluate the Merger Process and identify the stages involved in it

Course code	Course Name	CO Numbering	Statement
18MBAFM402	Risk Management and Insurance	CO4011.1	Analyse the various types of risks and their exposures.
		CO4011.2	Apply the tools and techniques of risk management.
		CO4011.3	Apply the rules & regulations of IRDA to insurance business.
		CO4011.4	Evaluate the different insurance products by applying legal framework in the environment of insurance business.
		CO4011.5	Evaluate the risk management process involved in insurance process.

Course code	Course Name	CO Numbering	Statement
18MBAFM403	Indirect Taxation	CO4012.1	Apply the concepts of The GST System In India
		CO4012.2	Analyse the Levy And Collection Of GST In India.
		CO4012.3	Evaluate The Customs Duty Rules In India.
		CO4012.4	Illustrate the customs duty valuation
		CO4012.5	Analyse The Baggage Principles Of Import And Export

Course code	Course Name	CO Numbering	Statement
18MBAFM404	International Financial Management	CO4013.1	Evaluate the International Business Methods in International Financial environment
		CO4013.2	Assess the foreign exchange market , participants and transactions
		CO4013.3	Evaluate the foreign exchange risk in FOREX market
		CO4013.4	Apply the financial theories to evaluate the exposure to risk in international environment
		CO4013.5	Develop international capital budgeting techniques in an organization.

Course code	Course Name	CO Numbering	Statement
18MBAFM405	Financial Derivatives	CO4014.1	Apply the principles and concepts of financial derivatives in derivative markets
		CO4014.2	Apply the mechanism of forwards ,futures ,options and financial swaps
		CO4014.3	Evaluate the financial derivatives using valuation models
		CO4014.4	Assess the commodity derivatives market in India
		CO4014.5	Evaluate various credit derivatives and VaR

Course code	Course Name	CO Numbering	Statement
18MBAFM406	Corporate Valuation	CO4015.1	Apply the basic concepts of corporate valuation and valuation process
		CO4015.2	Analyse the standard techniques of corporate valuation
		CO4015.3	Analyse financial and strategic decisions using valuation models
		CO4015.4	Evaluate the valuation in the context of IPOs, M&As and bankruptcy cases
		CO4015.5	Develop analytical skills and communication strategies for discussing corporate valuation

Course code	Course Name	CO Numbering	Statement
18MBAPR407	Project Work	CO4016.1	Apply the Management principles in ascertaining the Problems Identification of contemporary issues in the chosen field of research
		CO4016.2	Analyse the data collected with appropriate tools and techniques for meaningful results
		CO4016.3	Evaluate the suitable methods to solve the problem and to yield realist outcomes
		CO4016.4	Formulate the research design to be effective and distinct to confirm the solutions
		CO4016.5	Demonstrate and communicate the knowledge and Ideas through oral and written format for aid in decision making