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2. Demonstrate Fourier series to study the behavior of periodic functions and their applications in system communications, digital signal processing and field theory.  
3. Make use of Fourier transform and Z-transform to illustrate discrete/continuous function arising in wave and heat propagation, signals and systems.  
5. Determine the extremals of functionals using calculus of variations and solve problems arising in dynamics of rigid bodies and vibrational analysis. |
2. Solve network problems by applying Superposition/ Reciprocity/ Thevenin’s/Norton’s/ Maximum Power Transfer/ Millman’s Network Theorems and electrical laws to reduce circuit complexities and to arrive at feasible solutions.  
3. Calculate current and voltages for the given circuit under transient conditions.  
4. Apply Laplace transform to solve the given network.  
5. Solve the given network using specified two port network parameter like Z or Y or T or h.  
6. Understand the concept of resonance. |
| 3.     | Electronic Devices                               | 18EC33       | 1. Understand the principles of semiconductor Physics  
2. Understand the principles and characteristics of different types of semiconductor devices  
3. Understand the fabrication process of semiconductor devices  
4. Utilize the mathematical models of semiconductor junctions and MOS transistors for circuits and systems. |
| 4.     | Digital System Design                            | 18EC34       | 1. Explain the concept of combinational and sequential logic circuits.  
2. Design the combinational logic circuits.  
3. Design the sequential circuits using SR, JK, D, T flip-flops and Mealy & Moore machines  
4. Design applications of Combinational & Sequential Circuits. |
| 5.     | Computer Organization And Architecture           | 18EC35       | 1. Explain the basic organization of a computer system.  
2. Explain different ways of accessing an input / output device including interrupts.  
3. Illustrate the organization of different types of semiconductor and other secondary storage memories.  
4. Illustrate simple processor organization based on hardwired control and micro programmed control. |
2. Analyze and design controlled rectifier, DC to DC converters, DC to AC inverters and SMPS.  
3. Define instrument errors.  
4. Develop circuits for multirange Ammeters, Voltmeters and Bridges to measure passive component values and frequency.  
5. Describe the principle of operation of Digital instruments and PLCs.  
6. Use Instrumentation amplifier for measuring physical parameters. |
| 7. | Additional Mathematics - I | 18MATDIP31 | 1. Understand the fundamental concepts of complex numbers and vector algebra to analyze the problems arising in related area.  
2. Use derivatives and partial derivatives to calculate rates of change of multivariate functions.  
3. Learn techniques of integration including double and triple integrals to find area, volume, mass and moment of inertia of plane and solid region.  
4. Analyze position, velocity and acceleration in two or three dimensions using the calculus of vector valued functions.  
5. Identify and solve first-order ordinary differential equations. |
| 8. | Aadalitha Kannada | 18KAK28/39/49 | 1. At the end of the course, the student will be able to understand Kannada and communicate in Kannada language |
| 9. | Vyavaharika Kannada | 18KVK28/39/49 | 1. At the end of the course, the student will be able to understand Kannada and communicate in Kannada language |
2. Understand Engineering and Professional ethics and responsibilities of Engineers.  
3. Understand the cybercrimes and cyber laws for cyber safety measures. |
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| 1.     | Complex Analysis, Probability And Statistical Methods | 18MAT41      | 1. Use the concepts of analytic function and complex potentials to solve the problems arising in electromagnetic field theory.  
2. Utilize conformal transformation and complex integral arising in aerofoil theory, fluid flow visualization and image processing.  
3. Apply discrete and continuous probability distributions in analyzing the probability models arising in engineering field.  
4. Make use of the correlation and regression analysis to fit a suitable mathematical model for the statistical data.  
5. Construct joint probability distributions and demonstrate the validity of testing the hypothesis. |
| 2.     | Analog Circuits                                   | 18EC42       | 1. Understand the characteristics of BJTs and FETs.  
2. Design and analyze BJT and FET amplifier circuits.  
3. Design sinusoidal and non-sinusoidal oscillators.  
4. Understand the functioning of linear ICs.  
5. Design of Linear IC based circuits. |
| 3.     | Control Systems                                   | 18EC43       | 1. Develop the mathematical model of mechanical and electrical systems  
2. Develop transfer function for a given control system using block diagram reduction techniques and signal flow graph method  
3. Determine the time domain specifications for first and second order systems  
4. Determine the stability of a system in the time domain using Routh-Hurwitz criterion and Root-locus technique.  
5. Determine the stability of a system in the frequency domain using Nyquist and bode plots. |
2. Analyze and model the Random events in typical communication events to extract quantitative statistical parameters.  
3. Analyze and model typical signal sets in terms of a basis function set of Amplitude, phase and frequency.  
4. Demonstrate by way of simulation or emulation the ease of analysis employing basis functions, statistical representation and Eigen values. |
| 5.     | Signals & Systems                                 | 18EC45       | 1. Analyze the different types of signals and systems.  
2. Determine the linearity, causality, time-invariance and stability properties of continuous and discrete time systems.  
3. Represent continuous and discrete systems in time and frequency domain using different transforms Test whether the system is stable. |
| 6.     | Microcontroller                                   | 18EC46       | 1. Explain the difference between Microprocessors & Microcontrollers, Architecture of 8051 Microcontroller, Interfacing of 8051 to external memory and Instruction set of 8051.  
2. Write 8051 Assembly level programs using 8051 instruction set.  
3. Explain the Interrupt system, operation of Timers/Counters and Serial port of 8051.  
4. Write 8051 Assembly language program to generate timings and waveforms using 8051 timers, to send & receive serial data using 8051 serial port and to generate an external interrupt using a switch.  
5. Write 8051 Assembly language programs to generate square wave on 8051 I/O port pin using interrupt and C Programme to send & receive serial data using 8051 serial port.  
6. Interface simple switches, simple LEDs, ADC 0804, LCD and Stepper Motor to 8051 using 8051 I/O ports. |
2. Apply the knowledge of numerical methods in modelling and solving engineering problems.  
3. Make use of analytical methods to solve higher order differential equations.  
4. Classify partial differential equations and solve them by exact methods.  
5. Apply elementary probability theory and solve related problems. |
18MAT31-TRANSFORM CALCULUS, FOURIER SERIES AND NUMERICAL TECHNIQUES

Course Learning Objectives:
- To have an insight into Fourier series, Fourier transforms, Laplace transforms, Difference equations and Z-transforms.
- To develop the proficiency in variational calculus and solving ODE’s arising in engineering applications, using numerical methods.

Course outcomes: At the end of the course the student will be able to:
- CO1: Use Laplace transform and inverse Laplace transform in solving differential/ integral equation arising in network analysis, control systems and other fields of engineering.
- CO2: Demonstrate Fourier series to study the behaviour of periodic functions and their applications in system communications, digital signal processing and field theory.
- CO3: Make use of Fourier transform and Z-transform to illustrate discrete/continuous function arising in wave and heat propagation, signals and systems.
- CO4: Solve first and second order ordinary differential equations arising in engineering problems using single step and multistep numerical methods.
- CO5: Determine the externals of functional using calculus of variations and solve problems arising in dynamics of rigid bodies and vibrational analysis.

18CV32-STRENGTH OF MATERIALS

Course Learning Objectives: This course will enable students
1. To understand the basic concepts of the stresses and strains for different materials and strength of structural elements.
2. To know the development of internal forces and resistance mechanism for one dimensional and twodimensional structural elements.
3. To analyse and understand different internal forces and stresses induced due to representative loads on structural elements.
4. To determine slope and deflections of beams.
5. To evaluate the behaviour of torsion members, columns and struts.

Course outcomes: After studying this course, students will be able:
1. To evaluate the basic concepts of the stresses and strains for different materials and strength of structural elements.
2. To evaluate the development of internal forces and resistance mechanism for one dimensional and two
dimensional structural elements.
3. To analyse different internal forces and stresses induced due to representative loads on structural elements.
4. To evaluate slope and deflections of beams.
5. To evaluate the behaviour of torsion members, columns and struts.

18CV33-FLUIDS MECHANICS

Course Learning Objectives: The objectives of this course is to make students to learn:
1. The Fundamental properties of fluids and its applications.
2. Hydrostatic laws and application to solve practical problem.
3. Principles of Kinematics and Hydrodynamics for practical applications.
4. Basic design of pipes and pipe networks considering flow, pressure and its losses.
5. The basic flow rate measurements.

Course outcomes: After successful completion of the course, the student will be able to:
1. Possess a sound knowledge of fundamental properties of fluids and fluid Continuum
2. Compute and solve problems on hydrostatics, including practical applications
3. Apply principles of mathematics to represent kinematic concepts related to fluid flow
4. Apply fundamental laws of fluid mechanics and the Bernoulli’s principle for practical applications
5. Compute the discharge through pipes and over notches and weirs

18CV34-BUILDING MATERIALS AND CONSTRUCTION

Course Learning Objectives: This course will develop a student;
1. To recognize good construction materials based on properties.
2. To investigate soil properties and design suitable foundation.
3. To understand the types and properties of masonry materials and supervise masonry construction.
4. To gain knowledge of structural components like lintels, arches, staircase and roofs.
5. To understand the finishes in construction like flooring, plastering, paining

Course outcomes: After a successful completion of the course, the student will be able to:
1. Select suitable materials for buildings and adopt suitable construction techniques.
2. Decide suitable type of foundation based on soil parameters
3. Supervise the construction of different building elements based on suitability
4. Exhibit the knowledge of building finishes and form work requirements

18CV35-BASIC SURVEYING

Course Learning Objectives: This course will enable students to;
1. Understand the basic principles of Surveying
2. Learn Linear and Angular measurements to arrive at solutions to basic surveying problems.
3. Employ conventional surveying data capturing techniques and process the data for
computations.
4. Analyze the obtained spatial data to compute areas and volumes and draw contours to represent 3D data on plane figures

**Course outcomes:** After a successful completion of the course, the student will be able to:
1. Posses a sound knowledge of fundamental principles Geodetics
2. Measurement of vertical and horizontal plane, linear and angular dimensions to arrive at solutions to basic surveying problems.
3. Capture geodetic data to process and perform analysis for survey problems.
4. Analyse the obtained spatial data and compute areas and volumes. Represent 3D data on plane figures as contours

**18CV36-ENGINEERING GEOLOGY**

**Course Learning Objectives:** This course will enable students;
1. To inculcate the importance of earth's interior and application of Geology in civil engineering. Attempts are made to highlight the industrial applications of minerals.
2. To create awareness among Civil engineers regarding the use of rocks as building materials.
3. To provide knowledge on dynamic Geology and its importance in modifying the physical character of rocks which cause rocks suitable or unsuitable in different civil engineering projects such as Dams, bridges, tunnels and highways.
4. To educate the ground water management regarding diversified geological formations, climatologically dissimilarity which are prevailed in the country. To highlight the concept of rain water harvesting.
5. To understand the application of Remote Sensing and GIS, Natural disaster and management and environmental awareness

**Course outcomes:** After a successful completion of the course, the student will be able to:
1. Apply geological knowledge in different civil engineering practice.
2. Students will acquire knowledge on durability and competence of foundation rocks, and confidence enough to use the best building materials.
3. Civil Engineers are competent enough for the safety, stability, economy and life of the structures that they construct.
4. Able to solve various issues related to ground water exploration, build up dams, bridges, tunnels which are often confronted with ground water problems.
5. Intelligent enough to apply GIS, GPS and remote sensing as a latest tool in different civil engineering construction.

**18CVL37-COMPUTER AIDED BUILDING PLANNING AND DRAWING**

**Course Learning Objectives:** Provide students with a basic understanding
1. Achieve skill sets to prepare computer aided engineering drawings
2. Understand the details of construction of different building elements.
3. Visualize the completed form of the building and the intricacies of construction based on the engineering
Drawings

**Course Outcomes:** After studying this course, students will be able to
1. Prepare, read and interpret the drawings in a professional set up.
2. KnowtheproceduresofsubmissionofdrawingsandDevelopworkingandsubmissiondrawingsforbuilding.
3. Plananddesignaresidentialorpublicbuildingsasperthegivenrequirements.

**18CVL38-BUILDING MATERIALS TESTING LABORATORY**

**Course Learning Objectives:** The objectives of this course is to make students to learn:
1. Ability to apply knowledge of mathematics and engineering in calculating the mechanical properties of structural materials.
2. Ability to function on multi-disciplinary teams in the area of materials testing.
3. Ability to use the techniques, skills and modern engineering tools necessary for engineering.
4. Understanding of professional and ethical responsibility in the areas of material testing.
5. Ability to communicate effectively the mechanical properties of materials

**Course Outcomes:** After successful completion of the course, the students will be able to:
1. Reproduce the basic knowledge of mathematics and engineering in finding the strength in tension, compression, shear and torsion.
2. Identify, formulate and solve engineering problems of structural elements subjected to flexure.
3. 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.

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**18MAT41-COMPLEX ANALYSIS, PROBABILITY AND STATISTICAL METHODS**

**Course Learning Objectives:**
- To provide an insight into applications of complex variables, conformal mapping and special functions arising in potential theory, quantum mechanics, heat conduction and field theory.
- To develop probability distribution of discrete, continuous random variables and joint probability distribution occurring in digital signal processing, design engineering and microwave engineering

**Course outcomes:** At the end of the course the student will be able to:
- CO1: Use the concepts of analytic function and complex potentials to solve the problems arising in electromagnetic field theory.
- CO2: Utilize conformal transformation and complex integral arising in aerofoil theory, fluid flow visualization and image processing.
- CO3: Apply discrete and continuous probability distributions in analyzing the probability models
18CV42-ANALYSIS OF DETERMATE STRUCTURES

Course Learning Objectives: This course will enable students to
1. To understand different forms of structural systems.
2. To understand concept of ILD and moving loads.
3. To determine slopes and deflections of beams and trusses.
4. To analyse arches and cables.

Course Outcomes: After studying this course, students will be able to:
1. Identify different forms of structural systems.
2. Construct ILD and analyse the beams and trusses subjected to moving loads
3. Understand the energy principles and energy theorems and its applications to determine the
deflections of trusses and beams.
4. Determine the stress resultants in arches and cables.

18CV43-APPLIED HYDRAULICS

Course Learning Objectives: The objectives of this course is to make students to learn:
1. Principles of dimensional analysis to design hydraulic models and Design of various models.
2. Design the open channels of various cross sections including design of economical sections.
3. Energy concepts of fluid in open channel, Energy dissipation, Water surface profiles at different
   conditions.
4. The working principles of the hydraulic machines for the given data and analyzing the
   performance of Turbines for various design data

Course outcomes: After a successful completion of the course, the student will be able to:
1. Apply dimensional analysis to develop mathematical modeling and compute the parametric
   values in prototype by analyzing the corresponding model parameters
2. Design the open channels of various cross sections including economical channel sections
3. Apply Energy concepts to flow in open channel sections, Calculate Energy dissipation,
4. Compute water surface profiles at different conditions
5. Design turbines for the given data, and to know their operation characteristics under different
   operating conditions

18CV44-CONCRETE TECHNOLOGY

Course Learning Objectives: This course will enable students to:
1. To recognize material characterization of ingredients of concrete and its influence on properties of concrete
2. Proportion ingredients of Concrete to arrive at most desirable mechanical properties of Concrete.
3. Ascertain and measure engineering properties of concrete in fresh and hardened state which meet the requirement of real time structures.

**Course outcomes:** After studying this course, students will be able to:
1. Relate material characteristics and their influence on microstructure of concrete.
2. Distinguish concrete behavior based on its fresh and hardened properties.
3. Illustrate proportioning of different types of concrete mixes for required fresh and hardened properties using professional codes.
4. Adopt suitable concreting methods to place the concrete based on requirement.
5. Select a suitable type of concrete based on specific application

### 18CV45-ADVANCED SURVEYING

**Objectives:** This course will enable students to
1. Apply geometric principles to arrive at solutions to surveying problems.
2. Analyze spatial data using appropriate computational and analytical techniques.
3. Design proper types of curves for deviating type of alignments.
4. Use the concepts of advanced data capturing methods necessary for engineering practice

**Course outcomes:** After a successful completion of the course, the student will be able to:
1. Apply the knowledge of geometric principles to arrive at surveying problems.
2. Use modern instruments to obtain geo-spatial data and analyse the same to appropriate engineering problems.
3. Capture geodetic data to process and perform analysis for survey problems with the use of electronic instruments;
4. Design and implement the different types of curves for deviating type of alignments.

### 18CV46-WATER SUPPLY AND TREATMENT ENGINEERING

**Course Learning Objectives:** This course will enable students to
1. Analyze the variation of water demand and to estimate water requirement for a community.
2. Evaluate the sources and conveyance systems for raw and treated water.
3. Study drinking water quality standards and to illustrate qualitative analysis of water.
4. Design physical, chemical and biological treatment methods to ensure safe and potable water Supply

**Course Outcomes:** After studying this course, students will be able to:
1. Estimate average and peak water demand for a community.
2. Evaluate available sources of water, quantitatively and qualitatively and make appropriate choice
3. Evaluate water quality and environmental significance of various parameters and plan suitable treatment system.
4. Design a comprehensive water treatment and distribution system to purify and distribute water to the required quality standards.

18CVL47-ENGINEERING GEOLOGY LABORATORY

Course Learning Objectives: This course will enable students
1. To expose the students to identify the minerals and rocks based on their inherent properties and uses in civil engineering,
2. To educate the students in the interpretation of the geological maps related to civil engineering projects.
3. Students will learn the dip and strike, thickness of strata, Bore hole problems related to geological formation related to foundation, tunnels, reservoirs and mining.
4. Students will understand the Field knowledge by visiting the site like problems Faults, Folds, Joints, Unconformity etc.

Course outcomes: During this course, students will develop expertise in;
1. The students able to identify the minerals, rocks and utilize them effectively in civil engineering practices.
2. The students will interpret and understand the geological conditions of the area for implementation of civil engineering projects.
3. The students will interpret subsurface information such as thickness of soil, weathered zone, depth of hard rock and saturated zone by using geophysical methods.
4. The students will learn the techniques in the interpretation of LANDSAT Imageries to find out the lineaments and other structural features for the given area.
5. The students will be able to identify the different structures in the field.

18CVL48-FLUID MECHANICS AND HYDRAULIC MACHINES LABORATORY

Course Learning Objectives: This course will enable students to;
1. calibrate flow measuring devices
2. determine the force exerted by jet of water on vanes
3. measure discharge and head losses in pipes
4. understand the fluid flow pattern

Course outcomes: During the course of study students will develop understanding of:
1. Properties of fluids and the use of various instruments for fluid flow measurement.
2. Working of hydraulic machines under various conditions of working and their characteristics.
18CV51-CONSTRUCTION MANAGEMENT AND ENTREPRENEURSHIP

**Course Learning Objectives:** This course will enable students to
1. Understand the concept of planning, scheduling, cost and quality control, safety during construction, organization and use of project information necessary for construction project.
2. Inculcate Human values to grow as responsible human beings with proper personality.
3. Keep up ethical conduct and discharge professional duties

**Course Outcomes:** After studying this course, students will be able to:
1. Prepare a project plan based on requirements and prepare schedule of a project by understanding the activities and their sequence.
2. Understand labour output, equipment efficiency to allocate resources required for an activity / project to achieve desired quality and safety.
3. Analyze the economics of alternatives and evaluate benefits and profits of a construction activity based on monetary value and time value.
4. Establish as an ethical entrepreneur and establish an enterprise utilizing the provisions offered by the federal agencies.

18CV52-ANALYSIS OF INDETERMINATE STRUCTURES

**Course Learning Objectives:** This course will enable students to
1. Apply knowledge of mathematics and engineering in calculating slope, deflection, bending moment and shear force using slope deflection, moment distribution method and Kani’s method.
2. Identify, formulate and solve problems in structural analysis.
3. Analyze structural system and interpret data.
4. use the techniques, such as stiffness and flexibility methods to solve engineering problems
5. communicate effectively in design of structural elements

**Course Outcomes:** After studying this course, students will be able to:
1. Determine the moment in indeterminate beams and frames having variable moment of inertia and subsidence using slope deflection method
2. Determine the moment in indeterminate beams and frames of no sway and sway using moment distribution method.
3. Construct the bending moment diagram for beams and frames by Kani’s method.
4. Construct the bending moment diagram for beams and frames using flexibility method
5. Analyze the beams and indeterminate frames by system stiffness method.

18CV53-DESIGN OF RC STRUCTURAL ELEMENTS
Course Learning Objectives: This course will enable students to
1. Identify, formulate and solve engineering problems of RC elements subjected to different kinds of loading.
2. Follow a procedural knowledge in designing various structural RC elements.
3. Impart the usage of codes for strength, serviceability and durability.
4. Provide knowledge in analysis and design of RC elements

Course outcomes: After studying this course, students will be able to:
1. Understand the design philosophy and principles.
2. Solve engineering problems of RC elements subjected to flexure, shear and torsion.
3. Demonstrate the procedural knowledge in designs of RC structural elements such as slabs, columns and footings.
4. Owns professional and ethical responsibility.

18CV54-BASIC GEOTECHNICAL ENGINEERING

Course Learning Objectives: This course will enable students to
1. Appreciate basic concepts of soil mechanics as an integral part in the knowledge of civil engineering.
2. Comprehend basic engineering and mechanical properties of different types of soil.
3. Become broadly familiar with geotechnical engineering problems such as, flow of water through soil medium and terminologies associated with geotechnical engineering.
5. Model and measure strength-deformation characteristics of soils

Course outcomes: On the completion of this course students are expected to attain the following outcomes;
1. Ability to plan and execute geotechnical site investigation program for different civil engineering projects
2. Understanding of stress distribution and resulting settlement beneath the loaded footings on sand and clayey soils
3. Ability to estimate factor of safety against failure of slopes and to compute lateral pressure distribution behind earth retaining structures
4. Ability to determine bearing capacity of soil and achieve proficiency in proportioning shallow isolated and combined footings for uniform bearing pressure
5. Capable of estimating load carrying capacity of single and group of piles

18CV55-MUNICIPAL WASTEWATER ENGINEERING

Course Learning Objectives: This course will enable students to;
1. Understand the various water demands and population forecasting methods.
2. Understand and design different unit operations and unit process in involved in wastewater treatment process
3. Understand the concept and design of various physicochemical treatment units
4. Understand the concept and design of various biological treatment units
5. Understand the concept of various advance waste water and low cost treatment processes for rural areas.

**Course outcomes:** After studying this course, the students will be able to:
1. Select the appropriate sewer appurtenances and materials in sewer network.
2. Design the sewers network and understand the self purification process in flowing water.
3. Design the various physical-chemical treatment units
4. Design the various biological treatment units
5. Design various AOPs and low cost treatment units.

**18CV56-HIGHWAY ENGINEERING**

**Course Learning Objectives:** This course will enable students to;
1. Gain knowledge of different modes of transportation systems, history, development of highways and the organizations associated with research and development of the same in INDIA.
2. Understand Highway planning and development considering the essential criteria’s (engineering and financial aspects, regulations and policies, socio economic impact).
3. Get insight to different aspects of geometric elements and train them to design geometric elements of a highway network.
4. Understand pavement and its components, pavement construction activities and its requirements.
5. Gain the skills of evaluating the highway economics by B/C, NPV, IRR methods and also introduce the students to highway financing concepts.

**Course Outcomes:** After studying this course, students will be able to:
1. Acquire the capability of proposing a new alignment or re-alignment of existing roads, conduct necessary field investigation for generation of required data.
2. Evaluate the engineering properties of the materials and suggest the suitability of the same for pavement construction.
3. Design road geometrics, structural components of pavement and drainage.
4. Evaluate the highway economics by few select methods and also will have a basic knowledge of various highway financing concepts.

**18CVL57-SURVEYING PRACTICE**

**Course Learning Objectives:** This course will enable students to
1. Apply the basic principles of engineering surveying and measurements
2. Follow effectively field procedures required for a professional surveyor
3. Use techniques, skills and conventional surveying instruments necessary for engineering practice

**Course Outcomes:** After a successful completion of the course, the student will be able to:
1. Apply the basic principles of engineering surveying and for linear and angular measurements.
2. Comprehend effectively field procedures required for a professional surveyor.
3. Use techniques, skills and conventional surveying instruments necessary for engineering practice.
Course Learning Objectives: This course will enable students
1. To learn the procedure of testing concrete ingredients and properties of concrete as per standard code recommendations.
2. To learn the procedure of testing bituminous materials as per standard code recommendations.
3. To relate material characteristics to various application of construction.

Course Outcomes: During this course, students will develop expertise in
1. Able to interpret the experimental results of concrete and highway materials based on laboratory tests.
2. Determine the quality and suitability of cement.
3. Design appropriate concrete mix Using Professional codes.
5. Evaluate the strength of structural elements using NDT techniques.
6. Test the soil for its suitability as sub grade soil for pavements.

18CIV59-ENVIRONMENTAL STUDIES

Course outcomes: At the end of the course, students will be able to:
• CO1: Understand the principles of ecology and environmental issues that apply to air, land, and water issues on a global scale.
• CO2: Develop critical thinking and/or observation skills, and apply them to the analysis of a problem or question related to the environment.
• CO3: Demonstrate ecology knowledge of a complex relationship between biotic and a biotic components.
• CO4: Apply their ecological knowledge to illustrate and graph a problem and describe the realities that managers face when dealing with complex issues.
18CV61-DESIGN OF STEEL STRUCTURAL ELEMENTS

Course Learning Objectives: This course will enable students to
1. Understand advantages and disadvantages of steel structures, steel code provisions, and plastic behaviour of structural steel.
2. Learn Bolted connections and Welded connections.
3. Design of compression members, built-up columns and columns splices.
4. Design of tension members, simple slab base and gusseted base.
5. Design of laterally supported and un-supported steel beams

Course Outcomes: After studying this course, students will be able to:
1. Possess knowledge of Steel Structures Advantages and Disadvantages of Steel structures, steel code provisions and plastic behaviour of structural steel.
2. Understand the Concept of Bolted and Welded connections.
3. Understand the Concept of Design of compression members, built-up columns and columns splices.
4. Understand the Concept of Design of tension members, simple slab base and gusseted base.
5. Understand the Concept of Design of laterally supported and un-supported steel beams.

18CV62-APPLIED GEOTECHNICAL ENGINEERING

Course Learning Objectives: This course will enable students to
1. Appreciate basic concepts of soil mechanics as an integral part in the knowledge of Civil Engineering. Also to become familiar with foundation engineering terminology and understand how the principles of Geotechnology are applied in the design of foundations
2. Learn introductory concepts of Geotechnical investigations required for civil engineering projects emphasizing in situ investigations
3. Conceptually learn various theories related to bearing capacity of soil and their application in the design of shallow foundations and estimation of load carrying capacity of pile foundation
4. Estimate internal stresses in the soil mass and application of this knowledge in proportioning of shallow and deep foundation fulfilling settlement criteria
5. Study about assessing stability of slopes and earth pressure on rigid retaining structures

Course outcomes: On the completion of this course students are expected to attain the following outcomes;
1. Ability to plan and execute geotechnical site investigation program for different civil engineering projects
2. Understanding of stress distribution and resulting settlement beneath the loaded footings on sand and clayey soils
3. Ability to estimate factor of safety against failure of slopes and to compute lateral pressure distribution behind earth retaining structures
4. Ability to determine bearing capacity of soil and achieve proficiency in proportioning shallow isolated and combined footings for uniform bearing pressure
5. Capable of estimating load carrying capacity of single and group of piles

18CV63-HYDROLOGY AND IRRIGATION ENGINEERING

Course Learning Objectives: This course will enable students to
1. Understand the concept of hydrology and components of hydrologic cycle such as precipitation, infiltration, evaporation and transpiration.
2. Quantify runoff and use concept of unit hydrograph.
3. Demonstrate different methods of irrigation, methods of application of water and irrigation procedure.
4. Design canals and canal network based on the water requirement of various crops.
5. Determine the reservoir capacity

Course outcomes: After studying this course, students will be able to:
1. Understand the importance of hydrology and its components.
2. Measure precipitation and analyze the data and analyze the losses in precipitation.
3. Estimate runoff and develop unit hydrographs.
4. Find the benefits and ill-effects of irrigation.
5. Find the quantity of irrigation water and frequency of irrigation for various crops.
6. Find the canal capacity, design the canal and compute the reservoir capacity.

18CV642-SOLID WASTE MANAGEMENT

Course Learning Objectives: This course will enable students to
1. Study the present methods of solid waste management system and to analyze their draw backs comparing with statutory rules.
2. Understand different elements of solid waste management from generation of solid waste to disposal.
3. Analyze different processing technologies and to study conversion of municipal solid waste to compost or biogas.
4. Evaluate landfill site and to study the sanitary landfill reactions.

Course outcomes: After studying this course, students will be able to:
1. Analyse existing solid waste management system and to identify their drawbacks.
2. Evaluate different elements of solid waste management system.
4. Design suitable processing system and evaluate disposal sites.

18CV643-ALTERNATE BUILDING MATERIALS

Course Learning Objectives: This Course will enable students to:
1. understand environmental issues due to building materials and the energy consumption in manufacturing building materials
2. study the various masonry blocks, masonry mortar and structural behavior of masonry under compression.
3. Study the alternative building materials in the present context.
4. understand the alternative building technologies which are followed in present construction field.

**Course Outcomes:** After studying this course, students will be able to:

1. Solve the problems of Environmental issues concerned to building materials and cost effective building technologies;
2. Select appropriate type of masonry unit and mortar for civil engineering constructions; also they are able to Design Structural Masonry Elements under Axial Compression.
3. Analyse different alternative building materials which will be suitable for specific climate and in an environmentally sustainable manner. Also capable of suggesting suitable agro and industrial wastes as a building material.
4. Recommend various types of alternative building materials and technologies and design a energy efficient building by considering local climatic condition and building material.

18CV645-RAILWAYS, HARBOUR, TUNNELING AND AIRPORTS

**Course Learning Objectives:** This course will enable students to

1. Understand the history and development, role of railways, railway planning and development based on essential criteria’s.
2. Learn different types of structural components, engineering properties of the materials, to calculate the material quantities required for construction
3. Understand various aspects of geometrical elements, points and crossings, significance of maintenance of tracks.
4. Design and plan airport layout, design facilities required for runway, taxiway and impart knowledge about visual aids
5. Apply design features of tunnels, harbors, dock and necessary navigational aids; also expose them to various methods of tunneling and tunnel accessories.

**Course outcomes:** After studying this course, students will be able to:

1. Acquires capability of choosing alignment and also design geometric aspects of railway system, runway and taxiway.
2. Suggest and estimate the material quantity required for laying a railway track and also will be able to determine the hauling capacity of a locomotive.
3. Develop layout plan of airport, harbor, dock and will be able relate the gained knowledge to identify required type of visual and/or navigational aids for the same.
4. Apply the knowledge gained to conduct surveying, understand the tunneling activities.

18CV651-REMOTE SENSING AND GIS

**Course Learning Objectives:** This course will enable students to

1. Understand the basic concepts of remote sensing.
2. Analyze satellite imagery and extract the required units.
3. Extract the GIS data and prepare the thematic maps.
4. Use the thematic camps for various applications.

Course outcomes: After studying this course, students will be able to:
1. Collect data and delineate various elements from the satellite imagery using their spectral signature.
2. Analyze different features of ground information to create raster or vector data.
3. Perform digital classification and create different thematic maps for solving specific problems.
4. Make decision based on the GIS analysis on thematic maps.

18CV652-TRAFFIC ENGINEERING

Course Learning Objectives: This course will enable students to
1. Understand fundamental knowledge of traffic engineering, scope and its importance.
2. Describe basic techniques for collecting and analyzing traffic data, diagnosing problems, designing appropriate remedial treatment, and assessing its effectiveness.
3. Apply probabilistic and queuing theory techniques for the analysis of traffic flow situations and emphasis the interaction of flow efficiency and traffic safety.
4. Understand and analyse traffic issues including safety, planning, design, operation and control.
5. Apply intelligent transport system and its applications in the present traffic scenario.

Course outcomes: After studying this course, students will be able to:
1. Understand the human factors and vehicular factors in traffic engineering design.
2. Conduct different types of traffic surveys and analysis of collected data using statistical concepts.
3. Use an appropriate traffic flow theory and comprehend the capacity & signalized intersection analysis.
4. Understand the basic knowledge of Intelligent Transportation System.

18CVL66-SOFTWARE APPLICATION LABORATORY

Course Learning Objectives: This course will enable students to
1. Use industry standard software in a professional set up.
2. Understand the elements of finite element modeling, specification of loads and boundary condition, performing analysis and interpretation of results for final design.
3. Develop customized automation tools.

Course Outcomes: After studying this course, students will be able to:
use software skills in a professional set up to automate the work and thereby reduce cycle time for completion of the work

18CVL67-ENVIRONMENTAL ENGINEERING LABORATORY

Course Learning Objectives: This course will enable students,
1. To learn different methods of water & waste water quality
2. To conduct experiments to determine the concentrations of water and waste water
3. To determine the degree and type of treatment
4. To understand the environmental significance and application in environmental engineering practice

Course Outcomes: After studying this course, students will be able to:
1. Acquire capability to conduct experiments and estimate the concentration of different parameters.
2. Compare the result with standards and discuss based on the purpose of analysis.
3. Determine type of treatment, degree of treatment for water and waste water.
4. Identify the parameter to be analyzed for the student project work in environmental stream

18CVEP68-EXTENSIVE SURVEY PROJECT

Course Learning Objectives: This course will enable students to
1. Understand the practical applications of Surveying.
2. Use Total station and other Measurement Equipments.
3. Work in teams and learn time management, communication and presentation skills

Course outcomes: After studying this course, students will be able to:
1. Apply Surveying knowledge and tools effectively for the projects
2. Understanding Task environment, Goals, responsibilities, Task focus, working in Teams towards common goals, Organizational performance expectations, technical and behavioral competencies.
3. Application of individual effectiveness skills in team and organizational context, goal setting, time management, communication and presentation skills.
4. Professional etiquettes at workplace, meeting and general
5. Establishing trust based relationships in teams & organizational environment
6. Orientation towards conflicts in team and organizational environment, Understanding sources of conflicts, Conflict resolution styles and techniques
18CV71-QUANTITY SURVEYING AND CONTRACT MANAGEMENT

Course Learning Objectives: This course will enable students to;
1. Estimate the quantities of work, develop the bill of quantities and arrive at the Cost of civil engineering Project
2. Understand and apply the concept of Valuation for Properties
3. Understand, Apply and Create the Tender and Contract document.

Course outcomes: After studying this course, students will be able to:
1. Taking out quantities and work out the cost and preparation of abstract for the estimated cost for various civil engineering works.
2. Prepare detailed and abstract estimates for various road works, structural works and water supply and sanitary works.
3. Prepare the specifications and analyze the rates for various items of work.
4. Assess contract and tender documents for various construction items works.
5. Prepare valuation reports of buildings.

18CV72-DESIGN OF RCC AND STEEL STRUCTURES

Course Learning Objectives: This course will enable students to
1. Provide basic knowledge in the areas of limit state method and concept of design of RC and Steel structures
2. Identify, formulate and solve engineering problems in RC and Steel Structures
3. Give procedural knowledge to design a system, component or process as per needs and specifications of RC Structures like Retaining wall, Footing, Water tanks, Portal Frames and Steel Structures like Roof Truss, Plate Girder and Gantry Girder.
4. Imbibe the culture of professional and ethical responsibilities by following codal provisions in the analysis, design of RC and Steel Structures.
5. Provide factual knowledge on analysis and design of RC Structural elements, who can participate and succeed in competitive examinations.

Course Outcomes: After studying this course, students will be able to:
1. Students will acquire the basic knowledge in design of RCC and Steel Structures.
2. Students will have the ability to follow design procedures as per codal provisions and skills to arrive at structurally safe RC and Steel members.

18CV732-AIR POLLUTION AND CONTROL
Course Learning Objectives: This course will enable students to
1. Study the sources and effects of air pollution
2. Learn the meteorological factors influencing air pollution.
3. Analyze air pollutant dispersion models
4. Illustrate particular and gaseous pollution control methods

Course outcomes: After studying this course, students will be able to:
1. Identify the major sources of air pollution and understand their effects on health and environment.
2. Evaluate the dispersion of air pollutants in the atmosphere and to develop air quality models.
3. Ascertain and evaluate sampling techniques for atmospheric and stack pollutants.
4. Choose and design control techniques for particulate and gaseous emissions.

18CV733-PAVEMENT MATERIALS AND CONSTRUCTION

Course Learning Objectives:

1. Expose students to different materials which are used in pavement construction, impart knowledge about the engineering properties required.
2. To train students to perform various types of bituminous mix designs as per the guidelines (MORTH).
3. Student will get knowledge about different highway construction equipment with their suitability and adaptability in various field scenarios.
4. Expose students to construction practice and quality control aspects of embankment, flexible and rigid pavement as per the required specifications (MORTH).
5. To introduce students to possible improvisation in various layers of pavement to increase the structural strength by the use of non basic materials (DLC, polythene sheets).

Course outcomes: At the end of the course the student will be able to:
1. Students will be able to evaluate and assess the suitability of any pavement material to be used in various components of pavement by conducting required tests as per IS,IRC specifications
2. Students will be able to formulate the proportions of different sizes of aggregates to suit gradation criteria for various mixes as per MORTH and also design bituminous mixes.
3. Students will be competent to adapt suitable modern technique and equipment for speedy and economic construction.
4. Student will be able to execute the construction of embankment, flexible, rigid pavement and perform required quality control tests at different stages of pavement construction

18CV741-EARTHQUAKE ENGINEERING

Course Learning Objectives: This course will enable students to learn about
1. Fundamentals of engineering seismology
2. Irregularities in building which are detrimental to its earthquake performance
3. Different methods of computation seismic lateral forces for framed and masonry structures
4. Earthquake resistant design requirements for RCC and Masonry structures
5. Relevant clauses of IS codes of practice pertinent to earthquake resistant design of structures

**Course outcomes:** After studying this course, students will be able to:
1. Acquire basic knowledge of engineering seismology.
2. Develop response spectra for a given earthquake time history and its implementation to estimate response of a given structure.
3. Understanding of causes and types of damages to civil engineering structures during different earthquake scenarios.
4. Analyze multi-storied structures modeled as shear frames and determine lateral force distribution due to earthquake input motion using IS-1893 procedures.
5. Comprehend planning and design requirements of earthquake resistant features of RCC and Masonry structures thorough exposure to different IS-codes of practices.

18CV745-URBAN TRANSPORT PLANNING

**Course Learning Objectives:** This course will enable students to:
5. Understand and apply basic concepts and methods of urban transportation planning.
6. Apprise about the methods of designing, conducting and administering surveys to provide the data required for transportation planning.
7. Understand the process of developing an organized mathematical modelling approach to solve select urban transportation planning problem.
8. Excel in use of various types of models used for travel forecasting, prediction of future travel patterns.

**Course outcomes:** After studying this course, students will be able to:
5. Design, conduct and administer surveys to provide the data required for transportation planning.
6. Supervise the process of data collection about travel behavior and analyze the data for use in transport planning.
7. Develop and calibrate modal split, trip generation rates for specific types of land use developments.
8. Adopt the steps that are necessary to complete a long-term transportation plan.

18CV751-FINITE ELEMENT METHOD

**Course Learning Objectives:** This course will enable students to;
1. Develop analytical skills.
2. Learn principles of analysis of stress and strain.
3. Develop problem solving skills.
4. Understand the principles of FEM for one and two dimensional problems

**Course outcomes:** The student will have the knowledge on advanced methods of analysis of structures

18CVL76-COMPUTER AIDED DETAILING OF STRUCTURES

**Course Learning Objectives:** This course will enable students to
1. Be aware of the Scale Factors, Sections of drawings,
2. Draft the detailing of RC and Steel Structural member

Course outcomes: After studying this course, students will be able to:
• Prepare detailed working drawings

18CVL77-GEOTECHNICAL ENGINEERING LABORATORY

Course Learning Objectives: This course will enable students to;
1. To carry out laboratory tests and to identify soil as per IS codal procedures
2. To perform laboratory tests to determine index properties of soil
3. To perform tests to determine shear strength and consolidation characteristics of soils

Course outcomes: Students will be able to conduct appropriate laboratory/field experiments and interpret the results to determine
1. Physical and index properties of the soil
2. Classify based on index properties and field identification
3. To determine OMC and MDD, plan and assess field compaction program
4. Shear strength and consolidation parameters to assess strength and deformation characteristics
5. In-situ shear strength characteristics (SPT-Demonstration)
18CV81-DESIGN OF PRE-STRESSED CONCRETE

Course Learning Objectives: This course will enable students to learn Design of Pre Stressed Concrete Elements.

Course outcomes: After studying this course, students will be able to:
1. Understand the requirement of PSC members for present scenario.
2. Analyse the stresses encountered in PSC element during transfer and at working.
3. Understand the effectiveness of the design of PSC after studying losses
4. Capable of analyzing the PSC element and finding its efficiency.
5. Design PSC beam for different requirements.

18CV824-REHABILITATION AND RETROFITTING

Course Learning Objectives: This course will enable students to;
1. Investigate the cause of deterioration of concrete structures.
2. Strategies different repair and rehabilitation of structures.
3. Evaluate the performance of the materials for repair.

Course outcomes: After studying this course, students will be able to:
1. Identify the causes for structural (Concrete) deterioration.
2. Assess the type and extent of damage and carry out damage assessment of structures through various types of tests.
3. Recommend maintenance requirements of the buildings and preventive measures against influencing factors.
4. Select suitable material and suggest an appropriate method for repair and rehabilitation.

18CV825-PAVEMENT DESIGN

Course Learning Objectives: This course will enable students to
1. Gain knowledge about the process of collecting data required for design, factors affecting pavement design, and maintenance of pavement.
2. Excel in the path of analysis of stress, strain and deflection in pavement.
3. Understand design concepts of flexible pavement by various methods (CBR, IRC 37-2001, Mcleods, Kansas) and also the same of rigid pavement by IRC 58-2002
4. Understand the various causes leading to failure of pavement and remedies for the same.
5. Develop skills to perform functional and structural evaluation of pavement by suitable methods.
Course outcomes: After studying this course, students will be able to:
1. Systematically generate and compile required data's for design of pavement (Highway & Airfield).
2. Analyze stress, strain and deflection by boussinesq’s, bur mister’s and westergaard’s theory.
4. Evaluate the performance of the pavement and also develops maintenance statement based on site specific requirements.

18CVP83-PROJECT WORK PHASE-2

Course objectives:
- To support independent learning.
- To develop interactive, communication, organization, time management, and presentation skills.
- To impart flexibility and adaptability.
- To inspire independent and team working.
- To expand intellectual capacity, credibility, judgment, intuition.
- To adhere to punctuality, setting and meeting deadlines.
- To instill responsibilities to oneself and others.
- To train students to present the topic of project work in a seminar without any fear, face audience confidently, enhance communication skill, involve in group discussion to present and exchange ideas.

Course outcomes: At the end of the course the student will be able to:
- Describe the project and be able to defend it.
- Develop critical thinking and problem solving skills.
- Learn to use modern tools and techniques.
- Communicate effectively and to present ideas clearly and coherently both in written and oral forms.
- Develop skills to work in a team to achieve common goal.
- Develop skills of project management and finance.
- Develop skills of self learning, evaluate their learning and take appropriate actions to improve it.
- Prepare them for life-long learning to face the challenges and support the technological changes to meet the societal needs.
<table>
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<tr>
<th>Sl.No</th>
<th>Course name and code</th>
<th>Course Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>TRANSFORM CALCULUS, FOURIER SERIES AND NUMERICAL TECHNIQUES (18MAT31)</td>
<td><strong>MAT31.1</strong> Use Laplace transform and inverse Laplace transform in solving differential/integral equation arising in network analysis, control systems and other fields of engineering. <strong>MAT31.2</strong> Demonstrate Fourier series to study the behaviour of periodic functions and their applications in system communications, digital signal processing and field theory. <strong>MAT31.3</strong> Make use of Fourier transform and Z-transform to illustrate discrete/continuous function arising in wave and heat propagation, signals and systems. <strong>MAT31.4</strong> Solve first and second order ordinary differential equations arising in engineering problems using single step and multistep numerical methods. <strong>MAT31.5</strong> Determine the externals of functionals using calculus of variations and solve problems arising in dynamics of rigid bodies and vibrational analysis.</td>
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<td>2</td>
<td>COMPLEX ANALYSIS, PROBABILITY AND</td>
<td><strong>MAT41.1</strong> Use the concepts of analytic function and complex</td>
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| STATISTICAL METHODS (18MAT41) | potentials to solve the problems arising in electromagnetic field theory.  
**MAT41.2** Utilize conformal transformation and complex integral arising in aerofoil theory, fluid flow visualization and image processing.  
**MAT41.3** Apply discrete and continuous probability distributions in analysing the probability models arising in Engineering field.  
**MAT41.4** Make use of the correlation and regression analysis to fit a suitable mathematical model for the statistical data.  
**MAT41.5** Construct joint probability distributions and demonstrate the validity of testing the hypothesis. |
|---|---|
| MICROCONTROLLER AND EMBEDDED SYSTEMS (18CS44) | **CS44.1** Describe the architectural features and instructions of ARM microcontroller  
**CS44.2** Apply the knowledge gained for Programming ARM for different applications.  
**CS44.3** Interface external devices and I/O with ARM microcontroller.  
**CS44.4** Interpret the basic hardware components and their selection method based on the characteristics and attributes of an embedded system. |
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<th>OPERATING SYSTEMS (18CS43)</th>
<th>CS44.5 Develop the hardware/software co-design and firmware design approaches. CS44.6 Demonstrate the need of real time operating system for embedded system applications</th>
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<tr>
<td>4</td>
<td></td>
<td>CS43.1 Demonstrate need for OS and different types of OS CS43.2 Apply suitable techniques for management of different resources CS43.3 Use processor, memory, storage and file system commands CS43.4 Realize the different concepts of OS in platform of usage through case studies</td>
</tr>
</tbody>
</table>
COURSE OUTCOMES:

CO1. Able to explain different sources of energy and its conversion

CO2. Able to explain the conversion of energy by prime movers.

CO3. Able to explain the different machine tool operations and basics of Robotics and Automation.

CO4. Able to explain basic engineering materials with their properties and identify its application.

CO5. Able to explain the working principle of refrigeration and air conditioning.

COMPUTER AIDED ENGINEERING DRAWING (18CED14/24)

COURSE OUTCOMES,

Student will be able to,

CO1. Demonstrate the usage of CAD software
CO2. Draw orthographic projections of points, lines, planes and solids.
CO3. Generate the development of lateral surfaces of solids and isometric projections of solids
3rd semester mechanical engg

BASIC THERMODYNAMICS
Course Code 18ME33

COURSE OUTCOMES (CO’S)

At the end of the course, the student will be able to:
CO1: Explain fundamentals of thermodynamics and evaluate energy interactions across the boundary of thermodynamic systems.

CO2: Evaluate the feasibility of cyclic and non-cyclic processes using 2nd law of thermodynamics.

CO3: Apply the knowledge of entropy, reversibility and irreversibility to solve numerical problems and apply 1st law of thermodynamics to closed and open systems and determine quantity of energy transfers and change in properties.

CO4: Interpret the behavior of pure substances and its application in practical problems.

CO5: Recognize differences between ideal and real gases and evaluate thermodynamic properties of ideal and real gas mixtures using various relations.

MATERIAL SCIENCE (18ME34)

COURSE OUTCOMES,

Student will be able to,

CO1 Explain the basic structure of mechanical properties and failure of materials.
CO2 Explain the phase transformation of Solidification.
CO3 Describe the heat treatment process of metals.
CO4 Explain the process, and application of ceramics, plastics and smart materials properties..
CO5 Explain the process and application of composite Materials.
MECHANICS OF MATERIALS (18ME32)

COURSE OUTCOMES (CO’S)

The students will be able to

CO1 Know the different types of stresses and strains developed in the member subjected to axial, bending, shear, torsion & thermal loads.
CO2 Know the behaviour and properties of engineering materials.
CO3 Understand the stresses developed in bars, compounds bars, beams, shafts and cylinders.
CO4 Understand the concepts of calculation of shear force and bending moment for beams with different supports.
CO5 Analyze the concepts of Buckling of columns and strain energy.

METAL CUTTING AND FORMING

Course Code 18ME35A/45A

COURSE OUTCOMES (CO’S)
CO1: Explain the construction & specification of various machine tools.
CO2: Discuss different cutting tool materials, tool nomenclature & surface finish.
CO3: Apply mechanics of machining process to evaluate machining time.
CO4: Analyze tool wear mechanisms and equations to enhance tool life and minimize machining cost.
CO5: Understand the concepts of different metal forming processes.
CO6: Apply the concepts of design of sheet metal dies to design different dies for simple sheet metal components.

Metal casting & Welding. AND WELDING
Course Code 18ME35B/45B

COURSE OUTCOMES

At the end of completion of the course, students will be

CO1. Able to explain the basics & preparation of sand mold.
CO2. Able to explain different melting furnaces & methods of casting.
CO3. Able to explain the solidification process & casting of aluminium.
CO4. Able to describe different types of welding processes.
CO5. Able to describe metallurgical aspects in welding process & inspection methods.
COMPUTER AIDED MACHINE DRAWING
Course Code 18ME36A/46A

COURSE OUTCOMES (CO’S)

At the end of completion of this course, student will be

CO1: Able to demonstrate the usage of CAD software for 3D modeling

CO2: Able to draw section of solids and conversion of pictorial to orthographic views.

CO3: Able to draw different forms of threads and fasteners.

CO4: Able to draw types of riveted joints, knuckle joint, cotter joints and couplings.

CO5: Able to draw machine parts assembly and drafting.

MECHANICAL MEASUREMENTS AND METROLOGY
Course Code 18ME36B/46B

COURSE OUTCOMES (CO’S)

Student will be able to,

CO1. Describe metrology, methods, standards, of measurement and measuring instruments.
CO2. Explain system of limits, fits, tolerances, gauges and comparators.

CO3. Explain metrological measurements of screw threads, gear tooth parameters and describe advanced metrology instruments.

CO4. Explain basics and methods of indirect measurements.

CO5. Explain measurement of parameters force, pressure, temperature and strain.

MATERIAL TESTING LAB

COURSE OUTCOMES (CO’S)

At the end of the course, the student will be able to:

CO1: Acquire experimentation skills in the field of material testing.

CO2: Develop theoretical understanding of the mechanical properties of materials by performing experiments.

CO3: Apply the knowledge to analyse a material failure and determine the failure inducing agent/s.

CO4: Apply the knowledge of testing methods in related areas.

CO5: Understand how to improve structure/behaviour of materials for various industrial applications.
COURSE OUTCOMES (CO’S)

At the end of the course, the student will be able to:

CO1  Calibrate measuring instruments.

CO2  Measure thread and gear tooth parameters using measuring instruments.

CO3  Measure linear and angular dimensions using measuring instruments.

CO4  Measure force, pressure, temperature and strain using indirect measuring methods.

WORKSHOP AND MACHINE SHOP PRACTICE

COURSE OUTCOMES (CO’S)

CO1: To read working drawings, understand operational symbols and execute machining operations.
CO2: Prepare fitting models according to drawings using hand tools- V-block, marking gauge, files, hack saw, drills etc.
CO3: Understand integral parts of lathe, shaping and milling machines and various accessories and attachments used.
CO4: Select cutting parameters like cutting speed, feed, depth of cut, and tooling for various machining operations.
CO5: Perform cylindrical turning operations such as plain turning, taper turning, step turning, thread Cutting, facing, knurling, internal thread cutting, eccentric turning and estimate cutting time.
CO6: Perform machining operations such as plain shaping, inclined shaping, keyway cutting, Indexing and Gear cutting and estimate cutting time.

FOUNDRY, FORGING AND WELDING LAB
Course Code 18MEL38B/48B

COURSE OUTCOMES (CO’S)

At the end of the course, the student will be able to:

CO1  Demonstrate various skills in preparation of molding sand for conducting tensile, shear and compression tests using Universal sand testing machine.
CO2  Demonstrate skills in determining permeability, clay content and Grain Fineness Number of base sands.
CO3  Demonstrate skills in preparation of forging models involving upsetting, drawing and bending operations.
COURSE OUTCOMES

After the completion of the course, students could be able to

CO1 Able to explain Propulsion systems and determine performance parameters of Gas Power Cycles.
CO2 Able to analyse the performance parameters of Vapour Power Cycles.
CO3 Able to analyse Combustion constituents of exhaust gases.
CO4 Able to determine the performance parameters of I C Engines.
CO5 Able to determine performance parameters of Refrigeration system and properties of conditioned air.
CO6 Able to determine performance parameters of Reciprocating Compressors.

FLUID MECHANICS

CO1: Identify and calculate the key fluid properties used in the analysis of fluid behavior.
CO2: Explain the principles of pressure, buoyancy and floatation
CO3: Apply the knowledge of fluid statics, kinematics and dynamics while addressing problems of mechanical and chemical engineering.
CO4: Describe the principles of fluid kinematics and dynamics.
CO5: Explain the concept of boundary layer in fluid flow and apply dimensional analysis to form dimensionless numbers in terms of input output variables.

CO6: Illustrate and explain the basic concept of compressible flow and CFD

KINEMATICS OF MACHINES

Course Code 18ME44

COURSE OUTCOMES (CO’S)

CO1: Students will be able to explain basics and motion of various mechanisms.

CO2: Students will be to find velocity and acceleration of simple mechanisms analytically and graphically.

CO3: Students will be able to find different parameters of spur gear.

CO4: Students will be able to analyse motion of different gear trains.

CO5: Students will be able to draw and analyse the cam profiles for different types of follower motions.
COURSE OUTCOMES (CO’S)

At the end of the course the student will be able to:

CO1: Explain the construction & specification of various machine tools.
CO2: Discuss different cutting tool materials, tool nomenclature & surface finish.
CO3: Apply mechanics of machining process to evaluate machining time.
CO4: Analyze tool wear mechanisms and equations to enhance tool life and minimize machining cost.

MATERIAL TESTING LAB

COURSE OUTCOMES (CO’S)

At the end of the course the student will be able to:

CO1: Acquire experimentation skills in the field of material testing.
CO2: Develop theoretical understanding of the mechanical properties of materials by performing experiments.
CO3: Apply the knowledge to analyse a material failure and determine the failure inducing agent/s.
CO4: Apply the knowledge of testing methods in related areas.
CO5: Understand how to improve structure/behaviour of materials for various industrial applications.

V SEMESTER

MANAGEMENT AND ECONOMICS
Course Code 17ME51

COURSE OUTCOMES

At the end of completion of the course, students will be

CO1: Able to explain the Overview of Management.
CO2: Able to explain the Planning, Organizing, Staffing, Directing and Controlling of Management.
CO3: Able to explain the basics of Economics.
CO4: Able to determine the interest by various Methods.
CO5: Able to Evaluate and Select Economic Models from Various Alternatives.
CO6: Able to determine the Cost and Depreciation of Product.
DYNAMICS OF MACHINES
Course Code 17ME52

COURSE OUTCOMES (CO’S)

After studying this course, students will be able to:

CO Statements
CO1. To gain the knowledge static and dynamic equilibrium conditions of mechanisms subjected forces and couple, with and without friction.
CO2. Analyse the mechanisms for static and dynamic equilibrium.
CO3. To understand the balancing principles of rotating and reciprocating masses, governors and gyroscopes.
CO4. Analyse the balancing of rotating and reciprocating masses, governors and gyroscopes.
CO5. To understand vibrations characteristics of single degree of freedom systems.
CO6. Characterise the single degree freedom systems subjected to free and forced vibrations with and without damping.

TURBO MACHINES
Course Code 17ME53

COURSE OUTCOMES (CO’S)
At the end of the course, the student will be able to:

CO1: Model studies and thermodynamics analysis of turbomachines.
CO2: Analyse the energy transfer in Turbo machine with degree of reaction and utilisation factor.
CO3: Classify, analyse and understand various type of steam turbine.
CO4: Classify, analyse and understand various type of hydraulic turbine.
CO5: Understand the concept of radial power absorbing machine and the problems involved during its operation.

DESIGN OF MACHINE ELEMENTS- I
Course Code 17ME54

COURSE OUTCOMES (CO’S)

After studying this course, students will be able to:

CO Statements
CO1. To understand the various steps involved in the Design Process.
CO2 To explain the principles involved in design of machine elements, subjected to different kinds of forces, from the considerations of strength, rigidity, functional and manufacturing requirements.
CO3. To explain the principles involved in design of machine elements, subjected to different kinds of forces, from the considerations of strength, rigidity, functional and manufacturing requirements.
CO4 To learn to use national and international standards, standard practices, standard data,
catalogs, and standard components used in design of machine elements.

CO5 Develop the capability to design elements like shafts, couplings, welded joints, screwed joints, and power screws.

NON TRADITIONAL MACHINING

Course Code 17ME554

COURSE OUTCOMES (CO’S)

CO1 Understand the compare traditional and non-traditional machining process and recognize the need for Non-traditional machining
process.
CO2 Understand the constructional features, performance parameters, process characteristics, applications, advantages and limitations of USM, AJM and WJM.
CO3 Identify the need of Chemical and electro-chemical machining process along with the constructional features, process parameters, process characteristics, applications, advantages and limitations.
CO4 Understand the constructional feature of the equipment, process parameters, process characteristics, applications, advantages and limitations EDM & PAM.
CO5 Understand the LBM equipment, LBM parameters, and characteristics. EBM equipment and mechanism of metal removal, applications, advantages and limitations LBM & EBM.

FLUID MECHANICS & MACHINERY LAB

Course Code 17MEL57

COURSE OUTCOMES (CO’S)

CO1 Perform experiments to determine the coefficient of discharge of flow measuring devices.

CO2 Conduct experiments on hydraulic turbines and pumps to draw characteristics.

CO3 Test basic performance parameters of hydraulic turbines and pumps and execute the knowledge in real life situations.

CO4 Determine the energy flow pattern through the hydraulic turbines and pumps

CO5 Exhibit his competency towards preventive maintenance of hydraulic machines
ENERGY LAB
17MEL58

COURSE OUTCOMES (CO’S)

CO1 Perform experiments to determine the properties of fuels and oils.
CO2 Conduct experiments on engines and draw characteristics.
CO3 Test basic performance parameters of I.C. Engine and implement the knowledge in industry.
CO4 Identify exhaust emission, factors affecting them and report the remedies.
CO5 Determine the energy flow pattern through the I.C Engine.
CO6 Exhibit his competency towards preventive maintenance of IC engines.

FINITE ELEMENT ANALYSIS

17ME61

COURSE OUTCOMES (CO’S)

CO1 Understand the concepts behind formulation methods in FEM.
CO2 Identify the application and characteristics of FEA elements such as bars, beams, plane and iso-parametric elements.
CO3 Develop element characteristic equation and generation of global equation.
CO4 Able to apply suitable boundary conditions to a global equation for bars, trusses, beams, circular shafts, heat transfer, fluid flow, axi symmetric and dynamic problems and solve them displacements, stress and strains induced.
Computer Integrated Manufacturing
17ME62

COURSE OUTCOMES (CO’S)

CO1. Explain the basics of automated manufacturing systems and mathematical model to analyze the different types of automated flow lines.

CO2. Explain the different types of manufacturing planning and control system using graphics software.

CO3. Explain the Flexible manufacturing system.

CO4. Analyze the automated flow lines by using line balancing techniques.

CO5. Write CNC part program and programs for Robots.

CO6. Explain the basic principles of additive manufacturing systems and the applications of IOT.

Heat Transfer
17ME63

COURSE OUTCOMES (CO’S)
At the end of the course, the student will be able to:

CO1 Determine the conduction heat transfer of steady and unsteady state.
CO2 Analyze one-dimensional and two-dimensional steady and unsteady state heat conduction using numerical methods.
CO3 Analyze the radiation heat transfer by applying fundamental laws
CO4 Determine convective heat transfer using non-dimensional numbers.
CO5 Determine performance parameters using LMTD and NTU methods.
CO6 Determine heat transfer co-efficient of boiling and condensation.

DESIGN OF MACHINE ELEMENTS II

17ME64

COURSE OUTCOMES (CO’S)

CO1 Apply engineering design tools to product design.
CO2 Design mechanical systems involving springs, belts and pulleys.
CO3 Design different types of gears and simple gear boxes for different applications.
CO4 Design brakes and clutches.
CO5 Design hydrodynamic bearings for different applications.
CO5 Select Anti friction bearings for different applications using the manufacturers, catalogue.
CO6 Develop proficiency to generate production drawings using CAD software.
CO7 Become good design engineers through learning the art of working in a team with morality and ethics.

AUTOMOBILE ENGINEERING
17ME655

COURSE OUTCOMES (CO’S)

CO1 To identify the different parts of an automobile and it’s working
CO2 To understand the working of transmission and braking systems
CO3 To comprehend the working of steering and suspension systems
CO4 To learn various types of fuels and injection systems
CO5 To know the cause of automobile emissions, its effects on environment and methods to reduce the emissions.

TOTAL QUALITY MANAGEMENT
17ME664
COURSE OUTCOMES (CO’S)

CO1 Explain the various approaches of TQM
CO2 Infer the customer perception of quality
CO3 Analyze customer needs and perceptions to design feedback systems.
CO4 Apply statistical tools for continuous improvement of systems
CO5 Apply the tools and technique for effective implementation of TQM.

Automation & Robotics

Subject code: 17ME563

COURSE OUTCOMES (CO’S)

The students will be able to

CO1 Explain the concept of automation and understand types of hardware components used in automation.
CO2 Describe the automated production lines and assembly systems
CO3 Sketch various parts of robot machines and able to identify the parts.
CO4 Distinguish the spatial descriptions and transformation of robotic arms.
CO5 Describe the different programming language and automating subtasks in olp systems
Heat Transfer Lab

COURSE OUTCOMES (CO’S)

CO1 Perform experiments to determine the thermal conductivity of a metal rod
CO2 Conduct experiments to determine convective heat transfer coefficient for free and forced convection and correlate with theoretical values.
CO3 Estimate the effective thermal resistance in composite slabs and efficiency in pin-fin
CO4 Determine surface emissivity of a test plate
CO5 Estimate performance of a refrigerator and effectiveness of fin
CO6 Calculate temperature distribution of study and transient heat conduction through plane wall, cylinder and fin using numerical approach.

Modeling and Analysis Lab (FEA)

17MEL68

COURSE OUTCOMES (CO’S)
CO1 Demonstrate the basic features of an analysis package.
CO2 Use the modern tools to formulate the problem, and able to create geometry, describe, apply boundary condition to solve problems of bars, truss, beams, plate to find stress with different loading conditions.
CO3 Demonstrate the deflection of beams subjected to point, uniformly distributed, and varying loads further to use the available results to draw shear force and bending moment diagrams.
CO4 Analyze the given problem by applying basic principle to solve and demonstrate 1D and 2D heat transfer with conduction and convection boundary conditions.
CO5 Carry out dynamic analysis and finding natural frequencies for various boundary conditions and also analyze with forcing function.

VII SEMESTER
ENERGY ENGINEERING
15ME71

COURSE OUTCOMES (CO’S)

At the end of the course, the student will be able to:
CO1 Summarize the basic concepts of thermal energy systems,
CO2 Identify renewable energy sources and their utilization.
CO3 Understand the basic concepts of solar radiation and analyze the working of solar PV and thermal systems.
CO4 Understand principles of energy conversion from alternate sources including wind, geothermal, ocean, biomass, biogas.
CO5 Understand the concepts and applications of fuel cells, thermoelectric convertor and MHD generator.
CO6 Identify methods of energy storage for specific applications

FLUID POWER SYSTEMS
15ME72

COURSE OUTCOMES (CO’S)

CO1 Identify and analyse the functional requirements of a fluid power transmission system for a given application.
CO2 Visualize how a hydraulic/pneumatic circuit will work to accomplish the function.
CO3 Design an appropriate hydraulic or pneumatic circuit or combination circuit like electrohydraulics, electro-pneumatics for a given application.
CO4 Select and size the different components of the circuit.
CO5 Develop a comprehensive circuit diagram by integrating the components selected for the given application.

CONTROL ENGINEERING
15ME73
COURSE OUTCOMES (CO’S)

CO1: Recognize control system and its types, control actions
CO2: Determine the system governing equations for physical models (Electrical, Thermal, Mechanical, Electro Mechanical)
CO3: Calculate the gain of the system using block diagram and signal flow graph
CO4: Illustrate the response of 1st and 2nd order systems
CO5: Determine the stability of transfer functions in complex domain and frequency domain
CO6: Employ state equations to study the controllability and observability

TRIBOLOGY
15ME742

COURSE OUTCOMES (CO’S)

CO1 Understand the fundamentals of tribology and associated parameters.
CO2 Apply concepts of tribology for the performance analysis and design of components experiencing relative motion.
CO3 Analyse the requirements and design hydrodynamic journal and plane slider bearings for a given application.
CO4 Select proper bearing materials and lubricants for a given tribological application.
CO5 Apply the principles of surface engineering for different applications of tribology.
MECHATRONICS
15ME753

COURSE OUTCOMES (CO’S)

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

CO1 Illustrate various components of Mechatronics systems.
CO2 Assess various control systems used in automation.
CO3 Develop mechanical, hydraulic, pneumatic and electrical control systems.

DESIGN LABORATORY
15MEL76

COURSE OUTCOMES

At the end of the course, the students will be able to:

CO1 To understand the working principles of machine elements such as Governors, Gyroscopes etc.,
CO2 To identify forces and couples in rotating mechanical system components.
CO3 To identify vibrations in machine elements and design appropriate damping methods and to determine the critical speed of a rotating shaft.

CO4 To measure strain in various machine elements using strain gauges.

CO5 To determine the minimum film thickness, load carrying capacity, frictional torque and pressure distribution of journal bearing.

CO6 To determine strain induced in a structural member using the principle of photo-elasticity.

COMPTER INTEGRATED MANUFACTURING LAB
15MEL77

COURSE OUTCOMES (CO’S)

CO1 Generate CNC Lathe part program for Turning, Facing, Chamfering, Grooving, Step turning, Taper turning, Circular interpolation etc.

CO2 Generate CNC Mill Part programming for Point to point motions, Line motions, Circular interpolation, Contour motion, Pocket milling- circular, rectangular, Mirror commands etc.
CO3 Use Canned Cycles for Drilling, Peck drilling, Boring, Tapping, Turning, Facing, Taper turning Thread cutting etc.

CO4 Simulate Tool Path for different Machining operations of small components using CNC Lathe & CNC Milling Machine.

CO5 Use high end CAM packages for machining complex parts; use state of art cutting tools and related cutting parameters; optimize cycle time.

CO6 Understand & write programs for Robotcontrol; understand the operating principles of hydraulics, pneumatics and electropneumatic systems. Apply this knowledge to automate & improve efficiency of manufacturing.
COURSE OUTCOMES (CO’S)

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

CO1 Understand the meaning, definitions, scope, need, phases and techniques of operations research.

CO2 Formulate as L.P.P and derive optimal solutions to linear programming problems by graphical method, Simplex method, Big-M method and Dual Simplex method.

CO3 Formulate as Transportation and Assignment problems and derive optimum solutions for transportation, Assignment and travelling salesman problems.

CO4 Solve problems on game theory for pure and mixed strategy under competitive environment.

CO5 Solve waiting line problems for M/M/1 and M/M/K queuing models.

CO6 Construct network diagrams and determine critical path, floats for deterministic and PERT networks including crashing of Networks.

CO7 Determine minimum processing times for sequencing of n jobs-2 machines, n jobs-3 machines, n jobs-m machines and 2 jobs-n machines using Johnson’s algorithm.

ADDITIVE MANUFACTURING

15ME82

COURSE OUTCOMES (CO’S)

CO1 Understand the different process of Additive Manufacturing, using Polymer, Powder and Nano materials manufacturing.

CO2 Analyse the different characterization techniques.

CO3 Describe the various NC, CNC machine programming and Automation techniques.
COURSE OUTCOMES (CO’S)

Course Outcomes: Student will be able to

CO1 Explain the various strategies of PLM and Product Data Management
CO2 Describe decomposition of product design and model simulation
CO3 Apply the concept of New Product Development and its structuring.
CO4 Analyze the technological forecasting and the tools in the innovation
CO5 Apply the virtual product development and model analysis

Programme outcomes

Engineering Graduates will be able to:

1. Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. Problems Analysis: Identify, formulate, review research literature, and analyze complex, engineering problems reaching sustained conclusions using first principles of mathematics, natural science and engineering science.

3. Design/development of solutions: Design solutions for complex engineering problems and design system components of process that meet the specified needs with appropriate consideration for the public health and safety, and cultural, societal, and environmental consideration.

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

5. Modern tool usage: create, select, and apply appropriate techniques, resource and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

6. The engineer and society: Apply the reasoning informed by the contextual knowledge to access societal, health, safety, legal and cultural issue and the consequent responsibility relevant to the professional engineering practice.

7. Environment and sustainability: Understanding the impact of the professional engineering solution in the social and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

8. Ethics: Apply ethics principle and commit to professional ethic and responsibility and norms of the engineering practice.

9. Individual and team work: Function effectively as an individual, and as member or leader in diverse team, and in multidisciplinary setting.

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

11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one’s own work, as a member and leader in team, to manage projects and in multidisciplinary environments.
12. Life-long learning: Recognizing the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

**Programme Specific Outcomes**

**Mechanical Engineering Graduates will be able to:**

1. Model, analyze, design and realize physical systems, material with its properties, components or process by applying principles of Mechanical engineering.
2. Work professionally in industries or as an entrepreneur by analyse and design the machine components, by applying manufacturing and management practices.
3. Learn the knowledge of computer software and its application, artificial intelligence, IOT applicable for mechanical engineering.
18MBA11: Management Organisational Behaviour

1. Comprehend & correlate all the management functions which are happening around with fundamental concepts and principles of management.
2. Understand the overview of management, theory of management and practical applications of the same.
3. Effectively use their skills for self-grooming, working in groups and to achieve organizational goals.
4. Demonstrate their acumen in applying managerial and behavioral concept in real world/situation.
5. Understand and demonstrate their exposure on recent trends in

18MBA12: Managerial Economics

1. The student will understand the application of Economic Principles in Management decision making.
2. The student will learn the micro economic concepts and apply them for effective functioning of a Firm and Industry.
3. The Student will be able to understand, assess and forecast Demand.
4. The student will apply the concepts of production and cost for optimization of production.
5. The student will design Competitive strategies like pricing, product differentiation etc. and marketing according to the market structure.
6. The student will be able to identify, assess profits and apply BEP for decision making.

18MBA13: Accounting for Managers

1. Demonstrate theoretical knowledge and its application in real time accounting.
2. Demonstrate knowledge regarding accounting principles and its application.
3. Capable of preparing financial statement of sole trading concerns and companies.
4. Independently undertake financial statement analysis and take decisions.

18MBA14: Business Statistics and Analysis

1. Facilitate objective solutions in business decision making under subjective conditions.
2. Demonstrate different statistical techniques in business/real-life situations.
3. Understand the importance of probability in decision making.
4. Understand the need and application of analytics.
5. Understand and apply various data analysis functions for business Problems

18MBA15: Marketing Management

1. Develop an ability to assess the impact of the environment on marketing function.
2. To formulate marketing strategies that incorporate psychological and sociological factors which influence buying.
3. Explain how companies identify attractive market segments, differentiate and position their products for maximum competitive advantage in the market place.
4. Build marketing strategies based on product, price, place and promotion objectives.
5. Synthesize ideas into a viable marketing plan.

18MBA16: Managerial Communication

1. The students will be aware of their communication skills and know their potential to become successful managers.
2. The students will get enabled with the mechanics of writing and can compose the business letters in English precisely and effectively.
3. The students will be introduced to the managerial communication practices in business those are in vogue.
4. Students will get trained in the art of business communication with emphasis on analysing business situations.
5. Students will get exposure in drafting business proposals to meet the challenges of competitive environment.

18MBA21: Human Resource management

1. Understanding of HRM functions, principles, Job analysis that facilitates students to design a job description and job specification for various levels of employees.
2. Synthesize knowledge on effectiveness of recruitment process, sources & understanding of systematic selection procedure.
3. Identify the various training methods and design a training program.
4. Understand the concept of performance appraisal process in an organization.
5. List out the regulations governing employee benefit practices.

18MBA22: Financial Management

1. Understand the basic financial concepts.
2. Apply time value of money.
3. Evaluate the investment decisions.
4. Analyze the capital structure and dividend decisions.
5. Estimate working capital requirements.

18MBA23: Research Methods

1. Understand various research approaches, techniques and strategies in the appropriate in business.
2. Apply a range of quantitative / qualitative research techniques to business and day to day management problems.
3. Demonstrate knowledge and understanding of data analysis, interpretation and report writing.
4. Develop necessary critical thinking skills in order to evaluate different research approaches in Business.
18MBA24: LEGAL AND BUSINESS ENVIRONMENT

1. Students should get clear idea about the concept of incorporation of company, its relevance, characteristics, types of company, lifting of corporate.
2. Student to acquire knowledge about conducting meeting, duties of directors and Investigation of the company.
3. To give the students an insight on Winding up of the companies, Mode of winding up of the companies. To student will have an understanding of the macro environment of Business and various macroeconomic concepts.
4. The student will understand the industrial policies of the past and the present and the evolution over time, and how Indian Industrial structure evolved over time.
5. The student will be exposed to various economic policies of the country and the state of economy. To student will have an understanding of the macro environment of Business and various macroeconomic concepts.
6. The student will understand the industrial policies of the past and the present and the evolution over time, and how Indian Industrial structure evolved over time.
7. The student will be exposed to various economic policies of the country and the state of economy.

18MBA25: Strategic Management

1. Students should get clear idea about the concept of Strategic Management, its relevance, Characteristics, process nature and purpose.
2. Student to acquire an understanding of how firms successfully institutionalize a strategy and create an organizational structure for domestic and overseas operations and gain competitive advantage.
3. To give the students an insight on strategy at different levels of an organization to gain competitive advantage.
4. To help students understand the strategic drive in multinational firms and their decisions in different markets.
5. To enable the students to gain knowledge of strategy implementation and the control measures for effective decision-making.

18MBA26: ENTREPRENEURSHIP DEVELOPMENT

1. Display keen interest and orientation towards entrepreneurship, entrepreneurial opportunities in order to setup a business.
2. As an entrepreneur learn to think creatively and understand the components in developing a Business plan.
3. Become aware about various sources of funding and institutions supporting entrepreneurs.
4. Gain consciousness towards social entrepreneurship and rural entrepreneurship opportunities.

18MBAFM301: BANKING & FINANCIAL SERVICES
1. The Student will be acquainted to various Banking and Non-Banking financial services in India.
2. The Student will understand the activities of Merchant Banking and credit rating.
3. The Student will be equipped to understand micro financing and other financial services in India.
4. The Student will understand how to evaluate and compare leasing & hire purchase

18MBAFM302: INVESTMENT MANAGEMENT

1. The student will understand the capital market and various Instruments for Investment.
2. The learner will be able to assess the risk and return associated with investments and methods to value securities.
3. The student will be able to analyse the Economy, Industry and Company framework for Investment Management.
4. The student will learn the theories of Portfolio management and also the tools and techniques for efficient portfolio management.

18MBAFM303: DIRECT TAXATION

1. Understand the basics of taxation and process of computing residential status.
2. Calculate taxable income under different heads.
3. Understand deductions and calculation of tax liability of Individuals.
4. Know the corporate tax system.

18MBAHR01: RECRUITMENT & SELECTION

1. Gain the insights of various principles and practices of recruitment and selection in an industry.
2. Equip students with various selection procedure practiced in industry.
3. Develop students with latest selection tools in the corporate sector.
4. Develop students with various testing of job recruitment and selection.

18MBAHR02: HR ANALYTICS

1. Have an understanding of How HR function adds value and demonstrates the value in business terms
2. Measure the value of Intangibles that HR helps builds for the organization given a particular business context to facilitate decision making.
3. Convert soft factors in a people management context into measurable variables across various domains.

18MBAHR03: COMPENSATION & REWARD SYSTEM

1. Gain insights of various conceptual aspects of Compensation and Benefits to achieve organizational goals.
2. Determine the performance based compensation system for business excellence and solve various cases.
3. Designing the compensation strategies for attraction, motivation and retaining high quality workforce.
4. Understand the Legal & Administrative Issues in global compensation to prepare compensation plan, CTC, wage survey and calculate various bonus.

18MBAMM401: SALES MANAGEMENT

1. Understand the apply the selling techniques in an organisation.
2. Develop a plan for organising, staffing & training sales force.
3. Organise sales territories to maximize selling effectiveness.
4. Evaluate sales management strategies.

18MBAMM402: INTEGRATED MARKETING COMMUNICATIONS

1. Define and apply knowledge of various aspects of managerial decision making related to marketing communications strategy and tactics.
2. Ability to create an integrated marketing communications plan which includes promotional strategies.
3. Explain the role of IMC in the overall marketing & Use effectiveness measures to evaluate IMC strategies.
4. Prepare advertising copy and design other basic IMC tools

18MBAMM403: DIGITAL & SOCIAL MEDIA MARKETING

1. Recognize appropriate e-marketing objectives.
2. Appreciate the e-commerce framework and technology.
3. Illustrate the use of search engine marketing, online advertising and marketing strategies.
4. Use social media & create temples.
5. Develop social media strategy’s to solve business problems.

18MBAFM401: Mergers, Acquisitions & Corporate Restructuring

1. Understand M&A with its different classifications, strategies, theories, synergy etc.
2. Conduct financial evaluation of M&A
3. Analyse the results after evaluation.
4. Critically evaluate different types of M&A, takeover and antitakeover strategies

18MBAFM402: Risk Management and Insurance

1. Understand various types of risks.
2. Assess the process of identifying and measuring the risk.
3. Acquaint with the functioning of life Insurance in risk management.
4. Understand general insurance contract.

18MBAFM403: INDIRECT TAXATION
1. Have clarity about GST system in India.
2. Understanding of levy and collection of GST in India.
3. Have an overview of customs duty in India.
4. Understanding of valuation for customs duty

18MBAHR401: PUBLIC RELATIONS

1. To demonstrate an understanding of the fundamentals tools of public relations practices.
2. To describe the various emerging trends in the field of public relations.
3. To analyze the importance of employee communication and organizational change.
4. To evaluate the importance of community relations

18MBAHR402: ORGANIZATIONAL LEADERSHIP

1. Comprehend & correlate organizational leadership styles which are happening around with fundamental concepts of team leadership.
2. Understand the overview of leadership behavior and motivation in organization.
3. Effectively use their skills for self-grooming on leadership traits and ethics that influences them to effectively work in groups to achieve organizational goals.
4. Demonstrate their acumen in applying their knowledge in organizational leadership and behavioral concept in real world/situation

18MBA HR403: International Human Resource Management

1. Analyse the impact of contemporary issues and global imperatives on Human Resource concepts, policies and practices.
2. Apply concepts and knowledge in deployment, expatriate on international assignments.
3. Evaluate the effects of different human resource and international industrial relations.
4. Develop students to adopt international industrial relation strategies
PROGRAM SPECIFIC OUTCOME (PSOs):

- **PSO1**: Understand and apply the computing techniques with mathematics and industrial concepts for solving real time industrial problems.
- **PSO2**: Analyze, design, develop, test, deploy and maintain the software applications with latest computing tools and technologies.

Program Outcomes (PO)

- **PO1**: Understand and apply the fundamental principles of mathematics, statistics and knowledge of computer science for solving real time problems.
- **PO2**: Identify, analyze, and formulate the real world requirements in computing domain for solving problems.
- **PO3**: Design and estimate the computer system components, sub-systems and appropriate tools for developing solutions for complex problems.
- **PO4**: Use latest tools and technique needed for hard computing practices.
- **PO5**: Use right platform on design and execution for performance.
- **PO6**: Work effectively as an individual as well as working in a team.
- **PO7**: Developing communication skills to communicate with different stakeholders to manage software projects.
- **PO8**: Understand the societal, environmental, health, legal, ethical issues and its impact with respect to computing and professional practice.
- **PO9**: Design, execute and interpret the software with real time data and synthesis the information to reach suitable conclusions.

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<tr>
<th>sl. No.</th>
<th>Course Code</th>
<th>Course Name</th>
<th>Course Out Comes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>18MCA11</td>
<td>Object Oriented</td>
<td>CO1: Acquire knowledge on C++ programming concepts.</td>
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<tr>
<td>Course Code</td>
<td>Department</td>
<td>Course Title</td>
<td>Course Objectives</td>
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<tr>
<td>2</td>
<td>MCA12</td>
<td>Programming with C++</td>
<td>CO2: Analyze the different concepts of C++. CO3: Design and Develop the solution to a problem using Object Oriented Programming Concepts. CO4: Apply the learning into real world problems independently.</td>
</tr>
<tr>
<td>3</td>
<td>MCA13</td>
<td>UNIX and Shell</td>
<td>CO1: Understand and experience the UNIX environment, File system and hierarchy. CO2: Understand the mechanism of process creation and process management using commands. CO3: Explore special privileged commands of system administration. CO4: Analyze the usage of different shell commands, variables and AWK filtering. CO5: Use Unix commands and language constructs in building shell scripts.</td>
</tr>
<tr>
<td>4</td>
<td>MCA14</td>
<td>Web Technologies</td>
<td>CO1: Understand the fundamentals of web and thereby develop web applications using various web development languages and tools. CO2: Build the ability to select the essential technology needed to develop and implement web Applications. CO3: Use JavaScript and jQuery to develop dynamic and interactive web page. CO4: Write a well formed / valid XML document. CO5: Design XML document with presentation using CSS.</td>
</tr>
<tr>
<td>5</td>
<td>MCA15</td>
<td>Software Engineering</td>
<td>CO1: Categorize problems based on their characteristics and practical importance. CO2: Apply the correct process models for software development. CO3: Apply the techniques, skills, and modern engineering tools necessary for engineering practice. CO4: Define, formulate and analyze a problem as per the testing techniques. CO5: Apply new Generation of Software Engineering Technology to Meet Current and Future Industrial Challenges of Emerging Software Trends.</td>
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<tr>
<td>5</td>
<td>MCA15</td>
<td>Computer Organization</td>
<td>CO1: Understand the basic of Digital Systems CO2: Realize the concept of Computer System Organization CO3: Apply the concepts of Input/output Organization</td>
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</tbody>
</table>
| 6 | 18MCA16 | **C++ Programming Lab**  
   |  | CO1: Apply and implement major programming and object oriented concepts like function overloading, operator overloading, Encapsulations, and inheritance, message passing to solve real-world problems.  
   |  | CO2: Use major C++ features such as Virtual functions, Templates for data type independent designs and File I/O to deal with large data sets.  
   |  | CO3: Analyze, design and develop solutions to real-world problems applying OOP Concepts of C++. |
| 7 | 18MCA17 | **UNIX and Shell Programming LAB**  
   |  | CO1: Understand the Unix programming environment.  
   |  | CO2: Be fluent in the use of Vi editor.  
   |  | CO3: Be able to design and implement shell scripts to manage users with different types of Permission and file based applications.  
   |  | CO4: Be fluent to write Awk scripts. |
| 8 | 18MCA18 | **WEB TECHNOLOGIES LAB**  
   |  | CO1: Develop web pages using HTML and HTML5.  
   |  | CO2: Demonstrate the usage of CSS in designing web pages.  
   |  | CO3: Execute simple programming questions using JavaScript.  
   |  | CO4: Create dynamic web pages by manipulating the DOM elements.  
   |  | CO5: Design and implement user interactive dynamic web based applications using jQuery. |
| 9 | 18MCA21 | **Programming using Java**  
   |  | CO1: Understand the basic programming constructs of Java. Apply suitable OOP concepts to develop Java programs for a given scenario.  
   |  | CO2: Illustrate the concepts of Generalization and runtime polymorphism applications  
   |  | CO3: Exemplify the usage of Packages, Interfaces, Exceptions and Multithreading  
   |  | CO4: Demonstrate Enumerations, Wrappers, Auto boxing, Generics, collection framework and I/O operations  
<p>|  | CO5: Implement the concepts of Networking using Java |</p>
<table>
<thead>
<tr>
<th></th>
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<th>network classes</th>
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</thead>
<tbody>
<tr>
<td>10</td>
<td>18MCA22</td>
<td>Data Structures using C++</td>
<td>CO1: Acquire knowledge of - Various types of data structures, operations and algorithms - Sorting and searching operations CO2: Analyze the performance of - Stack, Queue, Lists, Trees, Hashing, Searching and Sorting techniques CO3: Implement all the applications of Data structures in a high-level language CO4: Design and apply appropriate data structures for solving computing problems</td>
</tr>
<tr>
<td>11</td>
<td>18MCA23</td>
<td>Discrete Mathematical Structures and Statistics</td>
<td>CO1: Use the logical notation to define and reason about fundamental mathematical concepts such as sets, relations, functions and integers. CO2: Calculate numbers of possible outcomes of elementary combinatorial processes such as permutations and combinations. CO3: Calculate probabilities and distributions for simple combinatorial processes; calculate expectations. CO4: Apply statistical methods for correlation and regression. Fitting a curve to a discrete data.</td>
</tr>
<tr>
<td>12</td>
<td>18MCA24</td>
<td>Computer Networks</td>
<td>CO1: Understand the computer network concepts. CO2: Know various types of Networks &amp; Communication media CO3: Identify the components required to build different types of networks CO4: Understand layering concepts of TCP/IP and OSI models CO5: Understand the working principles of various application protocols</td>
</tr>
<tr>
<td>14</td>
<td>18MCA26</td>
<td>Java Programming</td>
<td>CO1: Understand Java programming language</td>
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<tr>
<td>No.</td>
<td>Code</td>
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<tr>
<td>15</td>
<td>18MCA27</td>
<td>Lab</td>
<td>fundamentals and run time environment.</td>
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<td>CO2: Acquire knowledge and skill necessary to write java programs.</td>
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<td>CO3: Learn the object oriented concepts and its implementation in Java</td>
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<td>CO4: Implement the multithreading and client side programming</td>
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<td>Data Structures Lab</td>
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<tr>
<td>16</td>
<td>18MCA28</td>
<td>Lab</td>
<td>CO1: Acquire knowledge of - Various types of data structures, operations and algorithms</td>
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<td></td>
<td>- Sorting and searching operations</td>
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<td>CO2: Analyze the performance of - Stack, Queue, Lists, Trees, Hashing, Searching and Sorting techniques</td>
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<td>CO3: Implement all the applications of Data structures in a high-level language</td>
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<td>CO4: Design and apply appropriate data structures for solving computing problems</td>
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<tr>
<td>17</td>
<td>18MCA29</td>
<td>Lab</td>
<td>CO1: Understand the basic terminologies used for computer networking.</td>
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<td>CO2: Understand the functions of layers in the Internet Model.</td>
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<td>CO3: Demonstrate application layer protocols used for process to process communication.</td>
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<td>CO4: Demonstrate subnetting and routing mechanisms for a given network topology. Exemplify link layer functionalities.</td>
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<td>CO5: Describe the components and working of wireless networks.</td>
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<td>Computer Networks Lab</td>
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<td>Mini Project</td>
<td>CO1: Identify a suitable problem making use of the technical and engineering knowledge gained from previous courses with the awareness of impact of technology on the society and their ethical responsibilities.</td>
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<td>CO2: Ability to segregate work and execute/implement projects using appropriate tools.</td>
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<td>CO3: Develop skills to disseminate technical and general information by means of oral as well as written presentation skills.</td>
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<td>Course Objectives</td>
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</tbody>
</table>
| 18 | 18MCA31     | Database Management System          | CO1: Demonstrate the fundamentals of data models and conceptualize and depict a database system and Make use of ER diagram in developing ER Model  
CO2: To Summarize the SQL and relational database design.  
CO3: Illustrate transaction processing, concurrency control techniques and recovery  
CO4: Inference the database design in the real world entities. |
| 19 | 18MCA32     | Programming using Python            | CO1: Understand and comprehend the basics of Python programming.  
CO2: Apply knowledge in real time applications.  
CO3: Understands about files and its applications.  
CO4: Use standard programming constructs. |
| 20 | 18MCA33     | Design and Analysis of Algorithms   | CO1: Categorize problems based on their characteristics and practical importance.  
CO2: Develop Algorithms using iterative/recursive approach  
CO3: Compute the efficiency of algorithms in terms of asymptotic notations  
CO4: Design algorithm using an appropriate design paradigm for solving a given problem  
CO5: Classify problems as P, NP or NP Complete  
CO6: Implement algorithms using various design strategies and determine their order of growth. |
| 21 | 18MCA34     | System Software                    | CO1: Understand the introductory concepts of system software, SIC and SIC/XE machine architecture.  
CO2: Understand the design and implementation of Assemblers with implementation examples.  
CO3: Design and implement the linkers and loaders, macro processors and respective implementation examples.  
CO4: Learn the basic design and working of compilers |
| 22 | 18MCA351    | Software Testing                   | CO1: Acquire knowledge of basic principles and knowledge of software testing and Debugging and test cases.  
CO2: Understand the perceptions on testing like levels of testing, generalized pseudo code and with related examples |
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Course Objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>18MCA352</td>
<td>Optimization Techniques</td>
<td>23 CO1: Understand the importance of operations research &amp; acquire skills to develop linear programming mathematical models to real world problems. CO2: Understand the essence and foundations of the simplex algorithm and write the dual of the given primal problems. CO3: Recognize, formulate and giving optimal solution to a Transportation problem and Assignment problems. CO4: Analyse &amp; Solve Simple Game Theory Problems. CO5: Solve problems of job sequencing of production runs.</td>
</tr>
<tr>
<td>18MCA353</td>
<td>Advance Computer Networks</td>
<td>24 CO1: Understand the terminology and concepts of TCP-IP reference model and IPV6 message format and its services. CO2: Acquire the concepts of protocols, network interfaces, and design/performance issues in Local Area Networks and wide area networks. CO3: Analyze the difference between wireless networks and satellite network. CO4: Evaluate the performance of TCP/IP over asymmetric networks.</td>
</tr>
<tr>
<td>18MCA354</td>
<td>Management Information Systems</td>
<td>25 CO1: Recognize the roles and uses of technology in business systems, operations and describe organizational structure. CO2: Equip the students with preliminaries of technologies used in business information systems. CO3: Familiarize students with the Business applications and E-Commerce initiatives.</td>
</tr>
<tr>
<td>18MCA36</td>
<td>DBMS Lab</td>
<td>26 CO1: Understand, appreciate the underlying concepts of database technologies CO2: Able to create database with different types of integrity constraints and use the SQL commands such as DDL, DML, DCL, TCL to access data from database objects. CO3: Design and implement a database schema for a</td>
</tr>
<tr>
<td>Course Code</td>
<td>Course Name</td>
<td>Course Details</td>
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</tbody>
</table>
| 27          | 18MCA37 Python Programming Lab    | **CO4:** Perform embedded and nested queries  
**CO5:** Take up real world problems independently  
- CO1: Apply object-oriented programming concepts to develop dynamic interactive Python applications.  
- CO2: Use the procedural statements: assignments, conditional statements, loops, method calls and arrays  
- CO3: Design, code, and test small Python programs with a basic understanding of top-down design.  
- CO4: Learn how to create GUI and solve real-world problem using language idioms, data structures and standard library |
| 28          | 18MCA38 Algorithms Lab            | **CO1:** Implement the concepts of time and space complexity, divide-and-conquer strategy, dynamic programming, greedy and approximate algorithms.  
**CO2:** Describe the methodologies of how to analyze an algorithm  
**CO3:** Choose a better algorithm to solve the problems. |
| 29          | 18MCA41 Advanced Java Programming | **CO1:** Learn the concept of Servlet and its life cycle  
**CO2:** Understand JSP tags and its services  
**CO3:** Create packages and interfaces  
**CO4:** Build Database connection  
**CO5:** Develop Java Server Pages applications using JSP Tags.  
**CO6:** Develop Enterprise Java Bean Applications |
| 30          | 18MCA42 Advanced Web Programming  | **CO1:** Acquire knowledge of  
- Build the Web Applications using JQuery, PHP, XML.  
**CO2:** Design the Web Pages using AJAX.  
**CO3:** Understand the terminology of Web2.0.  
**CO4:** Acquire the knowledge of web services.  
**CO5:** Design responsive web applications using Bootstrap. |
| 31          | 18MCA43 Object Oriented Modeling and Design | **CO1:** Acquire knowledge of  
- Basic UML Concepts and terminologies  
- Life Cycle of Object oriented Development  
- Modeling Concepts  
**CO2:** Identify the basic principles of Software modeling and apply them in real world applications  
**CO3:** Produce conceptual models for solving operational problems |
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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Course Objectives</th>
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<tbody>
<tr>
<td>CO4</td>
<td>Analyze the development of Object Oriented</td>
<td>Software models in terms of</td>
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<td>Software models in terms of</td>
<td>- Static behaviour</td>
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<td></td>
<td></td>
<td>- Dynamic behaviour</td>
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<tr>
<td>CO5</td>
<td>Evaluate and implement various Design patterns</td>
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<tr>
<td>CO1</td>
<td>Understand the classification of devices,</td>
<td>limitations of devices, interfaces, protocol and system Architecture</td>
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<td>limitations of devices, interfaces, protocol and</td>
<td></td>
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<tr>
<td></td>
<td>system Architecture</td>
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<tr>
<td>CO2</td>
<td>Understand the importance of Wireless Medium</td>
<td>Access control and CDMA based communication and its Applications.</td>
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<td>CO3</td>
<td>Understand the concepts of Network layer,</td>
<td>Transport layer.</td>
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<td></td>
<td>Transport layer.</td>
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<tr>
<td>CO4</td>
<td>Analyze the working of Data Dissemination and</td>
<td>Broadcasting Systems.</td>
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<td>Broadcasting Systems.</td>
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<tr>
<td>CO5</td>
<td>Understand and apply the Data Synchronization</td>
<td>Server and Management Application languages (XML, Java, J2ME and JavaCard, Mobile</td>
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<td>Server and Management Application languages</td>
<td>Operating Systems).</td>
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<tr>
<td>CO1</td>
<td>Define and illustrate cyber security concepts and</td>
<td>applications</td>
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<tr>
<td>CO2</td>
<td>Analyze the working of cyber security principles</td>
<td>to system design</td>
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<td>CO3</td>
<td>Illustrate appropriate techniques to solve cyber</td>
<td>security threats</td>
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<td>security threats</td>
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<tr>
<td>CO4</td>
<td>Evaluate and implement cyber security through</td>
<td>network security protocols</td>
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<td></td>
<td>network security protocols</td>
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<tr>
<td>CO1</td>
<td>Understand constraints and opportunities of</td>
<td>wireless and mobile networks for Internet of Things.</td>
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<td>wireless and mobile networks for Internet of</td>
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<tr>
<td></td>
<td>Things.</td>
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<tr>
<td>CO2</td>
<td>Analyze the societal impact of IoT security</td>
<td>events.</td>
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<tr>
<td>CO3</td>
<td>Develop critical thinking skills.</td>
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<tr>
<td>CO4</td>
<td>Analyze, design or develop parts of an Internet</td>
<td>of Things solution and map it toward selected business model(s)</td>
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<td>of Things solution and map it toward selected</td>
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<tr>
<td></td>
<td>business model(s)</td>
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<tr>
<td>CO5</td>
<td>Evaluate ethical and potential security issues</td>
<td>related to the Internet of Things</td>
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<td>related to the Internet of Things</td>
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<tr>
<td>CO1</td>
<td>Describe fundamental and core concepts of cloud</td>
<td>computing.</td>
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<td></td>
<td>computing.</td>
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<tr>
<td>CO2</td>
<td>Understand the fundamentals concepts of</td>
<td>computing paradigms like parallel and distributed</td>
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<td>computing paradigms like parallel and distributed</td>
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<tr>
<td>36</td>
<td>18MCA451</td>
<td>Enterprise Resource Planning (ERP)</td>
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</table>
| CO1: Acquire knowledge of
  - Benefits of ERP, Process Re-engineering
  - Project management and Monitoring |
| CO2: Analyze the performance of
  - Project implementations
  - Quality management |
| CO3: Know how ERP evolves in market place |
| CO4: Develop the ERP system, ERP with E-Commerce & Internet |

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<tr>
<th>37</th>
<th>18MCA452</th>
<th>Data Warehousing And Data Mining</th>
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<tbody>
<tr>
<td>CO1: Learn the concept of Data warehousing and OLAP.</td>
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<tr>
<td>CO2: Understand storage and retrieval technique of data from DATA CUBE.</td>
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<td>CO3: Analyze different types of data and different preprocessing techniques.</td>
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<td>CO4: Evaluate various Association algorithms and its applications.</td>
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<td>CO5: Apply different Classification technique.</td>
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<td>CO6: Evaluate different types of classifiers.</td>
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<tr>
<td>CO7: Analyze different clustering techniques and their applications</td>
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<thead>
<tr>
<th>38</th>
<th>18MCA453</th>
<th>Advanced Database Management Systems</th>
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</thead>
<tbody>
<tr>
<td>CO1: Acquire knowledge on Storage and Indexing</td>
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<td>CO2: Learn the concept of Transaction Management</td>
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<td>CO3: Understand the concept of Query Evaluation, External Sorting, Evaluating Relational Operators and Relational Query Optimizer</td>
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<td>CO4: Apply the concept of query optimization into real world problem</td>
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<tr>
<th>39</th>
<th>18MCA454</th>
<th>Big Data Analytics</th>
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<tbody>
<tr>
<td>CO1: Understand the Map Reduce technique for solving Big Data problems</td>
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<td>CO2: Understand algorithms for Big Data by deciding on the apt Features set</td>
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<td>CO3: Apply algorithms for handling peta bytes of datasets</td>
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<tr>
<td>CO4: Analyze main memory consumption for Big Data</td>
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<td>Course Code</td>
<td>Title</td>
<td>Course Objectives</td>
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</tbody>
</table>
| 18MCA46     | Professional Communication & Report Writing | CO1: Understand the professional communication at work place.  
CO2: Acquire the knowledge technical writing and business reporting.  
CO3: Develop the leadership qualities.  
CO4: Understand and implement ethical behavior at work place. |
| 18MCA47     | Advanced Java Programming Lab       | CO 1: Designing HTML pages to demonstrate Java Servlets, JSP, Bean and EJB programs.  
CO 2: Implementing Dynamic HTML using Servlet and demonstration of service methods, auto web page refresh, Session tracking using cookie and Http Session in Servlet.  
CO 3: Learn the fundamental of connecting to the database.  
CO 4: Demonstrate JSP (page attributes, action tags and all basic tags) and types of EJB application. |
| 18MCA48     | Advanced Web Programming Lab        | CO1: Understand, analyze and apply the role of server side scripting languages.  
CO2: Build web application using PHP, Ruby, jQuery, XML and store values in MYSQL.  
CO3: Build web applications using Ruby and Rails. |
| 18MCA49     | Object Oriented Modeling and Design Lab | CO1: Understand the fundamental principles of Object-Oriented analysis, design, development and programming  
CO2: Demonstrate and represent the UML model elements, to enable visual representation of the system being developed  
CO3: Implement object oriented design model with the help of modern tool, Rational software Architect  
CO4: Analyze and differentiate the static and dynamic behavior of the system for achieving the intended functionalities of the system  
CO5: Evaluate Various design patterns for applicability, reasonableness, and relation to other design criteria |
| 18MCA51     | Programming                         | CO1: Understand C# and client-server concepts using analytics  
CO5: Understand and analyze the usage of map reduce techniques for solving big data problems |
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<tr>
<th>Course Code</th>
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<th>Objectives</th>
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<tbody>
<tr>
<td>18MCA52</td>
<td>Mobile Applications</td>
<td>CO1: Illustrate effective user interfaces that leverage evolving mobile device capabilities CO2: Develop applications using software development kits (SDKs), frameworks and toolkits CO3: Establish various methods to integrate database and server-side technologies CO4: Design and develop open source software based mobile applications CO5: Build and deploy competent mobile development solutions</td>
</tr>
<tr>
<td>18MCA541</td>
<td>Multimedia Systems</td>
<td>CO1: Understand the concepts of Multimedia technology CO2: Learn the concepts of various digital media CO3: Know the fundamentals of data compression CO4: Acquire the knowledge of optical storage media and data and file formats</td>
</tr>
<tr>
<td>18MCA542</td>
<td>Computer Graphics</td>
<td>CO1: Design and implement algorithms for 2D graphics primitives and attributes. CO2: Illustrate Geometric transformations on both 2D and 3D objects. CO3: Understand the concepts of clipping and visible surface detection in 2D and 3D viewing, and Illumination</td>
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<td>Course Code</td>
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<td>Course Objectives</td>
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<tr>
<td>49</td>
<td>18MCA543 Image Processing</td>
<td>CO1: Explain how digital images are represented and manipulated in a computer, including reading and writing from storage, and displaying. CO2: Be conversant with the mathematical description of image processing techniques and know how to go from the equations to code. CO3: Know the image enhancement, segmentation and compression techniques.</td>
</tr>
<tr>
<td>50</td>
<td>18MCA544 Parallel Computing</td>
<td>CO1: Know the fundamentals of parallel processing CO2: Analyze the hardware and software required for parallel computing CO3: Understand the distributive memory programming with MPI and OpenMP</td>
</tr>
<tr>
<td>51</td>
<td>18MCA551 System Simulation and Modeling</td>
<td>CO1: Understand the basics of simulation and various simulation models CO2: Distinguish different types of random number and random variate generation techniques for solving problems through statistical functions CO3: Explore verification, validation and optimization on simulation models CO4: Estimate the performance of system simulation models CO5: Understand the method of applying computational knowledge to solve specific problems</td>
</tr>
<tr>
<td>52</td>
<td>18MCA552 Principles of User Interface Design</td>
<td>CO1: use the new technologies that provide interactive devices and interfaces. CO2: apply the process and evaluate UID. CO3: understand Direct Manipulation and Virtual Environment CO4: discuss the command, natural languages and issues in design for maintaining QoS. CO5: persuade user documentations and information search.</td>
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<tr>
<td>53</td>
<td>18MCA553 Software Architecture</td>
<td>CO1: Acquire knowledge of - working principles, characteristics and basic applications of Architectural patterns.</td>
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<tr>
<td>54</td>
<td>18MCA554</td>
<td>Storage Area Networks</td>
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<td></td>
<td>CO1: Understand the fundamentals of storage and storage networking concepts</td>
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<td>CO2: Analyze Network Attached and Storage Area Networks Requirements</td>
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<td>CO3: Apply and Integrate SAN and NAS solutions for an enterprise requirements</td>
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<td>CO4: Design a secured, scalable SAN / NAS enterprise solutions</td>
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<td>55</td>
<td>18MCA56</td>
<td>C#.Net Laboratory</td>
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<td>CO1: Understand C# and client-server concepts using .Net Frame Work Components</td>
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<td>CO2: Apply delegates, event and exception handling to incorporate with ASP, Win Form, ADO.NET</td>
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<td>CO3: Analyze the use of .Net Components depending on the problem statement</td>
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<td>CO4: Implement &amp; develop a web based and Console based application with Database connectivity</td>
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<tr>
<td>56</td>
<td>18MCA57</td>
<td>Mobile Applications Laboratory</td>
</tr>
<tr>
<td></td>
<td>CO1: Illustrate effective user interfaces that leverage evolving mobile device capabilities</td>
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<td></td>
<td>CO2: Develop applications using software development kits (SDKs), frameworks and toolkits</td>
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<td>CO3: Establish various methods to integrate database and server-side technologies</td>
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<td></td>
<td>CO4: Design and develop open source software based mobile applications</td>
<td></td>
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<td></td>
<td>CO5: Build and deploy competent mobile development solutions</td>
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<td>57</td>
<td>18MCA58</td>
<td>Mini Project</td>
</tr>
<tr>
<td></td>
<td>CO1: Identify a suitable problem making use of the technical and engineering knowledge gained from</td>
<td></td>
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</tbody>
</table>

- project life cycle context.
- how the architecture is influenced.
- the quality attributes of architecture.
CO2: Modeling quality attributes through
- check lists.
- experiments.
- back-of-the envelope analysis.
CO3: Understand the techniques of requirements gathering through interviewing stake holders, etc.
CO4: Understand different types of design patterns
<table>
<thead>
<tr>
<th>Week</th>
<th>Course Code</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
</table>
| 58   | 18MCA61     | Internship | CO1: Identify a suitable problem making use of the technical and engineering knowledge gained from previous courses with the awareness of impact of technology on the society and their ethical responsibilities.  
CO2: Ability to segregate work and execute/implement projects using appropriate tools.  
CO3: Develop skills to disseminate technical and general information by means of oral as well as written presentation and professional skills. |
| 59   | 18MCA62     | Seminar    | CO1: Identify a suitable problem making use of the technical and engineering knowledge gained from previous courses with the awareness of impact of technology on the society and their ethical responsibilities.  
CO2: Ability to segregate work and execute/implement projects using appropriate tools.  
CO3: Develop skills to disseminate technical and general information by means of oral as well as written presentation and professional skills. |
| 60   | 18MCA63     | Major project | CO1: Identify a suitable problem making use of the technical and engineering knowledge gained from previous courses with the awareness of impact of technology on the society and their ethical responsibilities.  
CO2: Ability to segregate work and execute/implement projects using appropriate tools.  
CO3: Develop skills to disseminate technical and general information by means of oral as well as written presentation and professional skills. |