I semester

Course Outcomes (Year 2018-19)
PHYSICS CYCLE

Semester: I   Subject: Calculus & Linear Algebra   Sub Code: 18MAT11

CO	On completion of this course, students are able to:
18MAT11.1	Apply the knowledge of calculus to solve problems related to polar curves and its applications in determining the bentness of a curve.
18MAT11.2	Learn the notion of partial differentiation to calculate rates of change of multivariate functions and solve problems related to composite functions and Jacobians.
18MAT11.3	Apply the concept of change of order of integration and variables to evaluate multiple integrals and their usage in computing the area and volumes.
18MAT11.4	Illustrate the applications of multivariate calculus to understand the solenoidal and irrotational vectors and also to exhibit the interdependence of line, surface and volume integrals.
18MAT11.5	Make use of matrix theory for solving system of linear equations and compute eigen values and eigen vectors required for matrix diagonalization process.

Semester: I   Subject: ENGINEERING PHYSICS   Sub Code: PHY12

CO	Upon completion of this course, students will be able to
18PHY12.1	Understand various types of oscillations and their implications, the role of Shock waves in various fields and Recognize the elastic properties of materials for engineering applications
18PHY12.2	Realize the interrelation between time varying electric field and magnetic field, the transverse nature of the EM waves and their role in optical fiber communication.
18PHY12.3	Compute Eigen values, Eigen functions, momentum of Atomic and subatomic particles using Time independent 1-D Schrodinger's wave equation
18PHY12.4	Apprehend theoretical background of laser, construction and working of different types of laser and its applications in different fields
18PHY12.5	. Understand various electrical and thermal properties of materials like conductors, semiconductors and dielectrics using different theoretical models.

Semester: I   Subject: Basic Electrical Engg   Sub Code: 18ELE13

CO	After studying this course, students will be able to:
18ELE13.1	Analyse D.C and A.C Circuits
18ELE13.2	Explain the Principle of Operation and Construction of Single Phase transformer
18ELE13.3	Explain the Principle of Operation and Construction of D.C Machines and Synchronous Machines
18ELE13.4	Explain the Principle of Operation and Construction of Three phase Induction Motors
18ELE13.5	Discuss concepts of Electrical wiring ,circuit Protecting devices and Earthing

Semester: I   Subject: Elements of Civil Engg   Sub Code: 18CIV14

CO	After studying this course, students will be able to:
18CIV14.1	Mention the applications of various field of Civil Engineering
18CIV14.2	Compute the resultant of given force system subjected to various loads
18CIV14.3	Comprehend the action of forces, Moments and other loads on system of rigid bodies and compute the reactive forces that develop as a result of the external loads.
18CIV14.4	Locate the centroid and compute the Moment of Inertia of regular and built-up sections.
18CIV14.5	Express the relationship between the motion of bodies and analyze the bodies in motion

Semester: I   Subject: Engg Graphics   Sub Code: 18EGDL15

CO	After studying this course, students will be able to:
18EGDL15.1	Prepare Engineering drawings as per BIS conventions mentioned in the relevant
18EGDL15.2	Produce computer generated drawings using CAD Software
18EGDL15.3	Use the knowledge of orthographic projections to represent engineering information/concept present in the form of drawing.
18EGDL15.4	Develop the isometric drawing of simple objects reading the orthographic projection of those objects.
18EGDL15.5	Convert pictorial and isometric Views of simple objects to orthographic views.

Semester: I   Subject: Expts in Engg Physics Lab   Sub Code: 18PHYL16

CO	After studying this course, students will be able to:
18PHYL16.1	Apprehend the concepts of interference of light, diffraction of light, Fermi energy and magnetic effect of current
18PHYL16.2	Understand the principles of operations of optical fibers and semiconductor devices such as Photodiode, and NPN transistor using simple circuits
18PHYL16.3	Determine elastic moduli and moment of inertia of given materials with the help of suggested procedures
18PHYL16.4	Recognize the resonance concept and its practical applications
18PHYL16.5	Understand the importance of measurement procedure, honest recording and representing the data, reproduction of final results

Semester: I   **Subject: Basic Electrical Lab**   **Sub Code: 18ELE17**

CO	After studying this course, students will be able to:
18ELEL17.1	Get an exposure to common electrical components.
18ELEL17.2	Make electrical connections by wires of appropriate ratings.
18ELEL17.3	Understand the usage of common electrical measuring instruments.
18ELEL17.4.	Understand the basic functioning of electrical machines
18ELEL17.5	Understand two way and three way control of lamp.

Semester: I   **Subject: Technical Communication English-I**   **Sub Code: 18EGHL18**

CO	After studying this course, students will be able to:
18EGHL18.1	Use grammatical English and essentials of language skills and identify the nuances of phonetics, intonation and flawless pronounciation
18EGHL18.2	Implement English vocabulary at command and language proficiency
18EGHL18.3	Identify common errors in spoken and written communication
18EGHL18.4	Understand and improve the non verbal communication and kinetics
18EGHL18.5	Perform well in campus recruitment, engineering and all other general competitive examinations

I semester

Course Outcomes (Year 2018-19)

CHEMISTRY CYCLE

Semester: I   **Subject: Calculus & Linear Algebra**   **Sub Code: 18MAT11**

CO	On completion of this course, students are able to:
18MAT11.1	Apply the knowledge of calculus to solve problems related to polar curves and its applications in determining the bentness of a curve.
18MAT11.2	Learn the notion of partial differentiation to calculate rates of change of multivariate functions and solve problems related to composite functions and Jacobians.
18MAT11.3	Apply the concept of change of order of integration and variables to evaluate multiple integrals and their usage in computing the area and volumes.
18MAT11.4	Illustrate the applications of multivariate calculus to understand the solenoidal and irrotational vectors and also to exhibit the interdependence of line, surface and volume integrals.
18MAT11.5	Make use of matrix theory for solving system of linear equations and compute eigen values and eigen vectors required for matrix diagonalization process.

Semester: I   **Subject: Engg Chemistry**   **Sub Code: 18CHE12**

CO	After studying this course, students will be able to:
18CHE12.1	Use of free energy in equilibria, rationalize bulk properties and processes using thermodynamic considerations, electrochemical energy systems.
18CHE12.2	Causes & effects of corrosion of metals and control of corrosion. Modification of surface properties of metals to develop resistance to corrosion, wear, tear, impact etc. by electroplating and electroless plating.
18CHE12.3	Production & consumption of energy for industrialization of country and living standards of people. Electrochemical and concentration cells. Classical, modern batteries and fuel cells. Utilization of solar energy for different useful forms of energy.
18CHE12.4	Environmental pollution, waste management and water chemistry.
18CHE12.5	Different techniques of instrumental methods of analysis. Fundamental principles of nanomaterials

Semester: I   **Subject: C programming for problem solving**   **Sub Code: 18CPS13**

CO	After studying this course, students will be able to:
18CPS13.1	Illustrate simple algorithms from the different domains such as mathematics, physics, etc.
18CPS13.2	Construct a programming solution to the given problem using C.
18CPS13.3	Identify and correct the syntax and logical errors in C programs
18CPS13.4	Modularize the given problem using functions and structures

Semester: I   **Subject: Basic Electronics**   **Sub Code: 18ELN14**

CO	After studying this course, students will be able to:
18ELN14.1	Undestand the significance of electronics in different applications like rectifiers and filter circuits
18ELN14.2	Apply the concept of diode in rectifiers, filters circuits
18ELN14.3	Design simple circuits like amplifiers (inverting and non inverting),comparators, adders, integrator and differentiator using OPAMPS
18ELN14.4	Compile the different building blocks in digital electronics using logic gates and implement simple logic function using basic universal gates.
18ELN14.5	Understand the functioning of a communication system, and different modulation technologies
18ELN14.6	Understand the basic principles of different types of Transuducers

Semester: I   **Subject: Elements of Mechanical Engg**   **Sub Code: 18ME15**

CO	After studying this course, students will be able to:
18ME15.1	Learn the fundamental concepts of energy ,its sources and conversion
18ME15.2	Comprehend the basic concept of thermodynamics
18ME15.3	Understand the concept of boiler ,turbines,pumps,internal combustion engine and refrigeration
18ME15.4	Distinguish the different metal joining techniques
18ME15.5	Enumerate the knowledge of working with conventional machine tools, their specifications.

Semester: I   **Subject: Engg Chemistry Lab**   **Sub Code: 18CHEL16**

CO	After studying this course, students will be able to:
18CHEL16.1	Handling different types of instruments for the measurements.
18CHEL16.2	Carrying out different types of titrations for estimation of concerned in materials using comparatively more quantities of materials involved for good results.

Semester: I   **Subject: Computer Programming Lab**   **Sub Code: 18CPL17**

CO	After studying this course, students will be able to:
18CPL17.1	Describe [1] the knowledge of Knowledge of design and development of C problem solving skills.
18CPL17.2	Apply [3] and Understand the basic principles of Programming in C language
18CPL17.3	Solve [5] the problem and Design and develop modular programming skills
18CPL17.4	Explain [2] the Effective utilization of memory using pointer technology
18CPL17.5	Understand [2] the basic concepts of pointers and data structures

Semester: I   Subject: Technical Communication English-I   Sub Code: 18EGHL18

CO	After studying this course, students will be able to:
18EGHL18.1	Use grammatical English and essentials of language skills and identify the nuances of phonetics, intonation and flawless pronounciation
18EGHL18.2	Implement English vocabulary at command and language proficiency
18EGHL18.3	Identify common errors in spoken and written communication
18EGHL18.4	Understand and improve the non verbal communication and kinetics
18EGHL18.5	Perform well in campus recruitment, engineering and all other general competitive examinations

II semester

Course Outcomes (Year 2018-19)
PHYSICS CYCLE

Semester: II   Subject: Advanced Calculus & Numerical Methods   Sub Code: 18MAT21

CO	After studying this course, students will be able to:
18MAT21.1	Solve first order linear/nonlinear differential equations analytically using standard methods
18MAT21.2	Explain various physical models through higher order differential equations and solve such linear ordinary differential equations.
18MAT21.3	Understand a variety of partial differential equations and solution by exact methods/method of separation of variables.
18MAT21.4	Describe the applications of infinite series and obtain series solution of ordinary differential equations.
18MAT21.5	Apply the knowledge of numerical methods in the models of various physical and engineering phenomena.

Semester: II   Subject: ENGINEERING PHYSICS   Sub Code: 18PHY22

CO	Upon completion of this course, students will be able to
18PHY22.1	Understand various types of oscillations and their implications, the role of Shock waves in various fields and Recognize the elastic properties of materials for engineering applications
18PHY22.2	Realize the interrelation between time varying electric field and magnetic field, the transverse nature of the EM waves and their role in optical fiber communication.
18PHY22.3	Compute Eigen values, Eigen functions, momentum of Atomic and subatomic particles using Time independent 1-D Schrodinger's wave equation
18PHY22.4	Apprehend theoretical background of laser, construction and working of different types of laser and its applications in different fields
18PHY22.5	. Understand various electrical and thermal properties of materials like conductors, semiconductors and dielectrics using different theoretical models.

Semester: II   Subject: Basic Electrical Engg   Sub Code: 18ELE23

CO	After studying this course, students will be able to:
18ELE23.1	Analyse D.C and A.C Circuits
18ELE23.2	Explain the Principle of Operation and Construction of Single Phase transformer
18ELE23.3	Explain the Principle of Operation and Construction of D.C Machines and Synchronous Machines
18ELE23.4	Explain the Principle of Operation and Construction of Three phase Induction Motors
18ELE23.5	Discuss concepts of Electrical wiring ,circuit Protecting devices and Earthing

Semester: II   Subject: Elements of Civil Engg   Sub Code: 18CIV24

CO	After studying this course, students will be able to:
18CIV24.1	Mention the applications of various field of Civil Engineering
18CIV24.2	Compute the resultant of given force system subjected to various loads
18CIV24.3	Comprehend the action of forces, Moments and other loads on system of rigid bodies and compute the reactive forces that develop as a result of the external loads.
18CIV24.4	Locate the centroid and compute the Moment of Inertia of regular and built-up sections.
18CIV24.5	Express the relationship between the motion of bodies and analyze the bodies in motion

Semester: II   Subject: Engg Graphics   Sub Code: 18EGDL25

CO	After studying this course, students will be able to:
18EGDL25.1	Prepare Engineering drawings as per BIS conventions mentioned in the relevant
18EGDL25.2	Produce computer generated drawings using CAD Software
18EGDL25.3	Use the knowledge of orthographic projections to represent engineering information/concept present in the form of drawing.
18EGDL25.4	Develop the isometric drawing of simple objects reading the orthographic projection of those objects.
18EGDL25.5	Convert pictorial and isometric Views of simple objects to orthographic views.

Semester: II   Subject: Expts in Engg Physics Lab   Sub Code: 18PHYL26

CO	After studying this course, students will be able to:
18PHYL26.1	Apprehend the concepts of interference of light, diffraction of light, Fermi energy and magnetic effect of current
18PHYL26.2	Understand the principles of operations of optical fibers and semiconductor devices such as Photodiode, and NPN transistor using simple circuits
18PHYL26.3	Determine elastic moduli and moment of inertia of given materials with the help of suggested procedures
18PHYL26.4	Recognize the resonance concept and its practical applications
18PHYL26.5	Understand the importance of measurement procedure, honest recording and representing the data, reproduction of final results

Semester: II   **Subject: Basic Electrical Lab**   **Sub Code: 18ELE27**

CO	After studying this course, students will be able to:
18ELEL27.1	Get an exposure to common electrical components.
18ELEL27.2	Make electrical connections by wires of appropriate ratings.
18ELEL27.3	Understand the usage of common electrical measuring instruments.
18ELEL27.4.	Understand the basic functioning of electrical machines
18ELEL27.5	Understand two way and three way control of lamp.

Semester: II   **Subject: Technical Communication English-II**   **Sub Code: 18EGHL28**

CO	After studying this course, students will be able to:
18EGHL28.1	Identifying common errors in spoken and written communication
18EGHL28.2	Get familiarized with English vocabulary and language proficiency
18EGHL28.3	Improve nature and style of sensible writing and acquire employment and workplace communication skills
18EGHL28.4	Improve their technical communication skills through technical reading and writing practices
18EGHL28.5	Perform well in campus recruitment, engineering and all other general competitive examinations

II semester

Course Outcomes (Year 2018-19)
CHEMISTRY CYCLE

Semester: II   **Subject:Engg Chemistry**   **Sub Code: 18CHE22**

CO	After studying this course, students will be able to:
18CHE22.1	Use of free energy in equilibria, rationalize bulk properties and processes using thermodynamic considerations, electrochemical energy systems.
18CHE22.2	Causes & effects of corrosion of metals and control of corrosion. Modification of surface properties of metals to develop resistance to corrosion, wear, tear, impact etc. by electroplating and electroless plating.
18CHE22.3	Production & consumption of energy for industrialization of country and living standards of people. Electrochemical and concentration cells. Classical, modern batteries and fuel cells. Utilization of solar energy for different useful forms of energy.
18CHE22.4	Environmental pollution, waste management and water chemistry.
18CHE22.5	Different techniques of instrumental methods of analysis. Fundamental principles of nanomaterials

Semester: II   **Subject: C programming for problem solving**   **Sub Code: 18CPS23**

CO	After studying this course, students will be able to:
18CPS23.1	Illustrate simple algorithms from the different domains such as mathematics, physics, etc.
18CPS23.2	Construct a programming solution to the given problem using C.
18CPS23.3	Identify and correct the syntax and logical errors in C programs
18CPS23.4	Modularize the given problem using functions and structures

Semester: II   **Subject: Basic Electronics**   **Sub Code: 18ELN24**

CO	After studying this course, students will be able to:
18ELN24.1	Undestand the significance of electronics in different applications like rectifiers and filter circuits
18ELN24.2	Apply the concept of diode in rectifiers, filters circuits
18ELN24.3	Design simple circuits like amplifiers (inverting and non inverting),comparators, adders, integrator and differentiator using OPAMPS
18ELN24.4	Compile the different building blocks in digital electronics using logic gates and implement simple logic function using basic universal gates.
18ELN24.5	Understand the functioning of a communication system, and different modulation technologies
18ELN24.6	Understand the basic principles of different types of Transuducers

Semester: II   Subject: Elements of Mechanical Engg   Sub Code: 18ME25

CO	After studying this course, students will be able to:
18ME25.1	Learn the fundamental concepts of energy ,its sources and conversion
18ME25.2	Comprehend the basic concept of thermodynamics
18ME25.3	Understand the concept of boiler ,turbines,pumps,internal combustion engine and refrigeration
18ME25.4	Distinguish the different metal joining techniques
18ME25.5	Enumerate the knowledge of working with conventional machine tools, their specifications.

Semester: II   Subject: Engg Chemistry Lab   Sub Code: 18CHEL26

CO	After studying this course, students will be able to:
18CHEL26.1	Handling different types of instruments for the measurements.
18CHEL26.2	Carrying out different types of titrations for estimation of concerned in materials using comparatively more quantities of materials involved for good results.

Semester: II   Subject: Computer Programming Lab   Sub Code: 18CPL27

CO	After studying this course, students will be able to:
18CPL27.1	Describe [1] the knowledge of Knowledge of design and development of C problem solving skills.
18CPL27.2	Apply [3] and Understand the basic principles of Programming in C language
18CPL27.3	Solve [5] the problem and Design and develop modular programming skills
18CPL27.4	Explain [2] the Effective utilization of memory using pointer technology
18CPL27.5	Understand [2] the basic concepts of pointers and data structures

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	CV
	Course Outcomes
	2018-19

Suresh Angadi Education Foundation's
ANGADI INSTITUTE OF TECHNOLOGY AND MANAGEMENT
Savagaon Road, Belagavi – 590 009.
Approved by AICTE, New Delhi
Affiliated to Visvesvaraya Technological University, Belagavi

Course Outcomes (Year 2018-19)

Semester: III   **Subject: Engineering Mathematics-III**   **Sub Code: 17MAT31**

CO	After studying this course, students will be able to:
17MAT31.1	Know the use of periodic signals and Fourier series to analyze circuits and system
17MAT31.2	Explain the general linear system theory for continuous-time signals and digital signal processing using the Fourier Transform and z-transform
17MAT31.3	Employ appropriate numerical methods to solve algebraic and transcendental equations.
17MAT31.4	Apply Green's Theorem, Divergence Theorem and Stokes' theorem in various applications in the field of electro-magnetic and gravitational fields and fluid flow problems
17MAT31.5	Determine the external of functional and solve the simple problems of the calculus of Variations.

Semester: III   **Subject: Strength Of Materials**   **Sub Code: 17CV32**

CO	After studying this course, students will be able to:
17CV32.1	To evaluate the strength of various structural elements internal forces such as compression, tension, shear, bending and torsion.
17CV32.2	To suggest suitable material from among the available in the field of construction and manufacturing.
17CV32.3	To evaluate the behavior and strength of structural elements under the action of compound stresses and thus understand failure concepts.
17CV32.4	To understand the basic concept of analysis and design of members subjected to torsion.
17CV32.5	To understand the basic concept of analysis and design of structural elements such as columns and struts.

Semester: III   **Subject: Fluids Mechanics**   **Sub Code: 17CV33**

CO	After studying this course, students will be able to:
17CV33.1	Possess a sound knowledge of fundamental properties of fluids and fluid continuum
17CV33.2	Compute and solve problems on hydrostatics, including practical applications.
17CV33.3	Apply principles of mathematics to represent kinematic concepts related to fluid flow
17CV33.4	Apply fundamental laws of fluid mechanics and the Bernoulli's principle for practical applications
17CV33.5	Compute the discharge through pipes and over notches and weirs

Semester: III   **Subject: Basic Surveying**   **Sub Code: 17CV34**

CO	After studying this course, students will be able to:
17CV34.1	Posses a sound knowledge of fundamental principles Geodetics
17CV34.2	Measurement of vertical and horizontal plane, linear and angular dimensions to arrive at solutions to basic surveying problems.
17CV34.3	Capture geodetic data to process and perform analysis for survey problems
17CV34.4	Understanding the concepts of leveling and different methods of leveling in surveying
17CV34.5	Analyse the obtained spatial data and compute areas and volumes. Represent 3D data on plane figures as contours

Semester: III   **Subject: Engineering Geology**   **Sub Code: 17CV35**

CO	After studying this course, students will be able to:
17CV35.1	Students will able to apply the knowledge of geology and its role in Civil Engineering
17CV35.2	Students will effectively utilize earth's materials such as mineral, rocks and water in civil engineering practices
17CV35.3	Analyze the natural disasters and their mitigation
17CV35.4	Assess various structural features and geological tools in ground water exploration, Natural resource estimation and solving civil engineering problems.
17CV35.5	Apply and asses use of building materials in construction and asses their properties

Semester: III   **Subject: Building Materials and Construction** **Sub Code: 17CV36**

CO	After studying this course, students will be able to:
17CV36.1	Select suitable materials for buildings and adopt suitable construction techniques
17CV36.2	Adopt suitable repair and maintenance work to enhance durability of buildings.
17CV36.3	Will be able to select suitable materials for lintels, chejja, arches, roofs and floors
17CV36.4	Understand different types of doors and windows, classification and design of staircase and formworks
17CV36.5	Understand materials used for plastering, painting and damp proofing.

Semester: III   **Subject: Building Materials Testing Laboratory**   **Sub Code: 17CVL37**

CO	After studying this course, students will be able to:
17CV37.1	Reproduce the basic knowledge of mathematics and engineering in finding the strength in tension, compression, shear and torsion.
17CV37.2	Identify, formulate and solve engineering problems of structural elements subjected to flexure.
17CV37.3	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.
17CV37.4	Understanding of professional and ethical responsibility in the areas of material testing.
17CV37.5	Communicate effectively the mechanical properties of materials.

Semester: III   **Subject: Basic Surveying Practice**   **Sub Code: 17CVL38**

CO	After studying this course, students will be able to:
17CV38.1	Apply the basic principles of engineering surveying and for linear and angular measurements.
17CV38.2	comprehend effectively field procedures required for a professional surveyor.
17CV38.3	Use techniques, skills and conventional surveying instruments necessary for engineering practice.
17CV38.4	Understand the concept of leveling and different methods of levelling
17CV38.5	Use instruments like Clinometer, Ceylon Ghat tracer, Box sextant, Hand level, Planimeter, nautical sextant and Pentagraph

Semester: IV   **Subject: Engineering Mathematics-IV**   **Sub Code: 17MAT41**

CO	After studying this course, students will be able to:
17MAT41.1	Solve first and second order ordinary differential equation arising in flow problems using single step and multistep numerical methods
17MAT41.2	Illustrate problems of potential theory, quantum mechanics and heat conduction by employing notions and properties of Bessel's functions and Legendre's polynomials
17MAT41.3	Explain the concepts of analytic functions, residues, poles of complex potentials and describe conformal and Bilinear transformation arising in field theory and signal processing
17MAT41.4	Develop probability distribution of discrete, continuous random variables and joint probability distribution occurring in digital signal processing, information theory and design engineering
17MAT41.5	Demonstrate testing of hypothesis of sampling distributions and illustrate examples of Markov chains related to discrete parameter stochastic process

Semester: IV   **Subject: Analysis of Determinate Structures**   **Sub Code: 17CV42**

CO	After studying this course, students will be able to:
17CV42.1	Evaluate the forces i n determinate trusses by method of joints and sections.
17CV42.2	Evaluate the deflection of cantilever, simply supported and overhanging beams by different methods
17CV42.3	Understand the energy principles and energy theorems and its applications to determine the deflections of trusses and bent frames.
17CV42.4	Determine the stress resultants in arches and cables.
17CV42.5	Understand the concept of influence lines and construct the ILD diagram for the moving loads.

Semester: IV   **Subject: Applied Hydraulics**   **Sub Code: 17CV43**

CO	After studying this course, students will be able to:
17CV43.1	Apply dimensional analysis to develop mathematical modeling and compute the parametric values in prototype by analyzing the corresponding model parameters
17CV43.2	Design the open channels of various cross sections including economical channel sections
17CV43.3	Apply Energy concepts to flow in open channel sections, Calculate Energy dissipation
17CV43.4	Compute water surface profiles at different conditions
17CV43.5	Design turbines for the given data, and to know their operation characteristics under different operating conditions.

Semester: IV   **Subject: Concrete Technology**   **Sub Code: 17CV44**

CO	After studying this course, students will be able to:
17CV44.1	Relate material characteristics and their influence on microstructure of concrete.
17CV44.2	Distinguish concrete behaviour based on its fresh and hardened properties.
17CV44.3	Illustrate proportioning of different types of concrete mixes for required fresh and hardened properties using professional codes
17CV44.4	Understanding test procedures on fresh and hardened concrete
17CV44.5	Introduction to special concrete, their ingredients and properties

Semester: IV   **Subject: Basic Geotechnical Engineering**   **Sub Code: 17CV45**

CO	After studying this course, students will be able to:
17CV45.1	Will acquire an understanding of the procedures to determine index properties of any type of soil, classify the soil based on its index properties
17CV45.2	Will be able to determine compaction characteristics of soil and apply that knowledge to assess field compaction procedures
17CV45.3	Will be able to determine permeability property of soils and acquires conceptual knowledge about stresses due to seepage and effective stress; Also acquire ability to estimate seepage losses across hydraulic structure
17CV45.4	Will be able to estimate shear strength parameters of different types of soils using the data of different shear tests and comprehend Mohr-Coulomb failure theory
17CV45.5	Ability to solve practical problems related to estimation of consolidation settlement of soil deposits also time required for the same

Semester: IV   **Subject: Advanced Surveying**   **Sub Code: 17CV46**

CO	After studying this course, students will be able to:
17CV46.1	Apply the knowledge of geometric principles to arrive at surveying problems
17CV46.2	Use modern instruments to obtain geo-spatial data and analyze the same to appropriate engineering problems
17CV46.3	Capture geodetic data to process and perform analysis for survey problems with the use of electronic instruments
17CV46.4	Design and implement the different types of curves for deviating type of alignments
17CV46.5	Understanding concept of GIS and remote sensing.

Semester: IV   **Subject: Fluid Mechanics and Hydraulic Machines Laboratory**   **Sub Code: 17CVL47**

CO	After studying this course, students will be able to:
17CVL47.1	Properties of fluids and the use of various instruments for fluid flow measurement
17CVL47.2	Working of hydraulic machines under various conditions of working and their characteristics.
17CVL47.3	Calibration of flow measuring devices
17CVL47.4	Measure discharge and head losses in pipes
17CVL47.5	Understand operating characteristics and efficiency of different types of turbine

Semester: IV   Subject: Engineering Geology Laboratory   Sub Code: 17CVL48

CO	After studying this course, students will be able to:
17CVL48.1	Identifying the minerals and rocks and utilize them effectively in civil engineering practices
17CVL48.2	Understanding and interpreting the geological conditions of the area for the implementation o f civil engineering projects
17CVL48.3	Interpreting subsurface information such as thickness of soil, weathered zone, depth of hard rock and saturated zone by using geophysical methods
17CVL48.4	The techniques of drawing the curves of electrical resistivity data and its interpretation for geotechnical and aquifer boundaries
17CVL48.5	Understand engineering related problems.

Semester: V   Subject: Design of RC Structural Elements   Sub Code: 15CV51

CO	After studying this course, students will be able to:
15CV51.1	Understand the design philosophy and principles
15CV51.2	Solve engineering problems of RC elements subjected to flexure, shear and torsion
15CV51.3	Demonstrate the procedural knowledge in designs of RC structural elements such as slabs, columns and footings
15CV51.4	Owns professional and ethical responsibility
15CV51.5	Use of IS456-2000 and SP16,

Semester: V   Subject: Analysis of Indeterminate Structures   Sub Code: 15CV52

CO	After studying this course, students will be able to:
15CV52.1	Determine the moment in indeterminate beams and frames having variable moment of inertia and subsidence using slope defection method
15CV52.2	Determine the moment in indeterminate beams and frames of no sway and sway using moment distribution method
15CV52.3	Construct the bending moment diagram for beams and frames by Kani's method
15CV52.4	Construct the bending moment diagram for beams and frames using flexibility method
15CV52.5	Analyze the beams and indeterminate frames by system stiffness method

Semester: V   Subject: Applied Geotechnical Engineering   Sub Code: 15CV53

CO	After studying this course, students will be able to:
15CV53.1	Ability to plan and execute geotechnical site investigation program for different civil engineering projects
15CV53.2	Understanding of stress distribution and resulting settlement beneath the loaded footings on sand and clayey soils
15CV53.3	Ability to estimate factor of safety against failure of slopes and to compute lateral pressure distribution behind earth retaining structures
15CV53.4	Ability to determine bearing capacity of soil and achieve proficiency in proportioning shallow isolated and combined footings for uniform bearing pressure
15CV53.5	Capable of estimating load carrying capacity of single and group of piles

Semester: V   Subject: Computer Aided Building Planning and Drawing   Sub Code: 15CV54

CO	After studying this course, students will be able to:
15CV54.1	Use AUTOCAD software and gain a broad understanding of planning and designing of buildings
15CV54.2	Prepare, read and interpret the drawings in a professional set up
15CV54.3	Know the procedures of submission of drawings and Develop working and submission drawings for building
15CV54.4	Plan and design a residential or public building as per the given requirements
15CV54.5	Detail water supply, sanitary and electrical connections

Semester: V   Subject: Railways, Harbor, Tunneling and Airports   Sub Code: 15CV552

CO	After studying this course, students will be able to:
15CV552.1	Understand the history and development, role of railways, railway planning and development based on essential criteria's.
15CV552.2	Acquires capability of choosing alignment and also design geometric aspects of railway system, runway, taxiway
15CV552.3	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
15CV552.4	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
15CV552.5	Apply the knowledge gained to conduct surveying, understand the tunneling activities

Semester: V   Subject: Masonry Structures   Sub Code: 15CV553

CO	After studying this course, students will be able to:
15CV553.1	Explain engineering properties and uses of masonry units, defects and crack in masonry and its remedial measures
15CV553.2	Summarize various formulae's for finding compressive strength of masonry units
15CV553.3	Explain permissible stresses and design criteria as per IS: 1905 and SP-20
15CV553.4	Design different types of masonry walls for different load considerations
15CV553.5	Design laterally and transversely loaded walls and concepts of in-filled frames

Semester: V   Subject: Traffic Engineering   Sub Code: 15CV561

CO	After studying this course, students will be able to:
15CV561.1	Understand the human factors and vehicular factors in traffic engineering design
15CV561.2	Conduct different types of traffic surveys and analysis of collected data using statistical concepts
15CV561.3	Use an appropriate traffic flow theory and to comprehend the capacity & signalized intersection analysis
15CV561.4	Understand the basic knowledge of Intelligent Transportation System
15CV561.5	Understand the basic knowledge of visual aids in transportation system

Semester: V   Subject: Geotechnical Engineering Lab   Sub Code: 15CVL57

CO	After studying this course, students will be able to:
15CVL57.1	Physical and index properties of the soil
15CVL57.2	Classify based on index properties and field identification
15CVL57.3	To determine OMC and MDD, plan and assess field compaction program
15CVL57.4	Shear strength and consolidation parameters to assess strength and deformation characteristics
15CVL57.5	In-situ shear strength characteristics (SPT- Demonstration)

Semester: V   Subject: Concrete and Highway Materials Lab   Sub Code: 15CVL58

CO	After studying this course, students will be able to:
15CVL58.1	Conduct appropriate laboratory experiments and interpret the results
15CVL58.2	Determine the quality and suitability of cement
15CVL58.3	Design appropriate concrete mix
15CVL58.4	Determine strength and quality of concrete
15CVL58.5	Test the road aggregates and bitumen for their suitability as road material.
15CVL58.6	Test the soil for its suitability as sub grade soil for pavements

Semester: VI   Subject: Construction Management and Entrepreneurship Sub Code: 15CV61

CO	After studying this course, students will be able to:
15CV61.1	Understand the construction management process.
15CV61.2	Understand and solve variety of issues that are encountered by every professional in discharging professional duties.
15CV61.3	Fulfill the professional obligations effectively with global outlook
15CV61.4	Understand the engineering economics
15CV61.5	Understand the concept of entrepreneurship and MSME

Semester: VI   Subject: Design of Steel Structural Elements   Sub Code: 15CV62

CO	After studying this course, students will be able to:
15CV62.1	Possess a knowledge of Steel Structures Advantages and Disadvantages of Steel structures, steel code provisions and plastic behavior of structural steel
15CV62.2	Understand the Concept of Bolted and Welded connections
15CV62.3	Understand the Concept of Design of compression members, built-up columns and columns splices
15CV62.4	Understand the Concept of Design of tension members, simple slab base and gusseted base
15CV62.5	Understand the Concept of Design of laterally supported and un-supported steel beams

Semester: VI   **Subject: Highway Engineering**   **Sub Code: 15CV63**

CO	After studying this course, students will be able to:
15CV63.1	Acquire the capability of proposing a new alignment or re-alignment of existing roads, conduct necessary field investigation for generation of required data
15CV63.2	Evaluate the engineering properties of the materials and suggest the suitability of the same for pavement construction
15CV63.3	Design road geometrics, structural components of pavement and drainage
15CV63.4	Evaluate the highway economics by few select methods and also will have a basic knowledge of various highway financing concepts
15CV63.5	Evaluate the highway drainage importance and basic knowledge of pavement design

Semester: VI   **Subject: Water Supply and Treatment Engineering**   **Sub Code: 15CV64**

CO	After studying this course, students will be able to:
15CV64.1	Explain the concept and necessary of protected water supply. Analyse the variation of water demand and to estimate water requirement for a community in a town/city
15CV64.2	Able to know the objectives on treatment of water. Concept of treatment units. Quality and characteristics of drinking water
15CV64.3	Able to evaluate the various types of water treatment process using sedimentation, coagulation and filtration process with their design
15CV64.4	Able to understand the water treatment system using softening and disinfection process
15CV64.5	Learning about collection and conveyance system for raw and treated water. Various methods of water distribution systems required to a community.

Semester: VI   **Subject: Solid Waste Management**   **Sub Code: 15CV651**

CO	After studying this course, students will be able to:
15CV651.1	Analyze existing solid waste management system and to identify their drawbacks
15CV651.2	Evaluate different elements of solid waste management system
15CV651.3	Suggest suitable scientific methods for solid waste management elements
15CV651.4	Design suitable processing system and evaluate disposal sites
15CV651.5	Understand the techniques of energy conservation

Semester: VI   **Subject: Alternative Building Materials**   **Sub Code: 15CV653**

CO	After studying this course, students will be able to:
15CV653.1	Solve the problems of Environmental issues concerned to building materials and cost effective building technologies
15CV653.2	Suggest appropriate type of masonry unit and mortar for civil engineering constructions
15CV653.3	Design Structural Masonry Elements under Axial Compression.
15CV653.4	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
15CV653.5	Recommend various types of alternative building materials and technologies and design a energy efficient building by considering local climatic condition and building material

Semester: VI   **Subject: Water Resources Management**   **Sub Code: 15CV661**

CO	After studying this course, students will be able to:
15CV661.1	Assess the potential of groundwater and surface water resources.
15CV661.2	Address the issues related to planning and management of water resources.
15CV661.3	Know how to implement IWRM in different regions
15CV661.4	Understand the legal issues of water policy
15CV661.5	Select the method for water harvesting based on the area.

Semester: VI   **Subject: Software Application Lab**   **Sub Code: 15CVL67**

CO	After studying this course, students will be able to:
15CVL67.1	Use software skills in a professional set up to automate the work and thereby reduce cycle time for completion of the work
15CVL67.2	Use of structural design software like STADPRO/ETABS
15CVL67.3	Use of project management software like MSP and Primavera
15CVL67.4	Able to prepare excel spreadsheets for the design of RCC elements and super elevation, earth work quantity calculation
15CVL67.5	Learn the basics of GIS software

Semester: VI   **Subject: Extensive Survey Project /Camp**   **Sub Code: 15CVP68**

CO	After studying this course, students will be able to:
15CVP68.1	Apply Surveying knowledge and tools effectively for the projects
15CVP68.2	Understanding Task environment, Goals, responsibilities, Task focus, working in Teams towards common goals, Organizational performance expectations, technical and behavioral competencies
15CVP68.3	Application of individual effectiveness skills in team and organizational context, goal setting, time management, communication and presentation skills.
15CVP68.4	Professional etiquettes at workplace, meeting and general
15CVP68.5	Establishing trust based relationships in teams & organizational environment
15CVP68.6	Orientation towards conflicts in team and organizational environment, Understanding sources of conflicts, Conflict resolution styles and techniques

Semester: VII   **Subject: Municipal and Industrial Waste Water Engineering**   **Sub Code: 15CV71**

CO	After studying this course, students will be able to:
15CV71.1	Acquires capability to design sewer and Sewerage treatment plant.
15CV71.2	Evaluate degree of treatment and type of treatment for disposal, reuse and recycle
15CV71.3	Identify waste streams and design the industrial waste water treatment plant.
15CV71.4	Manage sewage and industrial effluent issues
15CV71.5	Know about the treatment methodologies on effluents generating from various industries

Semester: VII   Subject: Design of RCC and Steel Structures   Sub Code: 15CV72

CO	After studying this course, students will be able to:
15CV72.1	Students will acquire the basic knowledge in design of RCC and Steel Structures
15CV72.2	Students will have the ability to follow design procedures as per codal provisions and skills to arrive at structurally safe RC and Steel members

Semester: VII   Subject: Hydrology and Irrigation Engineering   Sub Code: 15CV73

CO	After studying this course, students will be able to:
15CV73.1	Understand the importance of hydrology and its components.
15CV73.2	Measure precipitation and analyze the data and analyze the losses in precipitation
15CV73.3	Estimate runoff and develop unit hydrographs
15CV73.4	Find the benefits and ill-effects of irrigation
15CV73.5	Find the quantity of irrigation water and frequency of irrigation for various crops.
15CV73.6	Find the canal capacity, design the canal and compute the reservoir capacity

Semester: VII   Subject: Design of Bridges   Sub Code: 15CV74

CO	After studying this course, students will be able to:
15CV74.1	Understand the load distribution and IRC standards
15CV74.2	Design the slab and T beam bridges
15CV74.3	Design Box culvert, pipe culvert
15CV74.4	Use bearings, hinges and expansion joints and
15CV74.5	Design Piers and abutments.

Semester: VII   Subject: Urban Transportation and Planning Sub Code: 15CV751

CO	After studying this course, students will be able to:
15CV751.1	Design, conduct and administer surveys to provide the data required for transportation planning
15CV751.2	Supervise the process of data collection about travel behavior and analyze the data for use in transport planning
15CV751.3	Develop and calibrate modal split, trip generation rates for specific types of land use developments
15CV751.4	Adopt the steps that are necessary to complete a long-term transportation plan
15CV751.5	Use of various types of models used for travel forecasting, prediction of future travel patterns

Semester: VII   Subject: Environmental Engineering Laboratory   Sub Code: 15CVL76

CO	After studying this course, students will be able to:
15CVL76.1	Acquire capability to conduct experiments and estimate the concentration of different parameters
15CVL76.2	Compare the result with standards and discuss based on the purpose of analysis
15CVL76.3	Determine type of treatment, degree of treatment for water and waste water
15CVL76.4	Identify the parameter to be analyzed for the student project work in environmental stream
15CVL76.5	Know about the identification of various organic and inorganic impurities present in water and waste water

Semester: VII   Subject: Computer Aided Detailing of Structures Sub Code: 15CVL77

CO	After studying this course, students will be able to:
15CVL77.1	Prepare detailed working drawings of RCC structural members
15CVL77.2	Prepare detailed working drawing of steel structural members

Semester: VIII   Subject: Quantity Surveying and Contracts Management   Sub Code: 15CV81

CO	After studying this course, students will be able to:
15CV81.1	Prepare detailed and abstract estimates for building
15CV81.2	Prepare detailed and abstract estimates for roads, steel truss, manhole and septic tank
15CV81.3	Prepare rate analysis and specification for different construction works
15CV81.4	Prepare valuation reports of buildings
15CV81.5	Interpret Contract document's of domestic and international construction works

Semester: VIII   Subject: Design of Pre Stressed Concrete Elements   Sub Code: 15CV82

CO	After studying this course, students will be able to:
15CV82.1	Understand the requirement of PSC members for present scenario
15CV82.2	Analyse the stresses encountered in PSC element during transfer and at working
15CV82.3	Understand the effectiveness of the design of PSC after studying losses
15CV82.4	Capable of analyzing the PSC element and finding its efficiency
15CV82.5	Design PSC beam for different requirements

Semester: VIII   Subject: Earthquake Resistant Design of Structures   Sub Code: 15CV831

CO	After studying this course, students will be able to:
15CV831.1	Acquire basic knowledge of engineering seismology
15CV831.2	Develop response spectra for a given earthquake time history and its implementation to estimate response of a given structure
15CV831.3	Understanding of causes and types of damages to civil engineering structures during different earthquake scenarios
15CV831.4	Analyze multi-storied structures modeled as shear frames and determine lateral force distribution due to earthquake input motion using IS-1893 procedures
15CV831.5	Comprehend planning and design requirements of earthquake resistant features of RCC and Masonry structures thorough exposure to different IS-codes of practices

Semester: VIII   Subject: Pavement Design   Sub Code: 15CV833

CO	After studying this course, students will be able to:
15CV833.1	Systematically generate and compile required data's for design of pavement (Highway & Airfield)
15CV833.2	Analyze stress, strain and deflection by boussinesq's, burmister's and westergaard's theory
15CV833.3	Design rigid pavement and flexible pavement conforming to IRC58-2002 and IRC37-2001
15CV833.4	Evaluate the performance of the pavement and also develops maintenance statement based on site specificrequirements
15CV833.5	To study the behaviour of pavements under various loads

Course Outcomes (Year 2018-19)

Semester: III   Subject: Engineering Mathematics-III   Sub Code: 17MAT31

CO	After studying this course, students will be able to:
17MAT31.1	The objectives of this course is to introduce students to the mostly used analytical and numerical methods in the different engineering fields by making them to learn Fourier series, Fourier transforms and Z-transforms, statistical methods, numerical methods to solve algebraic and transcendental equations, vector integration and calculus of variations.

Semester: III Subject: Analog and Digital Electronics   Sub Code: 17CS32

CO	After studying this course, students will be able to:
17CS32.1	Explain the operation of JFETs and MOSFETs , Operational Amplifier circuits and their application
17CS32.2	Explain Combinational Logic, Simplification Techniques using Karnaugh Maps, Quine McClusky technique.
17CS32.3	Demonstrate Operation of Decoders, Encoders, Multiplexers, Adders and Subtractors, working of Latches, Flip-Flops, Designing Registers, Counters, A/D and D/A Converters
17CS32.4	Design of Counters, Registers and A/D & D/A converters

Semester: III Subject: Data Structures and Application.   Sub Code: 17CS33

CO	After studying this course, students will be able to:
17CS33.1	Explain different types of data structures, operations and algorithms
17CS33.2	Apply searching and sorting operations on files
17CS33.3	Make use of stack, Queue, Lists, Trees and Graphs in problem solving.
17CS33.4	Develop all data structures in a high-level language for problem solving

Semester: III Subject: Computer Organization.   Sub Code: 17CS34

CO	After studying this course, students will be able to:
17CS34.1	Explain the basic organization of a computer system
17CS34.2	Demonstrate functioning of different sub systems, such as processor, Input/output, and memory.
17CS34.3	Illustrate hardwired control and micro programmed control. pipelining, embedded and other computing systems.
17CS34.4	Build simple arithmetic and logical units.

Semester: III Subject: Unix and Shell Programming.   Sub Code: 17CS35

CO	After studying this course, students will be able to:
17CS35.1	Explain UNIX system and use different commands.
17CS35.2	Compile Shell scripts for certain functions on different subsystems.
17CS35.3	Demonstrate use of editors and Perl script writing

Semester: III Subject: Discrete Mathematical Structures.   Sub Code: 17CS36

CO	After studying this course, students will be able to:
17CS36.1	Make use of propositional and predicate logic in knowledge representation and truth verification.
17CS36.2	Demonstrate the application of discrete structures in different fields of computer science.
17CS36.3	Solve problems using recurrence relations and generating functions.
17CS36.4	Apply different mathematical proofs, techniques in proving theorems
17CS36.5	Compare graphs, trees and their applications.

Semester: III Subject: Analog and Digital Electronics Laboratory. Sub Code: 17CSL37

CO	After studying this course, students will be able to:
17CS36.1	Demonstrate various Electronic Devices like Cathode ray Oscilloscope, Signal generators, Digital Trainer Kit, Multimeters and components like Resistors, Capacitors, Op amp and Integrated Circuit.
17CS36.2	Design and demonstrate various combinational logic circuits.
17CS36.3	Design and demonstrate various types of counters and Registers using Flip-flops
17CS36.4	Make use of simulation package to design circuits.
17CS36.5	Infer the working and implementation of ALU..

Semester: III Subject: Data Structures Laboratory   Sub Code: 17CSL38

CO	After studying this course, students will be able to:
17CS36.1	Make use of propositional and predicate logic in knowledge representation and truth verification.
17CS36.2	Demonstrate the application of discrete structures in different fields of computer science.
17CS36.3	Solve problems using recurrence relations and generating functions.
17CS36.4	Apply different mathematical proofs, techniques in proving theorems
17CS36.5	Compare graphs, trees and their applications.

Semester: IV   Subject: Engineering Mathematics-IV   Sub Code: 17MAT41

CO	After studying this course, students will be able to:
17MAAT41.1	Course Objectives: The purpose of this course is to make students well conversant with numerical methods to solve ordinary differential equations, complex analysis, sampling theory and joint probability distribution and stochastic processes arising in science and engineering.

Semester: III Subject: Object Oriented Concepts   Sub Code: 17CS42

CO	After studying this course, students will be able to:
17CS42.1	Explain the object-oriented concepts and JAVA.
17CS42.2	Develop computer programs to solve real world problems in Java.
17CS43.3	Develop simple GUI int erfaces for a computer program to interact with users, and to comprehend the event-based GUI handling principles using Applets and swings.

Semester: IV Subject: Design and Analysis of Algorithms Sub Code: 17CS43

CO	After studying this course, students will be able to:
17CS43.1	Describe computational solution to well known problems like searching, sorting etc.
17CS43.2	Estimate the computational complexity of different algorithms.
17CS43.3	Develop an algorithm using appropriate design strategies for problem solving.

Semester: IV Subject: Microprocessors and Microcontrollers   Sub Code: 17CS44

CO	After studying this course, students will be able to:
17CS44.1	Differentiate between microprocessors and microcontrollers
17CS44.2	Develop assembly language code to solve problems
17CS44.3	Explain interfacing of various devices to x86 family and ARM processor
17CS44.4	Demonstrate interrupt routines for interfacing devices.

Semester: IV Subject: Software Engineering   Sub Code: 17CS45

CO	After studying this course, students will be able to:
17CS45.1	Design a software system, component, or process to meet desired needs within realistic constraints. • Assess professional and ethical responsibility.
17CS45.2	Function on multi-disciplinary teams
17CS45.3	Make use of techniques, skills, and modern engineering tools necessary for engineering practice
17CS45.4	Comprehend software systems or parts of software systems.

Semester: IV Subject: Data Communication   Sub Code: 17CS46

CO	After studying this course, students will be able to:
17CS46.1	Illustrate basic computer network technology.
17CS46.2	Identify the different types of network topologies and protocols
17CS46.3	List and explain the layers of the OSI model and TCP/IP model.
17CS46.4	Comprehend the different types of network devices and their functions within a network.
17CS46.5	Demonstrate subnetting and routing mechanisms.

Semester: V Subject: Management and Entrepreneurship for It Industry Sub Code:15CS51

CO	After studying this course, students will be able to:
15CS51.1	Explain the principles of management, organization and entrepreneur.
15CS51.2	Discuss on planning, staffing, ERP and their importance
15CS51.3	Infer the importance of intellectual property rights and relate the institutional support

Semester: V   Subject: Computer Networks   Sub Code: 15CS52

CO	After studying this course, students will be able to:
15CS52.1	Demonstration of application layer protocols
15CS52.2	Discuss transport layer services and understand UDP and TCP protocols
15CS52.3	Explain routers, IP and Routing Algorithms in network layer
15CS52.4	Disseminate the Wireless and Mobile Networks covering IEEE 802.11 Standard
15CS53.5	Illustrate concepts of Multimedia Networking, Security and Network Management

Semester: V   Subject: Database Management System Sub Code: 15CS53

CO	After studying this course, students will be able to:
15CS53.1	Provide a strong foundation in database concepts, technology, and practice.
15CS53.2	Practice SQL programming through a variety of database problems.
15CS53.3	Demonstrate the use of concurrency and transactions in database
15CS53.4	Design and build database applications for real world problems.

Semester: V   Subject: Automata Theory and Computability   Sub Code: 15CS54

CO	After studying this course, students will be able to:
15CS54.1	Introduce core concepts in Automata and Theory of Computation
15CS54.2	Identify different Formal language Classes and their Relationships
15CS54.3	Design Grammars and Recognizers for different formal languages
15CS54.4	Prove or disprove theorems in automata theory using their properties
15CS54.5	Determine the decidability and intractability of Computational problems

Semester: V   Subject: Advanced Java and J2ee   Sub Code: 15CS553

CO	After studying this course, students will be able to:
15CS553.1	Identify the need for advanced Java concepts like Enumerations and Collections
15CS553.2	Construct client-server applications using Java socket API
15CS553.3	Make use of JDBC to access database through Java Programs
15CS554.4	Adapt servlets to build server side programs
15CS553.5	Demonstrate the use of JavaBeans to develop component-based Java software

Semester: V   Subject: Cloud Computing   Sub Code: 15CS565

CO	After studying this course, students will be able to:
15CS565.1	Explain the technology and principles involved in building a cloud environment.
15CS565.2	Contrast various programming models used in cloud computing
15CS565.3	Choose appropriate cloud model for a given application.

Semester: V   Subject: Computer Network Laboratory Sub Code: 15CSL57

CO	After studying this course, students will be able to:
15CSL57.1	Demonstrate operation of network and its management commands
15CSL57.2	Simulate and demonstrate the performance of GSM and CDMA
15CSL57.3	Implement data link layer and transport layer protocols

Semester: V   Subject: Dbms Laboratory with Mini Project sub Code: 15CSL58

CO	After studying this course, students will be able to:
15CSL58.1	Introduce core concepts in Automata and Theory of Computation
15CSL58.2	Identify different Formal language Classes and their Relationships
15CSL58.3	Design Grammars and Recognizers for different formal languages
15CSL58.4	Prove or disprove theorems in automata theory using their properties
15CSL58.5	Determine the decidability and intractability of Computational problems

Semester: VI   Subject: Cryptography, Network Security and Cyber Law sub Code:15CS61

CO	After studying this course, students will be able to:
15CS61.1	Explain the concepts of Cyber security
15CS61.2	Illustrate key management issues and solutions.
15CS61.3	Familiarize with Cryptography and very essential algorithms
15CS61.4	Introduce cyber Law and ethics to be followed.

Semester: VI   Subject: Computer Graphics and Visualization sub Code:15CS62

CO	After studying this course, students will be able to:
15CS62.1	Explain hardware, software and OpenGL Graphics Primitives.
15CS62.2	Illustrate interactive computer graphic using the OpenGL.
15CS62.3	Design and implementation of algorithms for 2D graphics Primitives and attributes
15CS62.4	Demonstrate Geometric transformations, viewing on both 2D and 3D objects.
15CS62.5	Infer the representation of curves, surfaces, Color and Illumination models

Semester: VI   Subject: System Software and Compiler Design   Sub Code:15CS63

CO	After studying this course, students will be able to:
15CS63.1	Define System Software such as Assemblers, Loaders, Linkers and Microprocessors.
15CS63.2	Familiarize with source file, object file and executable file structures and libraries.
15CS63.3	Describe the front-end and back-end phases of compiler and their importance to Students.

Semester: VI   Subject: OPERATING SYSTEMS   sub Code:15CS64

CO	After studying this course, students will be able to:
15CS64.1	Introduce concepts and terminology used in OS
15CS64.2	Explain threading and multithreaded systems
15CS64.3	Illustrate process synchronization and concept of Deadlock
15CS64.4	Introduce Memory and Virtual memory management, File system and storage Techniques.

Semester: VI   Subject: OPERATIONS RESEARCH   sub Code: 15CS653

CO	After studying this course, students will be able to:
15CS653.1	Formulate optimization problem as a linear programming problem.
15CS653.2	Solve optimization problems using simplex method.
15CS653.3	Formulate and solve transportation and assignment problems.
15CS653.4	Apply game theory for decision making problems.

Semester: VI   Subject: Python Application Programming sub Code:15CS664

CO	After studying this course, students will be able to:
15CS664.1	Learn Syntax and Semantics and create Functions in Python.
15CS664.2	Handle Strings and Files in Python.
15CS664.3	Understand Lists, Dictionaries and Regular expressions in Python.
15CS664.4	Implement Object Oriented Programming concepts in Python
15CS664.5	Build Web Services and introduction to Network and Database Programming in Python

Semester: VI   **Subject: System Software and Operating System Laboratory sub Code:**15CSL67

CO	After studying this course, students will be able to:
15CSL67.1	To make students familiar with Lexical Analysis and Syntax Analysis phases of Compiler Design and implement programs on these phases using LEX & YACC tools and/or C/C++/Java
15CSL67.2	To enable students to learn different types of CPU scheduling algorithms used in operating system.
15CSL67.3	To make students able to implement memory management - page replacement and deadlock handling algorithms.

Semester: VI   **Subject: Computer Graphics Laboratory With Mini Project sub Code:**15CSL68

CO	After studying this course, students will be able to:
15CSL68.1	Demonstrate simple algorithms using OpenGL Graphics Primitives and attributes.
15CSL68.2	Implementation of line drawing and clipping algorithms using OpenGL functions
15CSL68.3	Design and implementation of algorithms Geometric transformations on both 2D and 3D objects.

Semester: VII   **Subject: Web Technology and it's applications sub Code:**15CS71

CO	After studying this course, students will be able to:
15CS71.1	Illustrate the Semantic Structure of HTML and CSS
15CS71.2	Compose forms and tables using HTML and CSS
15CS71.3	Design Client-Side programs using JavaScript and Server-Side programs using PHP
15CS71.4	Infer Object Oriented Programming capabilities of PHP
15CS71.5	Examine JavaScript frameworks such as jQuery and Backbone

Semester: VII   **Subject: Advanced Computer Architectures sub Code:**15CS72

CO	After studying this course, students will be able to:
15CS72.1	Describe computer architecture.
15CS72.2	Measure the performance of architectures in terms of right parameters.
15CS72.3	Summarize parallel architecture and the software used for them.

Semester: VII   **Subject: MACHINE LEARNING   sub Code:**15CS73

CO	After studying this course, students will be able to:
15CS73.1	Define machine learning and problems relevant to machine learning.
15CS73.2	Differentiate supervised, unsupervised and reinforcement learning
15CS73.3	Apply neural networks, Bayes classifier and k nearest neighbor, for problems appear in machine learning.
15CS73.4	Perform statistical analysis of machine learning techniques.

Semester: VII   **Subject: Information and Network Security sub Code:**15CS73

CO	After studying this course, students will be able to:
15CS73.1	Analyze the cryptographic processes.
15CS73.2	Summarize the digital security process.
15CS73.3	Indicate the location of a security process in the given system.

Semester: VII   Subject: STORAGE AREA NETWORKS   sub Code: 15CS754

CO	After studying this course, students will be able to:
15CS754.1	Evaluate storage architectures.
15CS754.2	Define backup, recovery, disaster recovery, business continuity, and replication
15CS754.3	Examine emerging technologies including IP-SAN.
15CS754.4	Understand logical and physical components of a storage infrastructure
15CS754.5	Identify components of managing and monitoring the data center
15CS754.6	Define information security and identify different storage virtualization technologies

Semester: VII   Subject: MACHINE LEARNING LABORATORY sub Code: 15CSL76

CO	After studying this course, students will be able to:
15CSL76.1	Make use of Data sets in implementing the machine learning algorithms
15CSL76.2	Implement the machine learning concepts and algorithms in any suitable language of choice.

Semester: VII   Subject: Web Technology Laboratory with Mini Project sub Code: 15CSL77

CO	After studying this course, students will be able to:
15CSL77.1	Design and develop static and dynamic web pages.
15CSL77.2	Familiarize with Client-Side Programming, Server-Side Programming, Active server Pages.
15CSL77.3	Learn Database Connectivity to web applications.

Semester: VIII   Subject: INTERNET OF THINGS TECHNOLOGY sub Code: 15CS81

CO	After studying this course, students will be able to:
15CS81.1	Assess the genesis and impact of IoT applications, architectures in real world.
15CS81.2	Illustrate diverse methods of deploying smart objects and connect them to network.
15CS81.3	Compare different Application protocols for IoT.
15CS81.4	Infer the role of Data Analytics and Security in IoT
15CS81.5	Identify sensor technologies for sensing real world entities and understand the role of IoT in various domains of Industry.

Semester: VIII   Subject: BIG DATA ANALYTICS   sub Code: 15CS82

CO	After studying this course, students will be able to:
15CS82.1	Understand Hadoop Distributed File system and examine Map Reduce Programming
15CS82.2	Explore Hadoop tools and manage Hadoop with Ambari
15CS82.3	Appraise the role of Business intelligence and its applications across industries
15CS82.4	Assess core data mining techniques for data analytics
15CS82.5	Identify various Text Mining techniques

Semester: VIII   Subject: SYSTEM MODELLING AND SIMULATION sub Code: 15CS834

CO	After studying this course, students will be able to:
15CS82.1	Explain the basic system concept and definitions of system;
15CS82.2	Discuss techniques to model and to simulate various systems;
15CS82.3	Analyze a system and to make use of the information to improve the performance

Course Outcomes (Year 2018-19)

Semester: III   Subject: Engineering Mathematics-III   Sub Code: 17MAT31

CO	After studying this course, students will be able to:
15MAT31.1	Know the use of periodic signals and Fourier series to analyze circuits and system
15MAT31.2	Explain the general linear system theory for continuous-time signals and digital signal processing using the Fourier Transform and z-transform
15MAT31.3	Employ appropriate numerical methods to solve algebraic and transcendental equations.
15MAT31.4	Apply Green's Theorem, Divergence Theorem and Stokes' theorem in various applications in the field of electro-magnetic and gravitational fields and fluid flow problems
15MAT31.5	Determine the external of functional and solve the simple problems of the calculus of Variations.

Semester: III   Subject: Electronic Instrumentation   Sub Code: 17EC32

CO	After studying this course, students will be able to:
15EC32.1	Describe instrument measurement errors and calculate them.
15EC32.2	Describe the operation of Ammeters, Voltmeters, Multimeters and develop circuits for multirange Ammeters and Voltmeters
15EC32.3	Describe functional concepts and operation of Digital voltmeters and instruments to measure voltage, frequency, time period, phase difference of signals, rotation speed, capacitance and pH of solutions.
15EC32.4	Describe functional concepts and operation of various Analog measuring instruments to measure field Strength, impedance, stroboscopic speed, in/out of phase, Q of coils, insulation resistance.
15EC32.5	Describe and discuss functioning and types of Oscilloscopes, Signal generators and Transducers.
15EC32.6	Utilize AC and DC bridges for passive component and frequency measurements.

Semester: III   Subject: Analog Electronics   Sub Code: 17EC33

CO	After studying this course, students will be able to:
15EC33.1	Describe the working principle and characteristics of BJT, FET, Single stage,cascaded and feedback amplifiers.
15EC33.2	Describe the Phase shift, Wien bridge, tuned and crystal oscillators using BJT/FET/UJT.
15EC33.3	Calculate the AC gain and impedance for BJT using re and h parameters models for CE and CC configuration.
15EC33.4	Determine the performance characteristics and parameters of BJT and FET amplifier using small signal model.
15EC33.5	Determine the parameters which affect the low frequency and high frequency responses of BJT and FET amplifiers and draw the characteristics.
15EC33.6	Evaluate the efficiency of Class A and Class B power amplifiers and voltage regulators.

Semester: III   **Subject: Digital Electronics**   **Sub Code: 17EC34**

CO	After studying this course, students will be able to:
15EC34.1	Develop simplified switching equation using Karnaugh Maps and Quine- McClusky techniques.
15EC34.2	Explain the operation of decoders, encoders, multiplexers, demultiplexers, adders, subtractors and comparators.
15EC34.3	Explain the working of Latches and Flip Flops (SR,D,T and JK).
15EC34.4	Design Synchronous/Asynchronous Counters and Shift registers using Flip Flops.
15EC34.5	Develop Mealy/Moore Models and state diagrams for the given clocked sequential circuits.
15EC34.6	Apply the knowledge gained in the design of Counters and Registers.

Semester: III   **Subject: Network Analysis   Sub Code: 17EC35**

CO	After studying this course, students will be able to:
15EC35.1	Determine currents and voltages using source transformation/ source shifting/ mesh/ nodal analysis and reduce given network using star-delta transformation/ source transformation/ source shifting.
15EC35.2	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.
15EC35.3	Calculate current and voltages for the given circuit under transient conditions.
15EC35.4	Apply Laplace transform to solve the given network.
15EC35.5	Evaluate for RLC elements/ frequency response related parameters like resonant frequency, quality factor, half power frequencies, voltage across inductor and capacitor, current through the RLC elements, in resonant circuits
15EC35.6	Solve the given network using specified two port network parameter like Z or Y or T or h.

Semester: III   Subject: Engineering Electromagnetics   Sub Code: 17EC36

CO	After studying this course, students will be able to:
15EC36.1	Evaluate problems on electric field due to point, linear, volume charges by applying conventional methods or by Gauss law.
15EC36.2	Determine potential and energy with respect to point charge and capacitance using Laplace equation.
15EC36.3	Calculate magnetic field, force, and potential energy with respect to magnetic materials.
15EC36.4	Apply Maxwell's equation for time varying fields, EM waves in free space and conductors.
15EC36.5	Evaluate power associated with EM waves using Poynting theorem.

Semester: IV   Subject: Engineering Mathematics-IV   Sub Code: 17MAT41

CO	After studying this course, students will be able to:
17MAT41.1	Solve first and second order ordinary differential equations arising in flow problems using single step and multistep numerical methods.
17MAT41.2	Understand the analyticity, potential fields, residues and poles of complex potentials in field theory and electromagnetic theory.
17MAT41.3	Describe conformal and bilinear transformation arising in aerofoil theory, fluid flow visualization and image processing
17MAT41.4	Solve problems of quantum mechanics, hydrodynamics and heat conduction by employing Bessel's function relating to cylindrical polar coordinate systems and Legendre's polynomials relating to spherical polar coordinate systems.
17MAT41.5	Solve problems on probability distributions relating to digital signal processing, information theory and optimization concepts of stability of design and structural engineering
17MAT41.6	Draw the validity of the hypothesis proposed for the given sampling distribution in accepting or rejecting the hypothesis.
17MAT41.7	Determine joint probability distributions and stochastic matrix connected with the multivariable correlation problems for feasible random events.
17MAT41.8	Define transition probability matrix of a Markov chain and solve problems related to discrete parameter random process.

Semester: IV   Subject: Signals And Systems   Sub Code: 17EC42

CO	After studying this course, students will be able to:
17EC42.1	Classify the signals as continuous/discrete, periodic/aperiodic, even/odd,energy/power and deterministic/random signals.
17EC42.2	Determine the linearity, causality, time-invariance and stability properties of continuous and discrete time systems.
17EC42.3	Compute the response of a Continuous and Discrete LTI system using convolution integral and convolution sum.
17EC42.4	Determine the spectral characteristics of continuous and discrete time signal using Fourier analysis.
17EC42.5	Compute Z-transforms, inverse Z- transforms and transfer functions of complex LTI systems.

Semester: IV   Subject: Control Systems   Sub Code: 17EC43

CO	After studying this course, students will be able to:
17EC43.1	Develop the mathematical model of mechanical and electrical systems
17EC43.2	Develop transfer function for a given control system using block diagram reduction techniques and signal flow graph method
17EC43.3	Determine the time domain specifications for first and second order systems
17EC43.4	Determine the stability of a system in the time domain using Routh-Hurwitz criterion and Root-locus technique
17EC43.5	Determine the stability of a system in the frequency domain using Nyquist and bode plots
17EC43.5	Determine the stability of a system in the frequency domain using Nyquist and bode plots

Semester: IV   Subject: Principles Of Communication Systems   Sub Code: 17EC44

CO	After studying this course, students will be able to:
17EC44.1	Determine the performance of analog modulation schemes in time and frequency domains. Understand the characteristics of pulse amplitude modulation, pulse position modulation and pulse code modulation systems.
17EC44.2	Determine the performance of systems for generation and detection of modulated analog signals.
17EC44.3	Characterize analog signals in time domain as random processes and in frequency domain using Fourier transforms.
17EC44.4	Characterize the influence of channel on analog modulated signals Determine the performance of analog communication systems.
17EC44.5	Understand the characteristics of pulse amplitude modulation, pulse position modulation and pulse code modulation systems.

Semester: IV   Subject: Linear Integrated Circuits   Sub Code: 17EC45

CO	After studying this course, students will be able to:
17EC45.1	Explain Op-Amp circuit and parameters including CMRR, PSRR, Input & Output Impedances and Slew Rate.
17EC45.2	Design Op-Amp based Inverting, Non-inverting, Summing & Difference Amplifier, and AC Amplifiers including Voltage Follower.
17EC45.3	Test circuits of Op-Amp based Voltage/ Current Sources & Sinks, Current,Instrumentation and Precision Amplifiers.
17EC45.4	Test circuits of Op-Amp based linear and non-linear circuits comprising of imiting, clamping, Sample & Hold, Differentiator/ Integrator Circuits, Peak Detectors, Oscillators and Multiplier & Divider.
17EC45.5	Design first & second order Low Pass, High Pass, Band Pass, Band Stop Filters and Voltage Regulators using Op-Amps.
17EC45.6	Explain applications of linear ICs in phase detector, VCO, DAC, ADC and Timer.

Semester: IV   Subject: Microprocessors   Sub Code: 17EC46

CO	After studying this course, students will be able to:
17EC46.1	Explain the History of evaluation of Microprocessors, Architecture and instruction set of 8086, CISC & RISC, Von-Neumann & Harvard CPU Architecture, Configuration & Timing diagrams of 8086 and Instruction set of 8086.
17EC46.2	Write 8086 Assembly level programs using the 8086 instruction set
17EC46.3	Write modular programs using procedures.
17EC46.4	Write 8086 Stack and Interrupts programming.
17EC46.5	Interface 8086 to Static memory chips and 8255, 8254, 0808 ADC, 0800 DAC, Keyboard, Display and Stepper motors.
17EC46.6	Use INT 21 DOS interrupt function calls to handle Keyboard and Display.

Semester: V   Subject: Management And Entrepreneurship Development Sub Code: 15ES51

CO	After studying this course, students will be able to:
15ES51.1	Understand the fundamental concepts of Management and Entrepreneurship
15ES51.2	Select a best Entrepreneurship model for the required domain of establishment
15ES51.3	Describe the functions of Managers, Entrepreneurs and their social responsibilities
15ES51.4	Compare various types of Entrepreneurs
15ES51.5	Analyze the Institutional support by various state and central government agencies

Semester: V   Subject: Digital Signal Processing   Sub Code: 15EC52

CO	After studying this course, students will be able to:
15ES52.1	Determine response of LTI systems using time domain and DFT techniques.
15ES52.2	Compute DFT of real and complex discrete time signals.
15ES52.3	Computation of DFT using FFT algorithms and linear filtering approach.
15ES52.4	Solve problems on digital filter design and realize using digital computations.

Semester: V   Subject: Verilog HDL   Sub Code: 15EC53

CO	After studying this course, students will be able to:
15EC53.1	Write Verilog programs in gate, dataflow (RTL), behavioral and switch modeling levels of Abstraction.
15EC53.2	Write simple programs in VHDL in different styles.
15EC53.3	Design and verify the functionality of digital circuit/system using test benches.
15EC53.4	Identify the suitable Abstraction level for a particular digital design.
15EC53.5	Write the programs more effectively using Verilog tasks and directives.
15EC53.6	Perform timing and delay Simulation.

Semester: V   Subject: Information Theory And Coding   Sub Code: 15EC54

CO	After studying this course, students will be able to:
15EC54.1	Explain concept of Dependent & Independent Source, measure of information, Entropy, Rate of Information and Order of a source
15EC54.2	Represent the information using Shannon Encoding, Shannon Fano, Prefix and Huffman Encoding Algorithms
15EC54.3	Model the continuous and discrete communication channels using input, output and joint probabilities
15EC54.4	Determine a codeword comprising of the check bits computed using Linear Block codes, cyclic codes & convolutional codes
15EC54.5	Design the encoding and decoding circuits for Linear Block codes, cyclic codes, convolutional codes, BCH and Golay codes.

Semester: V   Subject: Operating System   Sub Code: 15EC553

CO	After studying this course, students will be able to:
15EC553.1	Explain the goals, structure, operation and types of operating systems.
15EC553.2	Apply scheduling techniques to find performance factors.
15EC553.3	Explain organization of file systems and IOCS.
15EC553.4	Apply suitable techniques for contiguous and non-contiguous memory allocation.
15EC553.5	Describe message passing, deadlock detection and prevention methods.

Semester: V   Subject: 8051 Microcontroller   Sub Code: 15EC563

CO	After studying this course, students will be able to:
15EC563.1	Explain the difference between Microprocessors & Microcontrollers, Architecture of 8051 Microcontroller, Interfacing of 8051 to external memory and Instruction set of 8051.
15EC563.2	Write 8051 Assembly level programs using 8051 instruction set.
15EC563.3	Explain the Interrupt system, operation of Timers/Counters and Serial port of 8051.
15EC563.4	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.
15EC563.5	Write 8051 C programs to generate square wave on 8051 I/O port pin using interrupt and to send & receive serial data using 8051 serial port.
15EC563.6	Interface simple switches, simple LEDs, ADC 0804, LCD and Stepper Motor to 8051 using 8051 I/O ports.

Semester: VI   Subject: Digital Communication   Sub Code: 15EC61

CO	After studying this course, students will be able to:
15EC61.1	Associate and apply the concepts of Bandpass sampling to well specified signals and channels.
15EC61.2	Analyze and compute performance parameters and transfer rates for low pass and bandpass symbol under ideal and corrupted non band limited channels.
15EC61.3	Test and validate symbol processing and performance parameters at the receiver under ideal and corrupted bandlimited channels.
15EC61.4	Demonstrate by simulation and emulation that bandpass signals subjected to corrupted and distorted symbols in a bandlimited channel, can be demodulated and estimated at receiver to meet specified performance criteria

Semester: VI   Subject: Arm Microcontroller & Embedded Systems Sub Code: 15EC62

CO	After studying this course, students will be able to:
15EC62.1	Describe the architectural features and instructions of 32 bit microcontroller ARM Cortex M3.
15EC62.2	Apply the knowledge gained for Programming ARM Cortex M3 for different applications
15EC62.3	Understand the basic hardware components and their selection method based on the characteristics and attributes of an embedded system
15EC62.4	Develop the hardware /software co-design and firmware design approaches.
15EC62.5	Explain the need of real time operating system for embedded system applications.

Semester: VI   Subject: VLSI Design   Sub Code: 15EC63

CO	After studying this course, students will be able to:
15EC63.1	Demonstrate understanding of MOS transistor theory, CMOS fabrication flow and technology scaling.
15EC63.2	Draw the basic gates using the stick and layout diagrams with the knowledge of physical design aspects.
15EC63.3	Interpret Memory elements along with timing considerations
15EC63.4	Demonstrate knowledge of FPGA based system design
15EC63.5	Interpret testing and testability issues in VLSI Design
15EC63.6	Analyze CMOS subsystems and architectural issues with the design constraints.

Semester: VI   Subject: Computer Communication Networks Sub Code: 15EC64

CO	After studying this course, students will be able to:
15EC64.1	Identify the protocols and services of Data link layer.
15EC64.2	Identify the protocols and functions associated with the transport layer services.
15EC64.3	Describe the layering architecture of computer networks and distinguish between the OSI reference model and TCP/IP protocol suite.
15EC64.4	Distinguish the basic network configurations and standards associated with each network.
15EC64.5	Construct a network model and determine the routing of packets using different routing algorithms.

Semester: VI   Subject: Cellular Mobile Communications   Sub Code: 15EC651

CO	After studying this course, students will be able to:
15EC651.1	Apply the understanding of statistical characterization of urban mobile channels to compute the performance for simple modulation schemes
15EC651.2	Demonstrate the limitations of GSM, GPRS and CDMA to meet high data rate requirements and limited improvements that are needed.
15EC651.3	Analyze the call process procedure between a calling number and called number for all scenarios in GSM or CDMA based systems.
15EC651.4	Test and validate voice and data call handling for various scenarios in GSM and CDMA systems for national and international interworking situations.

Semester: VI   Subject: Python Application Programming   Sub Code: 15CS664

CO	After studying this course, students will be able to:
15CS664.1	Examine Python syntax and semantics and be fluent in the use of Python flow control and functions.
15CS664.2	Demonstrate proficiency in handling Strings and File Systems.
15CS664.3	Create, run and manipulate Python Programs using core data structures like Lists, Dictionaries and use Regular Expressions..
15CS664.4	Interpret the concepts of Object-Oriented Programming as used in Python.
15CS664.5	Implement exemplary applications related to Network Programming, Web Services and Databases in Python

Semester: VII   Subject: Microwaves And Antennas   Sub Code: 15EC71

CO	After studying this course, students will be able to:
15EC71.1	Describe the use and advantages of microwave transmission
15EC71.2	Analyze various parameters related to microwave transmission lines and waveguides
15EC71.3	Identify microwave devices for several applications
15EC71.4	Analyze various antenna parameters necessary for building an RF system
15EC71.5	Recommend various antenna configurations according to the applications

Semester: VII   Subject: Digital Image Processing Sub Code: 15EC72

CO	After studying this course, students will be able to:
15EC72.1	Understand image formation and the role human visual system plays in perception of gray and color image data.
15EC72.2	Apply image processing techniques in both the spatial and frequency (Fourier) domains.
15EC72.3	Design image analysis techniques in the form of image segmentation and to evaluate the Methodologies for segmentation.
15EC72.4	Conduct independent study and analysis of Image Enhancement techniques.

Semester: VII   Subject: Power Electronics   Sub Code: 15EC73

CO	After studying this course, students will be able to:
15EC73.1	Describe the characteristics of different power devices and identify the various applications associated with it
15EC73.2	Illustrate the working of power circuit as DC-DC converter.
15EC73.3	Illustrate the operation of inverter circuit and static switches.
15EC73.4	Determine the output response of a thyristor circuit with various triggering options.
15EC73.5	Determine the output response of a thyristor circuit with various triggering options.

Semester: VII   Subject: Real Time Systems   Sub Code: 15EC743

CO	After studying this course, students will be able to:
15EC743.1	Understand the fundamentals of Real time systems and its classifications.
15EC743.2	Understand the concepts of computer control, operating system and the suitable computer hardware requirements for real-time applications.
15EC743.3	Develop the software languages to meet Real time applications.
15EC743.4	Apply suitable methodologies to design and develop Real-Time Systems.

Semester: VII   Subject: Satellite Communication   Sub Code: 15EC755

CO	After studying this course, students will be able to:
15EC755.1	Describe the satellite orbits and its trajectories with the definitions of parametersassociated with it.
15EC755.2	Describe the electronic hardware systems associated with the satellite subsystem and earth station.
15EC755.3	Describe the various applications of satellite with the focus on national satellite system.
15EC755.4	Compute the satellite link parameters under various propagation conditions with the illustration of multiple access techniques.

Semester: VIII   Subject: Wireless Cellular and LTE 4G Broadband   Sub Code: 15EC81

CO	After studying this course, students will be able to:
15EC81.1	Understand the system architecture and the functional standard specified in LTE 4G
15EC81.2	Analyze the role of LTE radio interface protocols and EPS Data convergence protocols to set up, reconfigure and release data and voice from users.
15EC81.3	Demonstrate the UTRAN and EPS handling processes from set up to release including mobility management for a variety of data call scenarios.
15EC81.4	Test and Evaluate the Performance of resource management and packet data processing and transport algorithms.

Semester: VIII   Subject: Fiber Optics And Networks   Sub Code: 15EC82

CO	After studying this course, students will be able to:
15EC82.1	Classification and working of optical fiber with different modes of signal propagation.
15EC82.2	Describe the transmission characteristics and losses in optical fiber communication.
15EC82.3	Describe the construction and working principle of optical connectors, multiplexers and amplifiers.
15EC82.4	Describe the constructional features and the characteristics of optical sources and detectors.
15EC82.5	Illustrate the networking aspects of optical fiber and describe various standards associated with it.

Semester: VIII   Subject: Radar Engineering   Sub Code: 15EC833

CO	After studying this course, students will be able to:
15EC833.1	Understand the radar fundamentals and radar signals.
15EC833.2	Explain the working principle of pulse Doppler radars, their applications and limitations
15EC833.3	Describe the working of various radar transmitters and receivers.
15EC833.4	Analyze the range parameters of pulse radar system which affect the system performance

			AITM
			EEE
			Course Outcomes
			2018-19

Suresh Angadi Education Foundation's
ANGADI INSTITUTE OF TECHNOLOGY AND MANAGEMENT
Savagaon Road, Belagavi – 590 009.
Approved by AICTE, New Delhi
Affiliated to Visvesvaraya Technological University, Belagavi

Course Outcomes (Year 2018-19)

Semester: III   Subject: Engineering Mathematics-III   Sub Code: 17MAT31

CO	After studying this course, students will be able to:
17MAT31.1	Know the use of periodic signals and Fourier series to analyze circuits and system communications.
17MAT31.2	Explain the general linear system theory for continuous-time signals and digital signal processing using the Fourier Transform and z-transform.
17MAT31.3	Employ appropriate numerical methods to solve algebraic and transcendental equations.
17MAT31.4	Apply Green's Theorem, Divergence Theorem and Stokes' theorem in various applications in the field of electro-magnetic and gravitational fields and fluid flow problems
17MAT31.5	Determine the extremals of functional and solve the simple problems of the calculus of variations

Semester: III   Subject: Electrical Circuit Analysis   Sub Code: 17EE32

CO	After studying this course, students will be able to:
17EE32.1	Understand the basic concepts, basic laws and methods of analysis of DC and AC networks.
17EE32.2	Reduce the complexity of network using source shifting, source transformation and network reduction using transformations.
17EE32.3	Solve complex electric circuits using network theorems.
17EE32.4	Discuss resonance in series and parallel circuits.
17EE32.5	Discus the importance of initial conditions and their evaluation.
17EE32.6	Synthesize typical waveforms using Laplace transformation.
17EE32.7	Solve unbalanced three phase systems.
17EE32.8	Evaluate the performance of two port networks

Semester: III   Subject: Transformers And Generators   Sub Code: 17EE33

CO	After studying this course, students will be able to:
17EE33.1	Explain the construction and operation and performance of single phase and three phasetransformers.
17EE33.2	Explain the use of auto transformer, tap changing and tertiary winding transformer and need of operating transformers in parallel.
17EE33.3	Explain the armature reaction and commutation and their effects in a DC generators.
17EE33.4	Explain the construction, operation and performance of Synchronous machines

Semester: III   Subject: Analog Electronic Circuits   Sub Code: 17EE34

CO	After studying this course, students will be able to:
17EE34.1	Predict the output response of clipper and clamper circuits.
17EE34.2	Design and compare biasing circuits for transistor amplifiers
17EE34.3	Explain the transistor switching.
17EE34.4	Explain the concept of feedback, its types and design of feedback circuits
17EE34.5	Design and analyze the power amplifier circuits and oscillators for different frequencies.
17EE34.6	Perform design and analysis of FET and MOSFET amplifiers in the common source mode with fixed bias.

Semester: III   **Subject: Digital system design**   **Sub Code: 17EE35**

CO	After studying this course, students will be able to:
17EE35.1	Simplify switching equations generated from truth tables.
17EE35.2	Design combinational logic circuits; adders, Subtractors and comparators.
17EE35.3	Design synchronous sequential circuits; latches, flip-flops, binary counters and Mod – 6 counters.
17EE35.4	Design Mealy and Moore synchronous sequential circuit models.
17EE35.5	Construct state diagrams for sequential circuits.
17EE35.6	Describe the structure of HDL module, operators, data types.
17EE35.7	Give Comparison between VHDL and Verilog.
17EE35.8	Understand the concept of data-flow description

Semester: III   **Subject: Electrical and Electronic Measurements**   **Sub Code: 17EE36**

CO	After studying this course, students will be able to:
17EE36.1	Measure resistance, inductance and capacitance using bridges and determine earth resistance.
17EE36.2	Explain the working of various meters used for measurement of Power & Energy.
17EE36.3	Understand the adjustments, calibration & errors in energy meters & also methods of extending the range of instruments & instrument transformers.
17EE36.4	Explain the working of different electronic instruments, display devices and recording mechanisms.

Semester: IV   **Subject: Engineering Mathematics-IV**   **Sub Code: 17MAT41**

CO	After studying this course, students will be able to:
17MAT41.1	Use appropriate single step and multi-step numerical methods to solve first and second order ordinary differential equations arising in flow data design problems.
17MAT41.2	Explain the idea of analyticity, potential fields residues and poles of complex potentials in field theory and electromagnetic theory.
17MAT41.3	Employ Bessel's functions and Legendre's polynomials for tackling problems arising in continuum mechanics, hydrodynamics and heat conduction
17MAT41.4	Describe random variables and probability distributions using rigorous statistical methods to analyze problems associated with optimization of digital circuits, information, coding theory and stability analysis of systems.
17MAT41.5	Apply the knowledge of joint probability distributions and Markov chains in attempting engineering problems for feasible random events.

Semester: IV   **Subject: Power Generation and Economics**   **Sub Code: 17EE42**

CO	After studying this course, students will be able to:
17EE42.1	Describe the working of hydroelectric, steam, nuclear power plants and state functions of major equipment of the power plants.
17EE42.2	Classify various substations and explain the importance of grounding.
17EE42.3	Understand the economic aspects of power system operation and its effects.
17EE42.4	Explain the importance of power factor improvement.

Semester: IV   Subject: Transmission and Distribution   Sub Code: 17EE43

CO	After studying this course, students will be able to:
17EE43.1	Explain the concepts of various methods of generation of power.
17EE43.2	Explain the importance of HVAC, EHVAC, UHVAC and HVDC transmission.
17EE43.3	Design and analyse overhead transmission system for a given voltage level.
17EE43.4	Calculate the parameters of the transmission line for different configurations and assess the performance of line.
17EE43.5	Explain the use of underground cables and evaluate different types of distribution systems.

Semester: IV   Subject: Electric motors   Sub Code: 17EE44

CO	After studying this course, students will be able to:
17EE44.1	Explain the constructional features of Motors and select a suitable drive for specific application.
17EE44.2	Analyse and assess the performance characteristics of DC motors by conducting suitable tests and control the speed by suitable method.
17EE44.3	Explain the constructional features of Three Phase and Single phase induction Motors and assess their performance.
17EE44.4	Control the speed of induction motor by a suitable method.
17EE44.5	Explain the operation of Synchronous motor and special motors.

Semester: IV   Subject: Electromagnetic field theory   Sub Code: 17EE45

CO	After studying this course, students will be able to:
17EE45.1	Use different coordinate systems to explain the concept of gradient, divergence and curl of a vector.
17EE45.2	Use Coulomb's Law and Gauss Law for the evaluation of electric fields produced by different charge configurations.
17EE45.3	Calculate the energy and potential due to a system of charges.
17EE45.4	Explain the behavior of electric field across a boundary between a conductor and dielectric and between two different dielectrics.
17EE45.5	Explain the behavior of magnetic fields and magnetic materials.
17EE45.6	Assess time varying fields and propagation of waves in different media

Semester: IV   Subject: Operational Amplifiers and Linear Ic's   Sub Code: 17EE46

CO	After studying this course, students will be able to:
17EE46.1	Describe the characteristics of ideal and practical operational amplifier.
17EE46.2	Design filters and signal generators using linear ICs.
17EE46.3	Demonstrate the application of Linear ICs as comparators and rectifiers.
17EE46.4	Use ICs in the electronic projects

Semester: V   Subject: Management and Entrepreneurship   Sub Code: 15EE51

CO	After studying this course, students will be able to:
15EE51.1	Explain the field of management, task of the manager, planning and the need of proper staff, recruitment and selection process
15EE51.2	Discuss work allocation, the structure of organization, the modes of communication and importance of managerial control in business.
15EE51.3	To explain need of coordination between the manager and staff in exercising the authority and delegating duties.
15EE51.4	To explain the social responsibility of business and leadership
15EE51.5	Explain the concepts of entrepreneurship and the role and importance of the entrepreneur in economic development
15EE51.6	Show an understanding of the role and importance of Micro, Small and medium Enterprises, business plan and its presentation.
15EE51.7	Discuss the concepts of project management, capitol building process, project feasibility study, project appraisal and project financing.
15EE51.8	Discuss the state /central level institutions / agencies supporting business enterprises

Semester: V   Subject: Microcontroller   Sub Code: 15EE52

CO	After studying this course, students will be able to:
15EE52.1	Discuss the history of the 8051 and features of other 8051 family members and the internal architecture of the 8051.
15EE52.2	Explains the use of an 8051 assembler, the stack and the flag register, loop, jump, and call instructions.
15EE52.3	Discuss 8051 addressing modes, accessing data and I/O port programming, arithmetic, logic instructions, and programs.
15EE52.4	Develop 8051C programs for time delay, I/O operations, I/O bit manipulation, logic and arithmetic operations, data conversion and data serialization
15EE52.5	Discuss the hardware connection of the 8051 chip, its timers, serial data communication and its interfacing of 8051to the RS232.
15EE52.6	Discuss in detail 8051 interrupts and writing interrupt handler programs.
15EE52.7	Interface 8051 with real-world devices such as LCDs and keyboards, ADC, DAC chips and sensors.
15EE52.8	Interface 8031/51 with external memories, 8255 chip to add ports and relays, opt isolators and motors.■

Semester: V   Subject: Power Electronics   Sub Code: 15EE53

CO	After studying this course, students will be able to:
15EE53.1	Explain application area of power electronics, types of power electronic circuits and switches their characteristics and specifications.
15EE53.2	Explain types of power diodes, their characteristics, and the effects of power diodes on, RL, RC and RLC circuits.
15EE53.3	Explain the techniques for design, operation and analysis of single phase and three phase diode rectifier circuits.
15EE53.4	Explain steady state, switching characteristics and gate control requirements of different power transistors and their limitations.
15EE53.5	Discuss different types of Thyristors, their operation, gate characteristics and gate control requirements.
15EE53.6	Explain designing, analysis techniques and characteristics of thyristor controlled rectifiers.
15EE53.7	Discuss the principle of operation of single phase and three phase DC –AC converters and AC voltage controllers
15EE53.8	Explain different protection technique of power electronic devices and circuits

Semester: V   **Subject: Signals and Systems**   **Sub Code: 15EE54**

CO	After studying this course, students will be able to:
15EE54.1	Classify the signals and systems
15EE54.2	Explain basic operations on signals and properties of systems
15EE54.3	Use convolution in both continuous and discrete domain for the analysis of systems given the impulse response of a system
15EE54.4	Evaluate response of a given linear time invariant system.
15EE54.5	Provide block diagram representation of a linear time invariant system.
15EE54.6	Apply continuous time Fourier transform representation to study signals and linear time invariant systems.
15EE54.7	Apply discrete time Fourier transform representation to study signals and linear time invariant systems. Use Z-transform and properties of Z transform for the analysis of discrete time systems

Semester: V   **Subject: Electrical engineering materials**   **Sub Code: 15EE552**

CO	After studying this course, students will be able to:
15EE552.1	Discuss electrical and electronics materials, their importance, classification and operational requirement
15EE552.2	Discuss conducting materials used in engineering, their properties and classification.
15EE552.3	Discuss dielectric materials used in engineering, their properties and classification.
15EE552.4	Discuss insulating materials used in engineering, their properties and classification.
15EE552.5	Discuss magnetic materials used in engineering, their properties and classification
15EE552.6	Explain the phenomenon superconductivity, super conducting materials and their application in engineering.
15EE552.7	Explain the plastic and its properties and applications.
15EE552.8	Discuss materials used for Opto electronic devices

Semester: V   **Subject: Renewable energy resources**   **Sub Code: 15EE56**

CO	After studying this course, students will be able to:56
15EE563.1	Discuss causes of energy scarcity and its solution, energy resources and availability of renewable energy.
15EE563.2	Discuss energy from sun, energy reaching the Earth's surface and solar thermal energy applications.
15EE563.3	Discuss types of solar collectors, their configurations, solar cell system, its characteristics and their applications.
15EE563.4	Discus generation of energy from hydrogen, wind, geothermal system, solid waste and agriculture refuse.
15EE563.5	Discuss production of energy from biomass, biogas.
15EE563.6	Discuss tidal energy resources, energy availability and power generation.
15EE563.7	Discuss power generation sea wave energy and ocean thermal energy.

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Semester: VI   **Subject: Control systems**   **Sub Code: 15EE61**

CO	After studying this course, students will be able to:
15EE61.1	Discuss the effects of feedback and types of feedback control systems
15EE61.2	Evaluate the transfer function of a linear time invariant system
15EE61.3	Evaluate the stability of linear time invariant systems.
15EE61.4	Apply block diagram manipulation and signal flow graph methods to obtain transfer function of systems
15EE61.5	Demonstrate the knowledge of mathematical modeling of control systems and components
15EE61.6	Determine transient and steady state time response of a simple control system.
15EE61.7	Investigate the performance of a given system in time and frequency domains.
15EE61.8	Determine the controller or compensator configuration and parameter values relative to how it is connected to the controlled process given the design specifications

Semester: VI   **Subject: Power system analysis – 1**   **Sub Code: 15EE62**

CO	After studying this course, students will be able to:
15EE62.1	Show understanding of per unit system, its advantages and computation.
15EE62.2	Show the concept of one line diagram and its implementation in problems
15EE62.3	Perform short circuit analysis on a synchronous machine and simple power system to select a circuit breaker for the system
15EE62.4	Evaluate symmetrical components of voltages and currents in un-balanced three phase circuits.
15EE62.5	Explain the concept of sequence impedance and sequence networks of power system components and power system.
15EE62.6	Analyze three phase synchronous machine and simple power systems for different unsymmetrical faults using symmetrical components.
15EE62.7	Discuss the dynamics of synchronous machine, stability and types of stability.
15EE62.8	Discuss equal area criterion for the evaluation of stability of a simple system under different fault conditions

Semester: VI   **Subject: Digital signal processing**   **Sub Code: 15EE63**

CO	After studying this course, students will be able to:
15EE63.1	Compute the DFT of various signals using its properties and linear filtering of two sequences.
15EE63.2	Apply fast and efficient algorithms for computing DFT and inverse DFT of a given sequence
15EE63.3	Design infinite impulse response Butterworth digital filters using impulse invariant / bilinear transformation technique
15EE63.4	Design infinite impulse response Chebyshev digital filters using impulse invariant or bilinear transformation technique
15EE63.5	Realize a digital IIR filter by direct, cascade, parallel and ladder methods of realization.
15EE63.6	Discuss different window functions and frequency sampling method used for design of FIR filters.
15EE63.7	Design FIR filters by use of window function or by frequency sampling method.
15EE63.8	Realize a digital FIR filter by direct, cascade, and linear phase form

Semester: VI   Subject: Electrical machine design   Sub Code: 15EE64

CO	After studying this course, students will be able to:
15EE64.1	Discuss design factors, limitations, modern trends in design, manufacturing of electrical machines and properties of materials used in the electrical machines.
15EE64.2	Derive the output equations of transformer, DC machines and AC machines.
15EE64.3	Discuss selection of specific loadings and magnetic circuits of different electrical machines
15EE64.4	Design the field windings of DC machine and Synchronous machine.
15EE64.5	Design stator and rotor circuits of a DC and AC machines.
15EE64.6	Estimate the number of cooling tubes, no load current and leakage reactance of core type transformer.
15EE64.7	Discuss short circuit ratio and its effects on performance of synchronous machines.
15EE64.8	Design salient pole and non-salient pole alternators for given specifications

Semester: VI   Subject: Energy audit and demand side management   Sub Code: 15EE653

CO	After studying this course, students will be able to:
15EE653.1	Understand the need of energy audit and energy audit methodology.
15EE653.2	Explain audit parameters and working principles of measuring instruments used to measure the parameters.
15EE653.3	Conduct energy audit of boilers, furnaces, power plant, steam distribution system and compressed air systems.
15EE653.4	Conduct energy audit HVAC systems, motors, pumps, blowers and cooling towers.
15EE653.5	Explain load management techniques, effects of harmonics, electricity tariff, improvement of power factor and losses in transmission
15EE653.6	Conduct energy audit of lighting systems and buildings.
15EE653.7	Show an understanding of demand side management and energy conservation

Semester: VI   Subject: Sensors and transducers   Sub Code: 15EE662

CO	After studying this course, students will be able to:
15EE662.1	Discuss need of transducers, their classification, advantages and disadvantages.
15EE662.2	Show an understanding of working of various transducers and sensors.
15EE662.3	Discuss recent trends in sensor technology and their selection.
15EE662.4	Discuss basics of signal conditioning and signal conditioning equipment.
15EE662.5	Discuss configuration of Data Acquisition System and data conversion.
15EE662.6	Show knowledge of data transmission and telemetry.
15EE662.7	Explain measurement of non-electrical quantities -temperature, flow, speed, force, torque, power and viscosity

Semester: VII   Subject : Power system analysis – 2   Sub Code: 15EE71

CO	After studying this course, students will be able to:
15EE71.1	Formulate network matrices and models for solving load flow problems.
15EE71.2	Perform steady state power flow analysis of power systems using numerical iterative techniques
15EE71.3	Suggest a method to control voltage profile.
15EE71.4	Show knowledge of optimal operation of generators on a bus bar, optimal unit commitment,
15EE71.5	Discuss optimal scheduling for hydro-thermal system, power system security and reliability.
15EE71.6	Analyze short circuit faults in power system networks using bus impedance matrix.
15EE71.7	Perform numerical solution of swing equation for multi-machine stability

Semester: VII   Subject: Power system protection   Sub Code: 15EE72

CO	After studying this course, students will be able to:
15EE72.1	Discuss performance of protective relays, components of protection scheme and relay terminology overcurrent protection.
15EE72.2	Explain the working of distance relays and the effects of arc resistance, power swings, line length and source impedance on performance of distance relays.
15EE72.3	Discuss pilot protection; wire pilot relaying and carrier pilot relaying.
15EE72.4	Discuss construction, operating principles and performance of differential relays for differential protection.
15EE72.5	Discuss protection of generators, motors, Transformer and Bus Zone Protection.
15EE72.6	Explain the principle of circuit interruption in different types of circuit breakers.
15EE72.7	Describe the construction and operating principle of different types of fuses and to give the definitions of different terminologies related to a fuse.
15EE72.8	Discuss protection against Overvoltages and Gas Insulated Substation (GIS)

Semester: VII   Subject : High voltage engineering   Sub Code: 15EE73

CO	After studying this course, students will be able to:
15EE73.1	Explain conduction and breakdown phenomenon in gases, liquid dielectrics.
15EE73.2	Explain breakdown phenomenon in solid dielectrics.
15EE73.3	Explain generation of high voltages and currents
15EE73.4	Discuss measurement techniques for high voltages and currents.
15EE73.5	Discuss overvoltage phenomenon and insulation coordination in electric power systems.
15EE73.6	Discuss non-destructive testing of materials and electric apparatus and high-voltage testing of electric apparatus

Semester: VII   Subject: Utilization of electrical power   Sub Code: 15EE742

CO	After studying this course, students will be able to:
15EE742.1	Discuss electric heating, air-conditioning and electric welding.
15EE742.2	Explain laws of electrolysis, extraction and refining of metals and electro deposition.
15EE742.3	Explain the terminology of illumination, laws of illumination, construction and working of electric lamps.
15EE742.4	Design interior and exterior lighting systems- illumination levels for factory lighting- flood lighting-street lighting.
15EE742.5	Discuss systems of electric traction, speed time curves and mechanics of train movement.
15EE742.6	Explain the motors used for electric traction and their control.
15EE742.7	Discuss braking of electric motors, traction systems and power supply and other traction systems.
15EE742.8	Explain the working of electric and hybrid electric vehicles.

Semester: VII   **Subject: testing and commissioning of power system apparatus**   **Sub Code: 15EE752**

CO	After studying this course, students will be able to:
15EE752.1	Describe the process to plan, control and implement commissioning of electrical equipment's.
15EE752.2	Differentiate the performance specifications of transformer and induction motor.
15EE752.3	Demonstrate the routine tests for synchronous machine, induction motor, transformer & switchgears.
15EE752.4	Describe corrective and preventive maintenance of electrical equipment's.
15EE752.5	Explain the operation of an electrical equipment's such as isolators, circuit breakers, induction motor and synchronous machines.

Semester: VIII   **Subject: Power system operation and control**   **Sub Code: 15EE81**

CO	After studying this course, students will be able to:
15EE81.1	Describe various levels of controls in power systems, the vulnerability of the system, components, architecture and configuration of SCADA.
15EE81.2	Solve unit commitment problems
15EE81.3	Explain issues of hydrothermal scheduling and solutions to hydro thermal problems
15EE81.4	Explain basic generator control loops, functions of Automatic generation control, speed governors
15EE81.5	Develop and analyse mathematical models of Automatic Load Frequency Control
15EE81.6	Explain automatic generation control, voltage and reactive power control in an interconnected power system.
15EE81.7	Explain reliability, security, contingency analysis, state estimation and related issues of power systems.

Semester: VIII   **Subject: Industrial drives and applications**   **Sub Code: 15EE82**

CO	After studying this course, students will be able to:
15EE82.1	Explain the advantages and choice of electric drive.
15EE82.2	Explain dynamics and different modes of operation of electric drives.
15EE82.3	Suggest a motor for a drive and control of dc motor using controlled rectifiers.
15EE82.4	Analyse the performance of induction motor drives under different conditions.
15EE82.5	Control induction motor, synchronous motor and stepper motor drives.
15EE82.6	Suggest a suitable electrical drive for specific application in the industry

Semester: VIII   **Subject: Integration of distributed generation**   **Sub Code: 15EE833**

CO	After studying this course, students will be able to:
15EE833.1	Explain the performance of the system when distributed generation is integrated to the system.
15EE833.2	Discuss effects of the integration of DG: the increased risk of overload and increased losses.
15EE833.3	Discuss effects of the integration of DG: increased risk of over voltages, increased levels of power quality disturbances.
15EE833.4	Discuss effects of the integration of DG: incorrect operation of the protection
15EE833.5	Discuss the impact the integration of DG on power system stability and operation.

Course Outcomes (Year 2018-19)

Semester: III   **Subject: Engineering Mathematics-III**   **Sub Code: 17MAT31**

CO	After studying this course, students will be able to:
17MAT31.1	Know the use of periodic signals and Fourier series to analyze circuits and system
17MAT31.2	Explain the general linear system theory for continuous-time signals and digital signal processing using the Fourier Transform and z-transform
17MAT31.3	Employ appropriate numerical methods to solve algebraic and transcendental equations.
17MAT31.4	Apply Green's Theorem, Divergence Theorem and Stokes' theorem in various applications in the field of electro-magnetic and gravitational fields and fluid flow problems
17MAT31.5	Determine the external of functional and solve the simple problems of the calculus of Variations.

Semester: III   **Subject: Material Science**   **Sub Code: 17ME32**

CO	After studying this course, students will be able to:
17ME32.1	Describe the mechanical properties of metals, their alloys and various modes of failure.
17ME32.2	Understand the microstructures of ferrous and non-ferrous materials to mechanical properties.
17ME32.3	Explain the processes of heat treatment of various alloys.
17ME32.4	Understand the properties and potentialities of various materials available and material selection procedures.
17ME32.5	Know about composite materials and their processing as well as applications.

Semester: III   **Subject: Basic Thermodynamics**   **Sub Code: 17ME33**

CO	After studying this course, students will be able to:
17ME33.1	Explain thermodynamic systems, properties, Zeroth law of thermodynamics, temperature scales and energy interactions.
17ME33.2	Determine heat, work, internal energy, enthalpy for flow &non flow process using First and Second Law of Thermodynamics.
17ME33.3	Interpret behavior of pure substances and its applications to practical problems.
17ME33.4	Determine change in internal energy, change in enthalpy and change in entropy using TD relations for ideal gases.
17ME33.5	Calculate Thermodynamics properties of real gases at all ranges of pressure, temperatures using modified equation of state including Vander Waals equation, Redlich Wong equation and Beattie-Bridgeman equation.

Semester: III   Subject: Mechanics of Materials   Sub Code: 17ME34

CO	After studying this course, students will be able to:
17ME34.1	Understand simple, compound, thermal stresses and strains their relations, Poisson's ratio, Hooke's law, mechanical properties including elastic constants and their relations
17ME34.2	Determine stresses, strains and deformations in bars with varying circular and rectangular cross-sections subjected to normal and temperature loads
17ME34.3	Determine plane stress, principal stress, maximum shear stress and their orientations using analytical method and Mohr's circle
17ME34.4	Determine the dimensions of structural members including beams, bars and rods using Energy methods and also stress distribution in thick and thin cylinders
17ME34.5	Draw SFD and BMD for different beams including cantilever beams, simply supported beams and overhanging beams subjected to UDL, UVL, Point loads and couples
17ME34.6	Determine dimensions, bending stress, shear stress and its distribution in beams of circular, rectangular, symmetrical I and T sections subjected to point loads and UDL
17ME34.7	Determine slopes and deflections at various points on beams subjected to UDL, UVL, Point loads and couples.
17ME34.8	Determine the dimensions of shafts based on torsional strength, rigidity and flexibility and also elastic stability of columns usingRankin's and Euler's theory.

Semester: III/IV   Subject: Metal Casting and Welding   Sub Code: 17ME35A/45A

CO	After studying this course, students will be able to:
17ME35A.1	Describe the casting process, preparation of Green, Core, dry sand molds and Sweep, Shell, Investment and plaster molds.
17ME35A.2	Explain the Pattern, Core, Gating, Riser system and Jolt, Squeeze, Sand Slinger Molding Machines.
17ME35A.3	Compare the Gas fired pit, Resistance, Coreless, Electrical and Cupola Metal Furnaces.
17ME35A.4	Compare the Gravity, Pressure die, Centrifugal, Squeeze, slush and Continuous Metal mold castings.
17ME35A.5	Explain the Solidification process and Casting of Non-Ferrous Metals.
17ME35A.6	Describe the Metal Arc, TIG, MIG, Submerged and Atomic Hydrogen Welding processes used in manufacturing.
17ME35A.7	Explain the Resistance spot, Seam, Butt , Projection, Friction, Explosive, Thermit, Laser and Electron Beam Special type of welding process used in manufacturing.
17ME35A.8	Describe the Metallurgical aspects in Welding and inspection methods for the quality assurance of components made of casting and joining process.

Semester: III/IV   Subject: Machine Tools and Operations   Sub Code:17ME35B/45B

CO	After studying this course, students will be able to:
17ME35B.1	Explain the construction & specification of various machine tools
17ME35B.2	Describe various machining processes pertaining to relative motions between tool & work piece.
17ME35B.3	Discuss different cutting tool materials, tool nomenclature & surface finish.
17ME35B.4	Apply mechanics of machining process to evaluate machining time.
17ME35B.5	Analyze tool wear mechanisms and equations to enhance tool life and minimize machining cost.

Semester: III/IV   Subject: Computer Aided Machine Drawing Sub Code:17ME36A/46A

CO	After studying this course, students will be able to:
17ME36A.1	Sections of pyramids, prisms, cubes, cones and cylinders resting on their bases in 2D
17ME36A.2	Orthographic views of machine parts with and without sectioning in 2D.
17ME36A.3	Sectional views for threads with terminologies of ISO Metric, BSW, square and acme, sellers and American standard threads in 2D.
17ME36A.4	Hexagonal and square headed bolt and nut with washer, stud bolts with nut and lock nut, flanged nut, slotted nut, taper and split pin for locking counter sunk head screw, grub screw, Allen screw assemblies in 2D.
17ME36A.5	Parallel key, Taper key, and Woodruff Key as per the ISO standards in 2D
17ME36A.6	single and double riveted lap joints, butt joints with single/double cover straps, cotter and knuckle joint for two rods in 2D
17ME36A.7	Sketch split muff, protected type flanged, pin type flexible, Oldham's and universal couplings in 2D
17ME36A.8	assemblies from the part drawings with limits ,fits and tolerance given for Plummer block, Rams bottom safety valve, I.C. Engine connecting rod, Screw Jack, Tailstock of lathe, Machine Vice and Lathe square tool post in 2D and 3D.

Semester: III/IV   Subject: Mechanical Measurements and Metrology   Sub Code: 17ME36B/46B

CO	After studying this course, students will be able to:
17ME36B.1	Understand the objectives of metrology, methods of measurement, selection of measuring instruments, standards of measurement and calibration of end bars.
17ME36B.2	Describe slip gauges, wringing of slip gauges and building of slip gauges, angle measurement using sinebar, sine center, angle gauges, optical instruments and straightness measurement using Autocollimator.
17ME36B.3	Explain tolerance, limits of size, fits, geometric and position tolerances, gauges and their design.
17ME36B.4	Understand the principle of Johnson Mikrokator, sigma comparator, dial indicator, LVDT, back pressure gauges, Solex comparators and Zeiss Ultra Optimeter
15ME36B.5	Describe measurement of major diameter, minor diameter, pitch, angle and effective diameter of screw threads by 2 – wire, 3 – wire methods, screw thread gauges and tool maker's microscope.
15ME36B.6	Explain measurement of tooth thickness using constant chord method, addendum comparator methods and base tangent method, composite error using gear roll tester and measurement of pitch, concentricity, run out and involute profile.
15ME36B.7	Understand laser interferometers and Coordinate measuring machines.
15ME36B.8	Explain measurement systems, transducers, intermediate modifying devices and terminating devices.
15ME36B.9	Describe functioning of force, torque, pressure, strain and temperature measuring devices.

Semester: III/IV   Subject: Materials Testing Lab   Sub Code: 17MEL37A/47A

CO	After studying this course, students will be able to:
17MEL37A.1	Acquire experimentation skills in the field of material testing.
17MEL37A.2	Develop theoretical understanding of the mechanical properties of materials by performing experiments.
17MEL37A.3	Apply the knowledge to analyze a material failure and determine the failure inducing agent/s.
17MEL37A.4	Apply the knowledge of testing methods in related areas.
17MEL37A.5	Apply the knowledge of testing methods in related areas.

Semester: III/IV   Subject: Mechanical Measurements & Metrology Lab   Sub Code:15MEL37B/47B

CO	After studying this course, students will be able to:
17MEL37B.1	To calibrate pressure gauge, thermocouple, LVDT, load cell, micrometer.
17MEL37B.2	To measure angle using Sine Center/ Sine Bar/ Bevel Protractor, alignment using Autocollimator/ Roller set.
17MEL37B.3	To demonstrate measurements using Optical Projector/Tool maker microscope, Optical flats.
17MEL37B.4	To measure cutting tool forces using Lathe/Drill tool dynamometer.
17MEL37B.5	To measure Screw thread parameters using 2-Wire or 3-Wire method, gear tooth profile using geartooth vernier/Gear tooth micrometer.
17MEL37B.6	To measure surface roughness using Tally Surf/ Mechanical Comparator

Semester: III/IV   Subject: Foundry and Forging Lab   Sub Code: 17MEL38A/48A

CO	After studying this course, students will be able to:
17MEL38A.1	Demonstrate various skills of sand preparation, molding
17MEL38A.2	Demonstrate various skills of forging operations.
17MEL38A.3	Work as a team keeping up ethical principles.

Semester: III/IV   Subject: Machine Shop   Sub Code: 17MEL38B/48B

CO	After studying this course, students will be able to:
17MEL38B.1	Perform turning , facing , knurling , thread cutting, tapering , eccentric turning and allied operations
17MEL38B.2	Perform keyways / slots , grooves etc using shaper
17MEL38B.3	Perform gear tooth cutting using milling machine
17MEL38B.4	Understand the formation of cutting tool parameters of single point cutting tool using bench grinder / tool and cutter grinder
17MEL38B.5	Understand Surface Milling/Slot Milling
17MEL38B.6	Demonstrate precautions and safety norms followed in Machine Shop
17MEL38B.7	Exhibit interpersonal skills towards working in a team

Semester: IV   Subject: Kinematics of Machines   Sub Code: 17ME42

CO	After studying this course, students will be able to:
17ME42.1	Identify mechanisms with basic understanding of motion.
17ME42.2	Comprehend motion analysis of planar mechanisms, gears, gear trains and cams
17ME42.3	Carry out motion analysis of planar mechanisms, gears, gear trains and cams.

Semester: IV   Subject: Applied Thermodynamics   Sub Code: 17ME43

CO	After studying this course, students will be able to:
17ME43.1	Apply thermodynamic concepts to analyze the performance of gas power cycles including propulsion systems.
17ME43.2	Evaluate the performance of steam turbine components.
17ME43.3	Understand combustion of fuels and combustion processes in I C engines including alternate fuels and pollution effect on environment.
17ME43.4	Apply thermodynamic concepts to analyze turbo machines
17ME43.5	Determine performance parameters of refrigeration and air-conditioning systems.
17ME43.6	Understand the principles and applications of refrigeration systems
17ME43.7	Analyze air-conditioning processes using the principles of psychrometry and Evaluate cooling and heating loads in an air conditioning system.
15ME43.8	Understand the working, applications, relevance of air and identify methods for performance improvement.

Semester: IV   **Subject: Fluid Mechanics**   **Sub Code: 17ME44**

CO	After studying this course, students will be able to:
17ME44.1	Identify and calculate the key fluid properties used in the analysis of fluid behavior.
17ME44.2	Understand and apply the principles of pressure, buoyancy and floatation
17ME44.3	Apply the knowledge of fluid statics, kinematics and dynamics while addressing problems of mechanical and chemical engineering.
17ME44.4	Understand and apply the principles of fluid kinematics and dynamics
17ME44.5	Understand the concept of boundary layer in fluid flow and apply dimensional analysis to form dimensionless numbers in terms of input output variables
17ME44.6	Understand the basic concept of compressible flow and CFD

Semester: V   **Subject: Management And Engineering Economics**   **Sub Code: 15ME51**

CO	After studying this course, students will be able to:
15ME51.1	Understand needs, functions, roles, scope and evolution of Management
15ME51.2	Understand importance, purpose of Planning and hierarchy of planning and also analyze its types
15ME51.3	Discuss Decision making, Organizing, Staffing, Directing and Controlling
15ME51.4	Select the best economic model from various available alternatives
15ME51.5	Understand various interest rate methods and implement the suitable one.
15ME51.6	Estimate various depreciation values of commodities
15ME51.7	Prepare the project reports effectively

Semester: V   **Subject: Dynamics of Machinery**   **Sub Code: 15ME52**

CO	After studying this course, students will be able to:
15ME52.1	Determine the forces and couples for static and dynamic conditions of four bar and slider crank mechanisms to keep the system in equilibrium.
15ME52.2	Determine magnitude and angular position of balancing masses under static and dynamic condition of rotating masses in same and different planes.
15ME52.3	Determine unbalanced primary, secondary forces and couples in single and multi-cylinder engine.
15ME52.4	Determine sensitiveness, isochronism, effort and power of porter and hartnell governors
15ME52.5	Determine gyroscopic couple and effects related to 2, 4 wheeler, plane disc, ship and aeroplanes.
15ME52.6	Understand types of vibration, SHM and methods of finding natural frequencies of simple mechanical systems.
15ME52.7	Determine equation of motion, natural frequency, damping factor, logarithmic decrement of damped free vibration (SDOF) systems.
15ME52.8	Determine the natural frequency, force and motion transmissibility of single degree freedom systems.
15ME52.9	Determine equation of motion of rotating and reciprocating unbalance systems, magnification factor, and transmissibility of forced vibration (SDOF) systems.

Semester: V   **Subject: Turbo Machines**   **Sub Code: 15ME53**

CO	After studying this course, students will be able to:
15ME53.1	Able to give precise definition of turbomachinery
15ME53.2	Identify various types of turbo machinery
15ME53.3	Apply the Euler's equation for turbomachinery to analyse energy transfer in turbomachines
15ME53.4	Understand the principle of operation of pumps, fans, compressors and turbines.
15ME53.5	Perform the preliminary design of turbomachines (pumps, rotary compressors and turbines)
15ME53.6	Analyze the performance of turbo machinery.

Semester: V   **Subject: Design of Machine Elements**   **Sub Code: 15ME54**

CO	After studying this course, students will be able to:
15ME54.1	Describe the design process, choose materials.
15ME54.2	Apply the codes and standards in design process.
15ME54.3	Analyze the behavior of machine components under static, impact, fatigue loading using failure theories.
15ME54.4	Design shafts, joints, couplings.
15ME54.5	Design of riveted and welded joints.
15ME54.6	Design of threaded fasteners and power screws

Semester: V   **Subject: Non Traditional Machining**   **Sub Code: 15ME554**

CO	After studying this course, students will be able to:
15ME554.1	Understand the compare traditional and non-traditional machining process and recognize the need for Non-traditional machining process.
15ME554.2	Understand the constructional features, performance parameters, process characteristics, applications, advantages and limitations of USM, AJM and WJM.
15ME554.3	Identify the need of Chemical and electro-chemical machining process along with the constructional features, process parameters, process characteristics, applications, advantages and limitations
15ME554.4	Understand the constructional feature of the equipment, process parameters, process characteristics, applications, advantages and limitations EDM & PAM
15ME554.5	Understand the LBM equipment, LBM parameters, and characteristics. EBM equipment and mechanism of metal removal, applications, advantages and limitations LBM & EBM.

Semester: V   **Subject: Energy And Environment**   **Sub Code: 15ME562**

CO	After studying this course, students will be able to:
15ME562.1	Summarize the basic concepts of energy, its distribution and general Scenario.
15ME562.2	Explain different energy storage systems, energy management, audit and economic analysis.
15ME562.3	Summarize the environment eco system and its need for awareness.
15ME562.4	Identify the various types of environment pollution and their effects.
15ME562.5	Discuss the social issues of the environment with associated acts.

Semester: V   **Subject: Fluid Mechanics & Machinery Lab**   **Sub Code: 15MEL57**

CO	After studying this course, students will be able to:
15MEL57.1	Perform experiments to determine the coefficient of discharge of flow measuring devices
15MEL57.2	Conduct experiments on hydraulic turbines and pumps to draw characteristics.
15MEL57.3	Test basic performance parameters of hydraulic turbines and pumps and execute the knowledge in real life situations.
15MEL57.4	Determine the energy flow pattern through the hydraulic turbines and pumps
15MEL57.5	Exhibit his competency towards preventive maintenance of hydraulic machines

Semester: V   **Subject: Energy Lab**   **Sub Code: 15MEL58**

CO	After studying this course, students will be able to:
15MEL58.1	Perform experiments to determine the properties of fuels and oils.
15MEL58.2	Conduct experiments on engines and draw characteristics.
15MEL58.3	Test basic performance parameters of I.C. Engine and implement the knowledge in industry.
15MEL58.4	Identify exhaust emission, factors affecting them and report the remedies.
15MEL58.5	Determine the energy flow pattern through the I C Engine
15MEL58.6	Exhibit his competency towards preventive maintenance of IC engines.

Semester: VI   Subject: Finite Element Analysis   Sub Code: 15ME61

CO	After studying this course, students will be able to:
15ME61.1	Understand the concepts behind formulation methods in FEM
15ME61.2	Identify the application and characteristics of FEA elements such as bars, beams, plane and iso-parametric elements.
15ME61.3	Develop element characteristic equation and generation of global equation.
15ME61.4	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.

Semester: VI   Subject: Computer Integrated Manufacturing   Sub Code: 15ME62

CO	After studying this course, students will be able to:
15ME62.1	Able to define Automation, CIM, CAD, CAM and explain the differences between these concepts. Solve simple problems of transformations of entities on computer screen.
15ME62.2	Explain the basics of automated manufacturing industries through mathematical models and analyze different types of automated flow lines
15ME62.3	Analyze the automated flow lines to reduce down time and enhance productivity.
15ME62.4	Explain the use of different computer applications in manufacturing, and able to prepare part programs for simple jobs on CNC machine tools and robot programming
15ME62.5	Visualize and appreciate the modern trends in Manufacturing like additive manufacturing, Industry 4.0 and applications of Internet of Things leading to Smart Manufacturing.

Semester: VI   Subject: Heat Transfer   Sub Code: 15ME63

CO	After studying this course, students will be able to:
15ME63.1	Understand the basic modes of heat transfer
15ME63.2	Compute temperature distribution in steady-state and unsteady-state heat conduction
15ME63.3	Understand and interpret heat transfer through extended surfaces.
15ME63.4	Interpret and compute forced and free convective heat transfer.
15ME63.5	Explain the principles of radiation heat transfer and understand the numerical formula for heat conduction problems.
15ME63.6	Design heat exchangers using LMTD and NTU methods.

Semester: VI   Subject: Design of Machine Elements II   Sub Code: 15ME64

CO	After studying this course, students will be able to:
15ME64.1	Apply engineering design tools to product design.
15ME64.2	Design mechanical systems involving springs,belts and pulleys.
15ME64.3	Design different types of gears and simple gear boxes for different applications
15ME64.4	Design brakes and clutches.
15ME64.5	Design hydrodynamic bearings for different applications.
15ME64.6	Select Anti friction bearings for different applications using the manufacturers, catalogue.
15ME64.7	Develop proficiency to generate production drawings using CAD software.
15ME64.8	Become good design engineers through learning the art of working in a team with morality and ethics.

Semester: VI   Subject: Automobile Engineering   Sub Code: 15ME655

CO	After studying this course, students will be able to:
15ME655.1	To identify the different parts of an automobile and it's working
15ME655.2	To understand the working of transmission and braking systems
15ME655.3	To comprehend the working of steering and suspension systems
15ME655.4	To learn various types of fuels and injection systems
15ME655.5	To know the cause of automobile emissions ,its effects on environment and methods to reduce the emissions

Semester: VI   **Subject: Total Quality Management**   **Sub Code: 15ME664**

CO	After studying this course, students will be able to:
15ME664.1	Explain the various approaches of TQM
15ME664.2	Infer the customer perception of quality
15ME664.3	Analyze customer needs and perceptions to design feedback systems
15ME664.4	Apply statistical tools for continuous improvement of systems
15ME664.5	Apply the tools and technique for effective implementation of TQM.

Semester: VI   **Subject: Heat Transfer Lab**   **Sub Code: 15MEL67**

CO	After studying this course, students will be able to:
15MEL67.1	Perform experiments to determine the thermal conductivity of a metal rod
15MEL67.2	Conduct experiments to determine convective heat transfer coefficient for free and forced convection and correlate with theoretical values.
15MEL67.3	Estimate the effective thermal resistance in composite slabs and efficiency in pin-fin
15MEL67.4	Determine surface emissivity of a test plate
15MEL67.5	Estimate performance of a refrigerator and effectiveness of fin
15MEL67.6	Calculate temperature distribution of study and transient heat conduction through plane wall, cylinder and fin using numerical approach.

Semester: VI   **Subject: Modeling and Analysis Lab**   **Sub Code: 15MEL68**

CO	After studying this course, students will be able to:
15MEL68.1	Demonstrate the basic features of an analysis package.
15MEL68.2	Use the modern tools to formulate the problem, and able to create geometry, descritize, apply boundary condition to solve problems of bars, truss, beams, plate to find stress with different- loading conditions
15MEL68.3	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.
15MEL68.4	Analyze the given problem by applying basic principle to solve and demonstrate 1D and 2D heat transfer with conduction and convection boundary conditions.
15MEL68.5	Carry out dynamic analysis and finding natural frequencies for various boundary conditions and also analyze with forcing function.

Semester: VII   **Subject: Energy Engineering**   **Sub Code: 15ME71**

CO	After studying this course, students will be able to:
15ME71.1	Summarize the basic concepts of thermal energy systems
15ME71.2	Identify renewable energy sources and their utilization.
15ME71.3	Understand the basic concepts of solar radiation and analyze the working of solar PV and thermal systems
15ME71.4	Understand principles of energy conversion from alternate sources including wind, geothermal, ocean, biomass, biogas
15ME71.5	Understand the concepts and applications of fuel cells, thermoelectric convertor and MHD generator
15ME71.6	Identify methods of energy storage for specific applications

Semester: VII   **Subject: Fluid Power Systems**   **Sub Code: 15ME72**

CO	After studying this course, students will be able to:
15ME72.1	Identify and analyze the functional requirements of a fluid power transmission system for a given application.
15ME72.2	Visualize how a hydraulic/pneumatic circuit will work to accomplish the function.
15ME72.3	Design an appropriate hydraulic or pneumatic circuit or combination circuit like electro hydraulics, electro-pneumatics for a given application.
15ME72.4	Select and size the different components of the circuit
15ME72.5	Develop a comprehensive circuit diagram by integrating the components selected for the given application.

Semester: VII   **Subject: Control Engineering**   **Sub Code: 15ME73**

CO	After studying this course, students will be able to:
15ME73.1	Recognize control system and its types , control actions
15ME73.2	Determine the system governing equations for physical models(Electrical, Thermal, Mechanical, Electro Mechanical)
15ME73.3	Calculate the gain of the system using block diagram and signal flow graph
15ME73.4	Illustrate the response of 1st and 2nd order systems
15ME73.5	Determine the stability of transfer functions in complex domain and frequency domain
15ME73.6	Employ state equations to study the controllability and observability.

Semester: VII   **Subject: Tribology**   **Sub Code: 15ME742**

CO	After studying this course, students will be able to:
15ME742.1	Understand the fundamentals of tribology and associated parameters.
15ME742.2	Apply concepts of tribology for the performance analysis and design of components experiencing relative motion
15ME742.3	Analyse the requirements and design hydrodynamic journal and plane slider bearings for a given application.
15ME742.4	Select proper bearing materials and lubricants for a given tribological application.
15ME742.5	Apply the principles of surface engineering for different applications of tribology.

Semester: VII   **Subject: Mechatronics**   **Sub Code: 15ME753**

CO	After studying this course, students will be able to:
15ME753.1	Illustrate various components of Mechatronics systems.
15ME753.2	Assess various control systems used in automation.
15ME753.3	Develop mechanical, hydraulic, pneumatic and electrical control system.

Semester: VII   **Subject: Design Laboratory**   **Sub Code: 15MEL76**

CO	After studying this course, students will be able to:
15MEL76.1	To understand the working principles of machine elements such as Governors, Gyroscopes etc.,
15MEL76.2	To identify forces and couples in rotating mechanical system components
15MEL76.3	To identify vibrations in machine elements and design appropriate damping methods and to determine the critical speed of a rotating shaft.
15MEL76.4	To measure strain in various machine elements using strain gauges
15MEL76.5	To determine the minimum film thickness, load carrying capacity, frictional torque and pressure distribution of journal bearing
15MEL76.6	To determine strain induced in a structural member using the principle of photo-elasticity.

Semester: VII   **Subject: Computer Integrated Manufacturing Lab**   **Sub Code: 15MEL77**

CO	After studying this course, students will be able to:
15MEL77.1	Generate CNC Lathe part program for Turning, Facing, Chamfering, Grooving, Step turning, Taper turning, Circular interpolation etc.
15MEL77.2	Generate CNC Mill Part programming for Point to point motions, Line motions, Circular interpolation, Contour motion, Pocket milling- circular, rectangular, Mirror commands etc.
15MEL77.3	Use Canned Cycles for Drilling, Peck drilling, Boring, Tapping, Turning, Facing, Taper turning Thread cutting etc.
15MEL77.4	Simulate Tool Path for different Machining operations of small components using CNC Lathe & CNC Milling Machine.
15MEL77.5	Use high end CAM packages for machining complex parts; use state of art cutting tools and related cutting parameters; optimize cycle time.
15MEL77.6	Understand & write programs for Robotcontrol;understand the operating principles of hydraulics, pneumatics and electropneumatic systems. Apply this knowledge to automate & improve efficiency of manufacturing

Semester: VIII   **Subject: Operations Research**   **Sub Code: 15ME81**

CO	After studying this course, students will be able to:
15ME81.1	Understand the meaning, definitions, scope, need, phases and techniques of operations research.
15ME81.2	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
15ME81.3	Formulate as Transportation and Assignment problems and derive optimum solutions for transportation, Assignment and travelling salesman problems
15ME81.4	Solve problems on game theory for pure and mixed strategy under competitive environment.
15ME81.5	Solve waiting line problems for M/M/1 and M/M/K queuing models.
15ME81.6	Construct network diagrams and determine critical path, floats for deterministic and PERT networks including crashing of Networks
15ME81.7	Determine minimum processing times for sequencing of n jobs-2 machines, n jobs-3machines,n jobs-m machines and 2 jobs-n machines using Johnson's algorithm.

Semester: VIII   **Subject: Additive Manufacturing**   **Sub Code: 15ME82**

CO	After studying this course, students will be able to:
15ME82.1	Understand the different process of Additive Manufacturing. using Polymer, Powder and Nano materials manufacturing
15ME82.2	Analyse the different characterization techniques.
15ME82.3	Describe the various NC, CNC machine programing and Automation techniques.

Semester: VIII   **Subject: Product Life Cycle Management**   **Sub Code: 15ME835**

CO	After studying this course, students will be able to:
15ME835.1	Explain the various strategies of PLM and Product Data Management 2
15ME835.2	Describe decomposition of product design and model simulation
15ME835.3	Apply the concept of New Product Development and its structuring.
15ME835.4	Analyze the technological forecasting and the tools in the innovation
15ME835.5	Apply the virtual product development and model analysis

COURSE OUTCOME (BATCH 2018-20)

SEMESTER: 1 SUBJECT: MANAGEMENT AND ORGANIGATIONAL BEHAVIOR SUBCODE: 18MBA11

CO	After studying this course, students will be able to
18MBA11.1	Comprehend & correlate all the management functions which are happening around with fundamental concepts and principles of management.
18MBA11.2	Understand the overview of management, theory of management and practical applications of the same
18MBA11.3	Effectively use their skills for self-grooming, working in groups and to achieve organizational goals
18MBA11.4	Demonstrate their acumen in applying managerial and behavioral concept in real world/situation.
18MBA11.5	Understand and demonstrate their exposure on recent trends in management
18MBA11.6	Application of motivational theories.

SEMESTER : 1   SUBJECT: MANAGERIAL ECONOMICS   SUBCODE: 18MBA12

CO	After studying this course, students will be able to
18MBA12.1	The student will understand the application of Economic Principles in Management decision making
18MBA12.2	The student will learn the micro economic concepts and apply them for effective functioning of a Firm and Industry
18MBA12.3	The Student will be able to understand, assess and forecast Demand.
18MBA12.4	The student will apply the concepts of production and cost for optimization of production.
18MBA12.5	The student will design Competitive strategies like pricing, product differentiation etc. and marketing according to the market structure
18MBA12.6	The student will be able to identify, assess profits and apply BEP for decision making.

SEMESTER:1   SUBJECT:ACCOUNTING FOR MANAGERS   SUB CODE: 18MBA13

CO	After studying this course, students will be able to
18MBA13.1	Demonstrate theoretical knowledge and its application in real time accounting
18MBA13.2	Demonstrate knowledge regarding accounting principles and its application.
18MBA13.3	Capable of preparing financial statement of sole trading concerns and companies.
18MBA13.4	Independently undertake financial statement analysis and take decisions
18MBA13.5	Comprehend emerging trends in accounting and taxation.
18MBA14.6	To understand the Basic concepts of Direct & Indirect Tax.

SEMESTER: 1   SUBJECT: BUSINESS STATISTICS & ANALYTICS SUB CODE:18MBA14

CO	After studying this course, students will be able to
18MBA14.1	Facilitate objective solutions in business decision making under subjective conditions.
18MBA14.2	Demonstrate different statistical techniques in business/real-life situations
18MBA14.3	Understand the importance of probability in decision making.
18MBA14.4	Understand the need and application of analytics.
18MBA14.5	Understand and apply various data analysis functions for business problems.
18MBA14.6	Understand and apply the Network components and precedence relationships – Critical path analysis – Project scheduling

SEMESTER:1   SUBJECT: MARKETING MANAGEMENT   SUBCODE: 18MBA15

CO	After studying this course, students will be able to
18MBA15.1	Develop an ability to assess the impact of the environment on marketing function.
18MBA15.2	To formulate marketing strategies that incorporate psychological and sociological factors which influence buying
18MBA15.3	Explain how companies identify attractive market segments, differentiate and position their products for maximum competitive advantage in the market place
18MBA154	Build marketing strategies based on product, price, place and promotion objectives
18MBA15.5	Synthesize ideas into a viable marketing plan.
18MBA15.6	Understand the Tools and Techniques of Sales Promotion, Public relation

SEMESTER :1   SUBJECT: MANAGERIAL COMMUNICATION   SUB CODE: 18MBA16

CO	After studying this course, students will be able to
18MBA16.1	The students will be aware of their communication skills and know their potential to become successful managers.
18MBA16.2	The students will get enabled with the mechanics of writing and can compose the business letters in English precisely and effectively
18MBA16.3	The students will be introduced to the managerial communication practices in business those are in vogue
18MBA164	Students will get trained in the art of business communication with emphasis on analyzing business situations
18MBA16.5	Students will get exposure in drafting business proposals to meet the challenges of competitive environment.
18MBA16.6	Students will understand about Writing CVs – Group discussions – Interview skills

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COURSE OUTCOME (BATCH 2018-20)

MBA SECOND SEMESTER

SEMESTER: 2   **SUBJECT: HUMAN RESOURCE MANAGEMENT**   **SUBJECT CODE: 18MBA21**

CO	After studying this course, students will be able to
18MBA21.1	Understanding of HRM functions, principles, importance and evolution
18MBA21.2	Knowledge of Job analysis that facilitates students to design a job description and job specification for various levels of employees.
18MBA21.3	Synthesize knowledge on effectiveness of recruitment process, sources & understanding of systematic selection procedure.
18MBA21.4	Identify the various training methods and design a training program.
18MBA21.5	Understand the concept of performance appraisal process in an organization
18MBA21.6	List out the regulations governing employee benefit practices.

SEMESTER: 2   **SUBJECT: FINANCIAL MANAGEMENT**   **SUBJECT CODE: 18MBA22**

CO	After studying this course, students will be able to
18MBA22.1	Understand the basic financial concepts.
18MBA22.2	Apply time value of money
18MBA22.3	Identify sources of finance and measurement of cost of capital.
18MBA22.4	Evaluate the investment decisions.
18MBA22.5	Estimate working capital requirements.
18MBA22.6	Analyze the capital structure and dividend decisions.

SEMESTER: 2   SUBJECT: RESEARCH METHODOLOGY   SUBJECT CODE: 18MBA23

CO	After studying this course, students will be able to
18MBA23.1	Understand various research approaches, techniques and strategies in the appropriate in business.
18MBA23.2	Apply a range of quantitative / qualitative research techniques to business and day to day management problems.
18MBA23.3	Equip with various research analytical tools used in business research.
18MBA23.4	Demonstrate knowledge of data collection and understanding of data analysis.
18MBA23.5	Understand data interpretation and report writing.
18MBA23.6	Develop necessary critical thinking skills in order to evaluate different research approaches in Business.

SEMESTER: 2   SUBJECT: LEGAL AND BUSINESS ENVIRONMENT   SUBJECT CODE: 18MBA24

CO	After studying this course, students will be able to
18MBA24.1	Get clear idea about the concept of incorporation of company, its relevance, characteristics, types of company, lifting of corporate.
18MBA24.2	Student to acquire knowledge about conducting meeting, duties of directors and Investigation of the company.
18MBA24.3	Have insight on Winding up of the companies, Mode of winding up of the companies.
18MBA24.4	Understand the macro environment of Business and various macroeconomic concepts.
18MBA24.5	Understand the industrial policies of the past and the present and the evolution over time, and how Indian Industrial structure evolved over time
18MBA24.6	Get exposed to various economic policies of the country and the state of economy.

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SEMESTER: 2   **SUBJECT: STRATEGIC MANAGEMENT**   **SUBJECT CODE: 18MBA25**

CO	After studying this course, students will be able to
18MBA25.1	Get clear idea about the concept of Strategic Management, its relevance, Characteristics, process nature and purpose.
18MBA25.2	Understand how firms successfully institutionalize a strategy and create an organizational structure for domestic and overseas operations and gain competitive advantage
18MBA25.3	Evaluate various business strategies in dynamic market environments.
18MBA25.4	Get insight on strategy at different levels of an organization to gain competitive advantage.
18MBA25.5	Understand the strategic drive in multinational firms and their decisions in different markets.
18MBA25.6	Gain knowledge of strategy implementation and the control measures for effective decision-making.

SEMESTER: 2   **SUBJECT: ENTREPRENEURSHIP DEVELOPMENT**   **SUBJECT CODE: 18MBA26**

CO	After studying this course, students will be able to
18MBA26.1	Display keen interest and orientation towards entrepreneurship, entrepreneurial opportunities in order to setup a business
18MBA26.2	Think creatively and understand the components in developing a Business plan.
18MBA26.3	Get awareness about various sources of funding and institutions supporting entrepreneurs
18MBA26.4	Evaluate various business opportunities with family business.
18MBA26.5	Understand the entrepreneurial drive in multinational firms and their decisions in domestic and international markets.
18MBA26.6	Gain consciousness towards social entrepreneurship and rural entrepreneurship opportunities.

COURSE OUTCOME (BATCH 2018-20)

MBA THIRD SEMESTER

SEMESTER: 3   SUBJECT: BANKING & FINANCIAL SERVICES   SUBJECT CODE: 18MBAFM301

CO	After studying this course, students will be able to
18MBAFM301.1	The Student will be acquainted to various Banking and Non-Banking financial services in India.
18MBAFM301.2	The Student will understand the activities of Merchant Banking.
18MBAFM301.3	The Student will be equipped to understand micro financing and other financial services in India.
18MBAFM301.4	The Student will understand how to evaluate and compare leasing & hire purchase
18MBAFM301.5	The Student will be equipped to understand Credit rating and Venture capital
18MBAFM301.6	The Student will understand the activities of Mutual Funds.

SEMESTER: 3   SUBJECT: INVESTMENT MANAGEMENT   SUBJECT   CODE: 18MBAFM302

CO	After studying this course, students will be able to
18MBAFM302.1	The student will understand the capital market and various Instruments for Investment
18MBAFM302.2	The learner will be able to assess the risk and return associated with Investments.
18MBAFM302.3	The learner will be able to assess the methods to value securities.
18MBAFM302.4	The student will be able to analyze the Economy, Industry and Company framework for Investment Management.
18MBAFM302.5	The student will learn the theories of Modern Portfolio

18MBAFM302.6	The student will learn the theories of Portfolio management and also the tools and techniques for efficient portfolio management.

SEMESTER: 3 **SUBJECT: DIRECT TAXATION** **SUBJECT CODE: 18MBAFM303**

CO	After studying this course, students will be able to
18MBAFM303.1	Understand the basics of taxation and process of computing residential status.
18MBAFM303.2	Understand Income from Salaries and its computation
18MBAFM303.3	Calculate Income under the head Profit and Gains of Business or Professions and its computation.
18MBAFM303.4	Understand Income under capital gain and other incomes
18MBAFM303.5	Understand deductions and calculation of tax liability of Individuals.
18MBAFM303.6	Know the corporate tax system.

SEMESTER: 3 **SUBJECT: RECRUITMENT AND SELECTION** **SUBJECT CODE: 18MBAHR301**

CO	After studying this course, students will be able to
18MBAHR301.1	Gain the insights of various principles and practices of recruitment and selection in an industry
18MBAHR301.2	Equip students with various selection procedure practiced in industry
18MBAHR301.3	Develop students with latest selection tools in the corporate sector
18MBAHR301.4	Develop students with various testing of job recruitment and selection
18MBAHR301.5	Develop the skills in students in Screening the candidates
18MBAHR301.6	Understand Testing, Reference checking & Appointment orders and Reference checking

SEMESTER: 3   **SUBJECT: HR ANALYTICS**   **SUBJECT CODE: 18MBAHR302**

CO	After studying this course, students will be able to
18MBAHR302.1	Have an understanding of How HR function adds value and demonstrates the value in business terms
18MBAHR302.2	Measure the value of Intangibles that HR helps builds for the organization given a particular business context to facilitate decision making.
18MBAHR302.3	Convert soft factors in a people management context into measurable across various domains.
18MBAHR302.4	Devise, conduct and analyses a study on employees or any other related to the HR context in an organization.
18MBAHR302.5	Have an understanding on HR Matrix and HR Dashboard
18MBAHR302.6	Have an understanding on HR Scorecard

SEMESTER: 3   **SUBJECT: COMPENSATION & REWARD SYSTEM**   **SUBJECT CODE: 18MBAHR303**

CO	After studying this course, students will be able to
18MBAHR303.1	Gain insights of various conceptual aspects of Compensation and Benefits to achieve organizational goals
18MBAHR303.2	Determine the performance-based compensation system for business excellence and solve various cases
18MBAHR303.3	Designing the compensation strategies for attraction, motivation and retaining high quality workforce.
18MBAHR303.4	Understand and prepare compensation plan, CTC, wage survey and calculate various bonus
18MBAHR303.5	Gain insights of various Performance Based Compensation System and incentives
18MBAHR303.6	Understand the Legal & Administrative Issues in global compensation

MARKETING SPECIALISATION

SEMESTER: 3   **SUBJECT: CONSUMER BEHAVIOR**   **SUBJECT CODE: 18MBAMM301**

CO	After studying this course, students will be able to
18MBAMM301.1	Explain the background and concepts vital for understanding Consumer Behavior
18MBAMM301.2	Identify the role of variables that determines Consumer Behaviour in Social & cultural domain
18MBAMM301.3	Identifying the psychological and behavioural practices adopted by organizations to enhance the Consumer Behaviour
18MBAMM301.4	Identify Individual Influences on Consumer Behaviour
18MBAMM301.5	Explain External Influences on Consumer Behaviour
18MBAMM301.6	Explain Consumer Influence and Diffusion of Innovations

MARKETING SPECIALISATION

SEMESTER: 3   **SUBJECT: RETAIL MANAGEMENT**   **SUBJECT CODE: 18MBAMM302**

CO	After studying this course, students will be able to
18MBAMM302.1	Find out the contemporary retail management, issues, and strategies
18MBAMM302.2	Evaluate the recent trends in retailing and its impact in the success of modern business
18MBAMM302.3	Relate store management and visual merchandising practices for effective retailing
18MBAMM302.4	Explain Store Management and Visual Merchandising
18MBAMM302.5	Study Relationship Marketing & International Retailing
18MBAMM302.6	Explain Retail Audit and ethics in Retailing

MARKETING SPECIALISATION

SEMESTER: 3   SUBJECT: SERVICES MARKETING   SUBJECT CODE: 18MBAMM303

CO	After studying this course, students will be able to
18MBAMM303.1	Develop an understanding about the various concepts and importance of Services Marketing
18MBAMM303.2	Enhance knowledge about emerging issues and trends in the service sector
18MBAMM303.3	Learn to implement service strategies to meet new challenges
18MBAMM303.4	**Explore Employee role in service designing**
18MBAMM303.5	Role of marketing communication
18MBAMM303.6	**Explain Physical evidence in services**

MBA FOURTH SEMESTER

SEMESTER IV   (FINANCE SPECIALISATION)

MBA SEM IV   SUBJECT: MERGERS, ACQUISITIONS &CORPORATE RESTRUCTURING

SUBJECT CODE: 18MBAFM401

CO	After studying this course, students will be able to
18MBAFM401.1	Understand M&A with its different classifications, strategies, theories, synergyetc
18MBAFM401.2	Conduct financial evaluation of M&A
18MBAFM401.3	Analyse the results after evaluation
18MBAFM401.4	Critically evaluate different types of M&A, takeover and antitakeover strategies
18MBAFM401.5	Analyze Acquisitions/Takeovers
18MBAFM401.6	Analyze Corporate Restructuring

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SEMESTER IV (FINANCE SPECIALISATION)

MBA SEM IV SUBJECT: RISK MANAGEMENT AND INSURANCE SUBJECT CODE: 18MBAFM402

CO	After studying this course, students will be able to
18MBAFM402.1	Understand various types of risks
18MBAFM402.2	Assess the process of identifying and measuring the risk
18MBAFM402.3	Acquaint with the functioning of life Insurance in risk management
18MBAFM402.4	Understand general insurance contract
18MBAFM402.5	General Insurance-Laws Related to General Insurance
18MBAFM402.6	Management of Insurance Companies Functions and Organization of Insurers

SEMESTER IV(FINANCE SPECIALISATION)

MBA SEM IV   SUBJECT: INDIRECT TAXATION   SUBJECT CODE: 18MBAFM403

CO	After studying this course, students will be able to
18MBAFM403.1	Have clarity about GST system in India.
18MBAFM403.2	Understanding of levy and collection of GST in India
18MBAFM403.3	Have an overview of customs duty in India
18MBAFM403.4	Understanding of valuation for customs duty.
18MBAFM403.5	Introduction to Customs Duty.
18MBAFM403.6	Import and Export Procedure under Customs

	Suresh Angadi Education Foundation's		AITM
	ANGADI INSTITUTE OF TECHNOLOGY AND MANAGEMENT		MBA
	Savagaon Road, Belagavi – 590 009.		Course
	Approved by AICTE, New Delhi		Outcomes
	Affiliated to Visvesvaraya Technological University, Belagavi		2018-19

HUMAN RESOURCE MANAGEMENT SPECIALISATION

Semester: IV   Subject: PUBLIC RELATIONS   Sub Code: 18MBAHR401

CO	After studying this course, students will be able to:
18MBAHR401.1	To demonstrate an understanding of the fundamental's tools of public relations practices.
18MBAHR401.2	To describe the various emerging trends in the field of public relations.
18MBAHR401.3	To analyze the importance of employee communication and organizational change.
18MBAHR401.4	To evaluate the importance of community relations.
18MBAHR401.5	To understand the role of media in public relations
18MBAHR401.6	To analyze various issues in public relations

Semester: IV   Subject: ORGANIZATIONAL LEADERSHIP   Sub Code: 18MBAHR402

CO	After studying this course, students will be able to:
18MBAHR402.1	Comprehend & correlate organizational leadership styles which are happening around with fundamental concepts of team leadership.
18MBAHR402.2	Effectively use their skills for self-grooming on leadership traits and ethics that influences them to effectively work in groups to achieve organizational goals
18MBAHR402.3	Understand the overview of behavior and motivation in organization.
18MBAHR402.4	Understand the leadership skills for effective team meetings and to analyze types of teams
18MBAHR402.5	Demonstrate their acumen in applying their knowledge in organizational leadership and behavioral concept in real world/situation.
18MBAHR402.6	To learn development through self-awareness and self-discipline

Semester: IV   Subject: INTERNATIONAL HUMAN RESOURCE MANAGEMENT   Sub Code: 18MBAHR403

CO	After studying this course, students will be able to:
18MBAHR403.1	Analyze the impact of contemporary issues and global imperatives on Human Resource concepts, policies and practices.
18MBAHR403.2	Develop students to adopt international industrial relation strategies.
18MBAHR403.3	Apply concepts and knowledge in deployment, expatriate on international assignments
18MBAHR403.4	Evaluate the effects of different human resource and international industrial relations
18MBAHR403.5	Evaluate performance management in international scenario
18MBAHR403.6	To understand international compensation and international employment laws and HRIS

MARKETING SPECIALISATION

Semester: IV   Subject: SALES MANAGEMENT   Sub Code: 18MBAMM401

CO	After studying this course, students will be able to:
18MBAMM401.1	Understand the trends and importance of sales management at workplace
18MBAMM401.2	Understand and apply the selling techniques in an organization
18MBAMM401.3	Organize sales territories to maximize selling effectiveness and develop a plan for organizing, staffing & training sales force.
18MBAMM401.4	Evaluate sales management strategies and sales force motivation and compensation
18MBAMM401.5	Understand role and functions of sales manager and sales person
18MBAMM401.6	Understand selling on the internet

Semester: IV   Subject: INTEGRATED MARKETING COMMUNICATION   Sub Code: 18MBAMM402

CO	After studying this course, students will be able to:
18MBAMM402.1	Explain the role of IMC in the overall marketing &Use effectiveness measures to evaluate IMC strategies.
18MBAMM402.2	Understand Ad agencies and service offered by ad agencies
18MBAMM402.3	Ability to create an integrated marketing communications plan which includes promotional strategies and Prepare advertising copy and design other basic IMC tools.
18MBAMM402.4	Understand direct marketing in detail
18MBAMM402.5	Understand Monitoring, Evaluation and control in advertising
18MBAMM402.6	Analyze international advertising

Semester: IV   Subject: DIGITAL & SOCIAL MEDIA MARKETING   Sub Code: 18MBAMM403

CO	After studying this course, students will be able to:
18MBAMM403.1	Recognize appropriate e-marketing objectives.
18MBAMM403.2	Understand e-marketing research
18MBAMM403.3	Appreciate the e-commerce framework and technology and ;earn e-marketing management
18MBAMM403.4	Illustrate the use of search engine marketing, online advertising and marketing strategies.
18MBAMM403.5	Understand acquisition and retention of consumers
18MBAMM403.6	Develop social media strategies to solve business problems.