PROGRAMME OUTCOME, PROGRAMME SPECIFIC OUTCOMES AND COURSE OUTCOMES OF ALL DEPARTMENTS - 2019-20 (CRITERIA - 2)

Department of Civil Engineering

2.6.1 Program outcomes, program specific outcomes and course outcomes

ProgramOutcomes:



Program Outcomes (POs)

At the end of the B.E program, students are expected to have developed the following outcomes.

PO1-Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems related to CE

PO-2Problem Analysis: Identify, formulate, review literature, and analyze complex engineering problems related to CE and reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences

PO3-Design/Development of Solutions: Design solutions for complex engineering problems related to CE and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations



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PO4-Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data and synthesis of the information to provide valid conclusions

PO5-Modern Tool Usage: Create, select and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with and understanding of the limitations

PO6-The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the CE professional engineering practice

PO7-Environment and Sustainability: Understand the impact of the CE professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of and need for sustainable development

PO8-Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice

PO9-Individual and Team Work: Function effectively as an individual and as a member or leader in diverse teams and in multidisciplinary settings

PO10-Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions

PO11-Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environment

PO12-Life-Long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

PROGRAM SPECIFIC OUTCOMES (PSOs): Engineering Graduates will be able to:

	Competence in Civil Engineering: Educating students with	
PSO-1:	fundamental mathematical, scientific, and Engineering knowledge to	
	have a significant and positive long-term impact on the field of civil	
	engineering.	
PSO_2.	Usage of Cutting Edge Technology: Inspiring students and preparing	
them for successful professional careers using appropriate tech		
	resources and modern attitudes and modeling to complex engineering	
	activities with practical knowledge and research exposure.	
PSO_3.	Continuous improvement: Motivate students in learning to learn and	
150-5.	the ability to keep learning for a lifetime to increase their	
	professionalism, update and deepen their knowledge through the	
	development of the profession.	



Course outcomes (COs)

Year / SEM : 2 nd year / 3 rd semYear of Study : 2019-20			
	Course Name:		
CO1	Use Laplace transform and inverse Laplace transform in solving differential/ integral equation arising in network analysis, control systems and other fields of engineering.		
CO2	Demonstrate Fourier series to study the behaviour of periodic functions and their applications in system communications, digital signal processing and field theory.		
CO3	Make use of Fourier transform and Z-transform to illustrate discrete/continuous function arising in wave and heat propagation, signals and systems.		
CO4	Solve first and second order ordinary differential equations arising in engineering problems using single step and multistep numerical methods.		
CO5	Determine the externals of functionals using calculus of variations and solve problems arising in dynamics of rigid bodies and vibrational analysis.		

Year / SEM: 2 nd year / 3 rd sem		Year of Study: 2019-20
Course Name: STRENGTH OF MATERIALS – 18CV32		
C01	To evaluate the basic concepts of the stresses and strains for different materials and strength of structural elements	
CO2	To evaluate the development of internal forces and resistance mechanism for one dimensional and two-dimensional structural elements	
CO3	To analyse different internal forces and stresses induced due to representative loads on structural elements	
CO4	To evaluate slope and deflections of beams	
C05	To evaluate the behaviour of torsid	on members, columns and struts

Year / SEM: 2 nd year / 3 rd sem		Year of Study: 2019-20
Course Name: – FLUIDS MECHANICS - 18CV33		
CO1	Possess a sound knowledge of fundamental properties of fluids and fluid Continuum	
CO2	Compute and solve problems on hydrostatics, including practical applications	



CO3	Apply principles of mathematics to represent kinematic concepts related to fluid flow
CO4	Apply fundamental laws of fluid mechanics and the Bernoulli's principle for practical applications
CO5	Compute the discharge through pipes and over notches and weirs

Year / SEM: 2 nd year / 3 rd sem		Year of Study: 2019-20
Course Name: – BUILDING MATERIALS AND CONSTRUCTION – 18CV34		
CO1	Select suitable materials for build	ngs and adopt suitable construction techniques
CO2	Decide suitable type of foundation based on soil parameters	
CO3	Supervise the construction of different building elements based on suitability	
CO 4	Exhibit the knowledge of building finishes and form work requirements	

Year / SEM: 2 nd year / 3 rd sem		Year of Study: 2019-20
Course Name: BASIC SURVEYING – 18CV35		
CO1	Posses a sound knowledge of fundamental principles Geodetics	
CO2	Measurement of vertical and horizontal plane, linear and angular dimensions to arrive at solutions to basic surveying problems	
CO3	Capture geodetic data to process and perform analysis for survey problems	
CO 4	Analyse the obtained spatial data and compute areas and volumes. Represent 3D data on plane figures as contours	

Year / SEM: 2 nd year / 3 rd sem		Year of Study: 2019-20	
	Course Name: ENGINEERING GEOLOGY – 18CV36		
CO1	Apply geological knowledge in different civil engineering practice		
CO2	Students will acquire knowledge on durability and competence of foundation rocks, and confidence enough to use the best building materials		
CO3	Civil Engineers are competent enough for the safety, stability, economy and life of the structures that they construct		
CO4	Able to solve various issues related to ground water exploration, build up dams, bridges, tunnels which are often confronted with ground water problems		
CO5	Intelligent enough to apply GIS, C different civil engineering constru	PS and remote sensing as a latest tool in ction	



Year / SEM: 2 nd year / 3 rd sem		Year of Study: 2019-20
Course Name: COMPUTER AIDED BUILDING PLANNING AND DRAWING LABORATORY - 18CVL37		
C01	Prepare, read and interpret the drawings in a professional set up	
CO2	Know the procedures of submission of drawings and Develop working and submission drawings for building	
CO3	Plan and design a residential or public building as per the given requirements	

Year / SEM: 2 nd year / 3 rd sem		Year of Study: 2019-20
Course Name: BUILDING MATERIALS TESTING LABORATORY- 18CVL38		
CO1	Reproduce the basic knowledge of strength in tension, compression, s	f mathematics and engineering in finding the shear and torsion
CO2	Identify, formulate and solve engineering problems of structural elements subjected to flexure	
CO3	Evaluate the impact of engineering aware of contemporary issues rega materials	g solutions on the society and also will be arding failure of structures due to unsuitable

Year	/ SEM : 2 nd year / 4 th sem Year of Study : 2019-20		
	Course Name:		
CO1	Use the concepts of analytic function and complex potentials to solve the problems arising in electromagnetic field theory.		
CO2	Utilize conformal transformation and complex integral arising in aerofoil theory, fluid flow visualization and image processing.		
CO3	Apply discrete and continuous probability distributions in analyzing the probability models arising in engineering field.		
CO4	Make use of the correlation and regression analysis to fit a suitable mathematical model for the statistical data.		
CO5	Construct joint probability distributions and demonstrate the validity of testing the hypothesis		

Year / SEM: 2 nd year / 4 th sem		Year of Study: 2019-20
Course Name: Analysis of Determinate Structures – 18CV42		
CO1	Identify different forms of structure	ral systems



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CO2	Construct ILD and analyse the beams and trusses subjected to moving load
CO3	Understand the energy principles and energy theorems and its applications to determine the deflections of trusses and beams
CO4	Determine the stress resultants in arches and cables

Year / SEM: 2 nd year / 4 th sem		Year of Study: 2019-20
Course Name: Applied Hydraulics - 18CV43		
CO1	Apply dimensional analysis to develop mathematical modeling and compute the parametric values in prototype by analyzing the corresponding model parameters	
CO2	Design the open channels of various cross sections including economical channel sections	
CO3	Apply Energy concepts to flow in open channel sections, Calculate Energy Dissipation	
CO4	Compute water surface profiles at different conditions	
C05	Design turbines for the given data under different operating condition	, and to know their operation characteristics

Year / SEM: 2 nd year / 4 th sem		Year of Study: 2019-20
Course Name: Concrete Technology - 18CV44		
CO1	Relate material characteristics and their influence on microstructure of concrete.	
CO2	Distinguish concrete behavior based on its fresh and hardened properties.	
CO3	Illustrate proportioning of different types of concrete mixes for required fresh and hardened properties using professional codes.	
CO4	Adopt suitable concreting methods to place the concrete based on requirement	
CO5	Select a suitable type of concrete based on specific application	

Year / SEM: 2 nd year / 4 th sem		Year of Study: 2019-20
Course Name: ADVANCED SURVEYING - 18CV45		
CO1	Apply the knowledge of geometric principles to arrive at surveying problems	
CO2	Use modern instruments to obtain geo-spatial data and analyse the same to appropriate engineering problems	
CO3	Capture geodetic data to process and perform analysis for survey problems with the use of electronic instrument	



CO4

Design and implement the different types of curves for deviating type of alignments

Year / SEM: 2 nd year / 4 th sem		Year of Study: 2019-20
Course Name: WATER SUPPLY AND TREATMENT ENGINEERING - 18CV46		
CO1	Estimate average and peak water of	lemand for a community
CO2	Evaluate available sources of water, quantitatively and qualitatively and make appropriate choice for a community	
CO3	Evaluate water quality and environ plan suitable treatment system	nmental significance of various parameters and
CO4	Design a comprehensive water tre distribute water to the required qu	atment and distribution system to purify and ality standards

Year / SEM: 2 nd year / 4 th sem		Year of Study: 2019-20
Course Name: ENGINEERING GEOLOGY LABORATORY - 18CVL47		
CO1	The students able to identify the minerals, rocks and utilize them effectively in civil engineering practices	
CO2	The students will interpret and understand the geological conditions of the area for implementation of civil engineering projects	
CO3	The students will interpret subsurface information such as thickness of soil, weathered zone, depth of hard rock and saturated zone by using geophysical methods	
CO4	The students will learn the techniques in the interpretation of LANDSAT Imageries to find out the lineaments and other structural features for the given area	
CO5	The students will be able to identi	fy the different structures in the field

Year / SEM: 2 nd year / 4 th sem		Year of Study: 2019-20
Course Name: FLUID MECHANICS AND HYDRAULIC MACHINES LABORATORY - 18CVL48		
CO1	Properties of fluids and the use of various instruments for fluid flow measurement	
CO2	CO2 Working of hydraulic machines under various conditions of working and their characteristics	

Year / SEM: 3 rd year / 5 th sem	Year of Study: 2019-20
Course Name: Design of RC	Structural Elements – 17CV51



CO1	understand the design philosophy and principles
CO2	solve engineering problems of RC elements subjected to flexure, shear and torsion
CO3	demonstrate the procedural knowledge in designs of RC structural elements such as slabs, columns and footings
CO4	owns professional and ethical responsibility

Year / SEM: 3 rd year / 5 th sem		Year of Study: 2019-20
Course Name: Analysis of Indeterminate Structures – 17CV52		
C01	Determine the moment in indeterminate beams and frames having variable moment of inertia and subsidence using slope defection method	
CO2	Determine the moment in indeterminate beams and frames of no sway and sway using moment distribution method.	
CO3	Construct the bending moment diagram for beams and frames by Kani's method.	
CO4	Construct the bending moment diagram for beams and frames using flexibility method	
CO5	Analyze the beams and indetermin	ate frames by system stiffness method.
Year / SEM: 3 rd year / 5 th sem Year of Study: 2019-20		
Course Name: Applied Geotechnical Engineering – 17CV53		
	Course Name: Applied Geote	chnical Engineering – 17CV53
CO1	Course Name: Applied Geote Ability to plan and execute geotec civil engineering projects	chnical Engineering – 17CV53 hnical site investigation program for different
C01	Course Name: Applied Geote Ability to plan and execute geotec civil engineering projects	chnical Engineering – 17CV53 hnical site investigation program for different
CO1	Course Name: Applied Geote Ability to plan and execute geotec civil engineering projects Understanding of stress distribution footings on sand and clayey soils	hnical Engineering – 17CV53 hnical site investigation program for different on and resulting settlement beneath the loaded
CO1 CO2 CO3	Course Name: Applied Geote Ability to plan and execute geotec civil engineering projects Understanding of stress distribution footings on sand and clayey soils Ability to estimate factor of safety pressure distribution behind earth	hnical Engineering – 17CV53 hnical site investigation program for different on and resulting settlement beneath the loaded against failure of slopes and to compute lateral retaining structures
CO1 CO2 CO3 CO4	Course Name: Applied Geote Ability to plan and execute geotec civil engineering projects Understanding of stress distribution footings on sand and clayey soils Ability to estimate factor of safety pressure distribution behind earth Ability to determine bearing capao shallow isolated and combined foo	hnical Engineering – 17CV53 hnical site investigation program for different on and resulting settlement beneath the loaded against failure of slopes and to compute lateral retaining structures bity of soil and achieve proficiency in proportioning otings for uniform bearing pressure

Year / SEM: 3 rd year / 5 th sem		Year of Study: 2019-20
Course Name: Computer Aided Building Planning and Drawing – 17CV54		
CO1	Gain a broad understanding of planning and designing of buildings	
CO2	Prepare, read and interpret the drawings in a professional set up.	
CO3	Know the procedures of submission of drawings and Develop working and submission drawings for building	
CO4	Plan and design a residential or public building as per the given requirements	



Year / SEM: 3 rd year / 5 th sem		Year of Study: 2019-20
Course Name: Air Pollution and Control – 17CV551		
CO1	Identify the major sources of air p and environment.	ollution and understand their effects on health
CO2	Evaluate the dispersion of air pollutants in the atmosphere and to develop air quality models.	
CO3	Ascertain and evaluate sampling techniques for atmospheric and stack pollutants.	
CO4	Choose and design control techniques for particulate and gaseous emissions.	

Year / SEM: 3 rd year / 5 th sem		Year of Study: 2019-20
Course Name: OCCUPATIONAL HEALTH AND SAFETY – 17CV564		
CO1	Identify hazards in the workplace that pose a danger or threat to their safety or health, or that of others	
CO2	Control unsafe or unhealthy hazards and propose methods to eliminate the hazard	
CO3	Present a coherent analysis of a potential safety or health hazard both verbally and in writing, citing the occupational Health and Safety Regulations as well as supported legislation	
CO4	Discuss the role of health and safety in the workplace pertaining to the responsibilities of workers, managers, supervisors	
CO5	Identify the decisions required to maintain protection of the environment, workplace as well as personal health and safety	

Year /	SEM: 3 rd year / 5 th sem	Year of Study: 2019-20
Course Name: Geotechnical Engineering Lab – 17CVL57		
CO1	Physical and index properties of the soil	
CO2	Classify based on index properties and field identification	
CO3	To determine OMC and MDD, plan and assess field compaction program	
CO4	Shear strength and consolidation parameters to assess strength and deformation characteristics	
C05	In-situ shear strength characteristics (SPT- Demonstration)	

Year / SEM: 3 rd year / 5 th sem		Year of Study: 2019-20
Course Name: Concrete and Highway Materials Laboratory – 17CVL58		
CO1 Conduct appropriate laboratory experiments and interpret the results		



CO2	Determine the quality and suitability of cement
CO3	Design appropriate concrete mix
CO4	Determine strength and quality of concrete
CO5	Test the road aggregates and bitumen for their suitability as road material.
CO6	Test the soil for its suitability as sub grade soil for pavements.

Year / SEM: 3 rd year / 6 th sem		Year of Study: 2019-20
Course Name: Construction Management and Entrepreneurship – 17CV61		
CO1	Understand the construction management process.	
CO2	Understand and solve variety of issues that are encountered by every professional in discharging professional duties.	
CO3	Fulfill the professional obligations effectively with global outlook	

Year /	SEM: 3 rd year / 6 th sem	Year of Study: 2019-20	
	Course Name: Design of Steel Structural Elements – 17CV62		
CO1	Possess a knowledge of Steel Structures Advantages and Disadvantages of Steel structures, steel code provisions and plastic behavior of structural steel		
CO2	Understand the Concept of Bolted and Welded connections.		
CO3	Understand the Concept of Design of compression members, built-up columns and columns splices.		
CO4	Understand the Concept of Design of tension members, simple slab base and gusseted base.		
C05	Understand the Concept of Design of laterally supported and un-supported steel beams.		

Year / SEM: 3 rd year / 6 th sem		Year of Study: 2019-20
Course Name: Highway Engineering - 17CV63		
CO1	Acquire the capability of proposing a new alignment or re-alignment of existing roads, conduct necessary field investigation for generation of required data.	
CO2	Evaluate the engineering properties of the materials and suggest the suitability of the same for pavement construction.	
CO3	Design road geometrics, structural components of pavement and drainage.	
CO4	Evaluate the highway economics by few select methods and also will have a basic knowledge of various highway financing concepts.	



Year / SEM: 3 rd year / 6 th sem		Year of Study: 2019-20
Course Name: Water Supply and Treatment Engineering - 17CV64		
CO1	Estimate average and peak water demand for a community.	
CO2	Evaluate available sources of water, quantitatively and qualitatively and make appropriate choice for a community.	
CO3	Evaluate water quality and environmental significance of various parameters and plan suitable treatment system.	
CO4	Design a comprehensive water tre distribute water to the required qu	atment and distribution system to purify and ality standards.

Year / SEM: 3 rd year / 6 th sem		Year of Study: 2019-20
Course Name: Solid Waste Management - 17CV651		
CO1	Analyze existing solid waste management system and to identify their drawbacks	
CO2	Evaluate different elements of solid waste management system	
CO3	Suggest suitable scientific methods for solid waste management elements	
CO4	Design suitable processing system	and evaluate disposal sites.

Year / SEM: 3 rd year / 6 th sem		Year of Study: 2019-20	
	Course Name: Water Resources Management - 17CV661		
CO1	Assess the potential of groundwater and surface water resources		
CO2	Address the issues related to planning and management of water resources		
CO3	Know how to implement IWRM in different regions		
CO4	Understand the legal issues of water policy.		
CO5	Select the method for water harves	sting based on the area	



Course Name: Software Application Lab - 17CVL67		
CO1	use software skills in a professional set up to automate the work and thereby reduce cycle time for completion of the work	

Year / SEM: 3 rd year / 6 th sem		Year of Study: 2019-20
Course Name: Extensive Survey Project /Camp – 17CVP68		
CO1	Apply Surveying knowledge and tools effectively for the projects	
CO2	Understanding Task environment, Goals, responsibilities, Task focus, working in Teams towards common goals, Organizational performance expectations, technical and behavioral competencies.	
CO3	Application of individual effectiveness skills in team and organizational context, goal setting, time management, communication and presentation skills.	
CO4	Professional etiquettes at workplace	ce, meeting and general
CO5	Establishing trust-based relationships in teams & organizational environment	
CO6	Orientation towards conflicts in te sources of conflicts, Conflict resol	am and organizational environment, Understanding ution styles and techniques

Year /	SEM: 3 rd year / 7 th sem	Year of Study: 2019-20
Course Name: Municipal and Industrial Waste Water Engineering – 15CV71		
CO1	Acquires capability to design sewe	er and Sewerage treatment plant.
CO2	Evaluate degree of treatment and t	ype of treatment for disposal, reuse and recycle.
CO3	Identify waste streams and design	the industrial waste water treatment plant.
CO4	Manage sewage and industrial eff	uent issues.

Year / SEM: 3 rd year / 7 th sem		Year of Study: 2019-20
Course Name: Design of RCC and Steel Structures – 15CV72		
CO1	Students will acquire the basic know	owledge in design of RCC and Steel Structures.
CO2	Students will have the ability to for and skills to arrive at structurally s	blow design procedures as per codal provisions safe RC and Steel members.

Year / SEM: 3 rd year / 7 th sem		Year of Study: 2019-20
Course Name: Hydrology and Irrigation Engineering – 15CV73		
CO1 Understand the importance of hydrology and its components.		



CO2	Measure precipitation and analyze the data and analyze the losses in precipitation.
CO3	Estimate runoff and develop unit hydrographs.
CO4	Find the benefits and ill-effects of irrigation.
CO5	Find the quantity of irrigation water and frequency of irrigation for various crops.
CO6	Find the canal capacity, design the canal and compute the reservoir capacity.

Year / SEM : 3 rd year / 7 th sem		Year of Study : 2018-19
Course Name: Ground Water & Hydraulics – 15CV742		
CO1	Find the characteristics of aquifers	
CO2	Estimate the quantity of ground w	ater by various methods.
CO3	Locate the zones of ground water resources.	
CO4	Select particular type of well and a	augment the ground water storage.

Year / SEM: 3 rd year / 7 th sem		Year of Study: 2019-20
Course Name: Rehabilitation and Retrofitting of Structures – 15CV753		Retrofitting of Structures – 15CV753
CO1	Understand the cause of deteriorat	ion of concrete structures.
CO2	Able to assess the damage for diff	erent type of structures
CO3	Summarize the principles of repair	and rehabilitation of structures
CO4	Recognize ideal material for differ	ent repair and retrofitting technique

Year /	' SEM: 3 rd year / 7 th sem	Year of Study: 2019-20
	Course Name: Environmental Engineering Laboratory – 15CVL76	
CO1	Acquire capability to conduct expedifferent parameters.	eriments and estimate the concentration of
CO2	Compare the result with standards	and discuss based on the purpose of analysis.
CO3	Determine type of treatment, degr	ee of treatment for water and waste water.
CO4	Identify the parameter to be analyzenvironmental stream	zed for the student project work in

Year / SEM: 3 rd year / 7 th sem	Year of Study: 2019-20
Course Name: Computer Aided	Detailing of Structures – 15CVL77



CO1

Prepare detailed working drawings

Year / SEM: 4 th year / 8 th sem		Year of Study: 2019-20
Course Name: Quantity Surveying and Contracts Management – 17CV81		
C01	Prepare detailed and abstract estin	nates for roads and building
CO2	Prepare valuation reports of build	ngs
CO3	Interpret Contract document's of a	lomestic and international construction works

Year /	SEM: 4 th year / 8 th sem	Year of Study: 2019-20
Course Name: Design of Pre Stressed Concrete Elements – 15CV82		
CO1	Understand the requirement of PS	C members for present scenario
CO2	Analyze the stresses encountered i	n PSC element during transfer and at working
CO3	Understand the effectiveness of th	e design of PSC after studying losses
CO4	Capable of analyzing the PSC eler	nent and finding its efficiency
CO5	Design PSC beam for different rec	uirements

Year / SEM: 4 th year / 8 th sem		Year of Study: 2019-20
Course Name: Hydraulic Structures – 15CV832		
CO1	Check the stability of gravity dam	s and design the dam.
CO2	Estimate the quantity of seepage the	nrough earth dams
CO3	Design spillways and aprons for v	arious diversion works
CO4	Select particular type of canal regu	alation work for canal network



2.6.1 Program outcomes, program specific outcomes and course outcomes

ProgramOutcomes:



PO1-Apply knowledge of mathematics and science, with fundamentals of Computer Science & Engineering to be able to solve complex engineering problems related to CSE.

PO2-Apply mathematical foundations, algorithmic principles, and computer Science theory in the modelling and design of computer based systems in a way that demonstrates comprehension of tradeoffs involved in design choices.

PO3-Analyze a problem, and identify and define the computing requirements appropriate to its solution PO4-Design and development principles in the construction of software systems of varying complexity.

PO5-Design, implement, and evaluate a software or a software/hardware system, component, or process to meet desired needs within realistic constraints such as memory, runtime efficiency, as well as appropriate constraints related to economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability considerations;

PO6-Use the techniques, skills, and modern engineering tools necessary for practice as a CSE professional; PO7-Work effectively as an individual, and as a member or leader in diverse teams and in multidisciplinary environment.

PO8-Demonstrate knowledge of contemporary issues and understand professional, ethical, legal, security



(Approved by AICTE, New Delhi, Govt. of Karnataka, Affiliated to Visvesvaraya Technological University, Belagavi) and social issues and responsibilities;

PO9-Analyze the local and global impact of computing on individuals, organizations, and society; PO10-Demonstrate knowledge and understanding of the engineering and management principles including financial implications and apply these to his/her work, as a member and leader in a team, and to manage project work as part of a multidisciplinary team.

PO11-Communicate effectively in both verbal and written forms

PO12-Recognize the need for, and be motivated to engage in life-long learning and continuing professional development.

PROGRAM SPECIFIC OUTCOMES (PSOs):

Engineering Graduates will be able to:

PSO-1:	Understand, apply and demonstrate advanced technical skills in problem solving and leadership, as well as an understanding of system integration and the practical technological problems of end users.
PSO-2:	An ability to design, implement, and evaluate a software or a
	software/hardware system, component, or process to meet desired
	needs within realistic constraints such as memory, runtime efficiency,
	as well as other socio-economic constraints.



Course Outcomes:

Year /	SEM : 2 nd year / 3 rd sem Year of Study : 2019-20
	Course Name:
CO1	Use Laplace transform and inverse Laplace transform in solving differential/ integral equation arising in network analysis, control systems and other fields of engineering.
CO2	Demonstrate Fourier series to study the behaviour of periodic functions and their applications in system communications, digital signal processing and field theory.
CO3	Make use of Fourier transform and Z-transform to illustrate discrete/continuous function arising in wave and heat propagation, signals and systems.
CO4	Solve first and second order ordinary differential equations arising in engineering problems using single step and multistep numerical methods.
C05	Determine the externals of functionals using calculus of variations and solve problems arising in dynamics of rigid bodies and vibrational analysis.

Year /	SEM : 2 nd year / 3 rd sem	Year of Study : 2019-20	
Course Name:DATA STRUCTURES AND APPLICATIONS-18CS32			
CO1	Use different types of data structures, operations and algorithms		
CO2	Apply searching and sorting operations on files		
CO3	Use stack, Queue, Lists, Trees and Graphs in problem solving		
CO4	Implement all data structures in a high-level language for problem solving.		

Year /	SEM : 2 nd year / 3 rd sem	Year of Study : 2019-20			
Course Name: ANALOG AND DIGITAL ELECTRONICS – 18CS33					
CO1	Design and analyze application of analog circuits using photo devices, timer IC, power supply and regulator IC and op-amp.				
CO2	Explain the basic principles of A/D and D/A conversion circuits and develop the same.				
CO3	Simplify digital circuits using K	Carnaugh Map , and Quine-McClusky Methods			
CO4	Explain Gates and flip flops and make us in designing different data processing circuits, registers and counters and compare the types.				
CO5	Develop simple HDL programs				



Year / SEM : 2 nd year / 3 rd sem			Yea	r of Study	7 : 2019) -20	
Course Name: COMPUTER ORGANIZATION – 18CS34							
CO1	Explain the basic organization of	of a comput	ter sys	stem.			
CO2	Demonstrate functioning of Input/output,andmemory.	different	sub	systems,	such	as	processor,
CO3	Illustrate hardwired control and embedded and other computing	micro prog systems.	gramn	ned contro	l, pipel	ininş	g,
CO4	Design and analyse simple arith	metic and	logica	l units.			

Year / SEM : 2 nd year / 3 rd sem		Year of Study : 2019-20				
	Course Name: SOFTWARE ENGINEERING- 18CS35					
CO1	CO1 Design a software system, component, or process to meet desired needs within realistic constraints.					
CO2	Assess professional and ethical responsibility					
CO3	Function on multi-disciplinary teams					
CO4	Use the techniques, skills, and modern engineering tools necessary for engineering practice					
CO5	Analyze, design, implement, verify, validate, implement, apply, and maintain software systems or parts of software systems					

Year /	SEM : 2 nd year / 3 rd sem	Year of Study : 2019-20			
Cours	Course Name: DISCRETE MATHEMATICAL STRUCTURES – 18CS36				
CO1	Use propositional and predicate logic in knowledge representation and truth verification				
CO2	Demonstrate the application of discrete structures in different fields of computer science.				
CO3	Solve problems using recurrence relations and generating functions.				
CO4	Application of different mathematical proofs techniques in proving theorems in the courses				
C05	Compare graphs, trees and their applications.				

Year / SEM : 2 nd year / 3 rd sem		Year of Study : 2019-20
Course Name: ANALOG AND DIGITAL ELECTRONICS LABORATORY – 18CS		LECTRONICS LABORATORY – 18CSL37
CO1	Use appropriate design equations / methods to design the given circuit	



CO1	Examine an	d verif	y the design of	both analog a	nd digital ci	rcuits using	
02	simulators.						
CO3	Make us of	electro	nic components	s, ICs, instrun	nents and to	ols for design a	nd
05	testing of circuits for the given the appropriate inputs.						
	Compile	а	laboratory	journal	which	includes;	aim,
CO4	tool/instruments/software/components used, design equations used and designs,						
004	schematics, program listing, procedure followed, relevant theory, results as						
	graphs and t	ables,	interpreting and	l concluding 1	the findings.		

Year / SEM : 2 nd year / 3 rd sem		Year of Study : 2019-20	
Course Name: DATA STRUCTURES LABORATORY – 18CSL38			
CO1	Analyze and Compare various linear and non-linear data structures		
CO2	Code, debug and demonstrate the working nature of different types of data structures and their applications		
CO3	Implement, analyze and evaluate the searching and sorting algorithms		
CO4	Choose the appropriate data structure for solving real world problems		
Year / SEM : 2 nd year / 4 th semYear of Study : 2019-20		Year of Study : 2019-20	
Cour	se Name: DESIGN AND ANA	LYSIS OF ALGORITHMS – 18CS42	
CO1	Describe computational solution to well known problems like searching, sorting etc.		
CO2	Estimate the computational complexity of different algorithms.		
CO3	Devise an algorithm using appropriate design strategies for problem solving.		

Year	r / SEM : 2 nd year / 4 th sem Year of Study : 2019-20
	Course Name:
CO1	Use the concepts of analytic function and complex potentials to solve the problems arising in electromagnetic field theory.
CO2	Utilize conformal transformation and complex integral arising in aerofoil theory, fluid flow visualization and image processing.
CO3	Apply discrete and continuous probability distributions in analyzing the probability models arising in engineering field.
CO4	Make use of the correlation and regression analysis to fit a suitable mathematical model for the statistical data.
CO5	Construct joint probability distributions and demonstrate the validity of testing the hypothesis



Year / SEM : 2 nd year / 4 th sem		Year of Study : 2019-20			
Course Name: OPERATING SYSTEMS – 18CS43					
CO1	Demonstrate need for OS and different types of OS				
CO2	Apply suitable techniques for management of different resources				
CO3	Use processor, memory, storage and file system commands.				
CO4	Realize the different concepts of OS in platform of usage through case studies				

Year / SEM : 2 nd year / 4 th sem		Year of Study : 2019-20		
Course Name: MICROCONTROLLER AND EMBEDDED SYSTEMS – 18CS44				
CO1	Describe the architectural features and instructions of ARM microcontroller			
CO2	Apply the knowledge gained for Programming ARM for different applications.			
CO3	Interface external devices and I/O with ARM microcontroller.			
CO4	Interpret the basic hardware components and their selection method based on the characteristics and attributes of an embedded system.			
CO5	Develop the hardware /software co-design and firmware design approaches.			

CO6	Demonstrate the need of real time operating system for embedded system
	applications

Year / SEM : 2 nd year / 4 th sem		Year of Study : 2019-20
Course Name: OBJECT ORIENTED CONCEPTS – 18CS45		ENTED CONCEPTS – 18CS45
CO1	Explain the object-oriented con	cepts and JAVA.
CO2	Develop computer programs to	solve real world problems in Java.
CO3	Develop simple GUI interfaces and to understand the event-bas	for a computer program to interact with users, ed GUI handling principles using swings.

Year / SEM : 2 nd year / 4 th sem		Year of Study : 2019-20
Course Name: DATA COMMUNICATION – 18CS46		
CO1	Explain the various components	s of data communication.
CO2	Explain the fundamentals of dig	gital communication and switching.
CO3	Compare and contrast data link	layer protocols.



CO4

Summarize IEEE 802.xx standards

Year / SEM : 2 nd year / 4 th sem		Year of Study : 2019-20
Course Name: DESIGN AND ANALYSIS OF ALGORITHM LABORATORY- 18CSL47		
CO1	Design algorithms using approp dynamic programming, etc.)	oriate design techniques (brute-force, greedy,
CO2	Implement a variety of algorithmeter, in a high level language.	ms such assorting, graph related, combinatorial,
CO3	Analyze and compare the performance of the performa	rmance of algorithms using language features
CO4	Apply and implement learned a solve real-world problems.	lgorithm design techniques and data structuresto

Year / SEM : 2 nd year / 4 th sem		Year of Study : 2019-20
Course Name: MICROCONTROLLER AND		D EMBEDDED SYSTEMS LABORATORY -
18CSL48		
CO1	Develop and test program using	, ARM7TDMI/LPC2148.
CO2	Conduct the following experi board using evaluation version	ments on an ARM7TDMI/LPC2148evaluation of Embedded 'C' & Keil Uvision-4tool/compiler.

Year / SEM : 3 rd year / 5 th sem		Year of Study : 2019-20
Course Name: MANAGEMENT AND EN		FREPRENEURSHIP FOR IT INDUSTRY –
	170	C851
CO1	Define management, organizati outline their importance in entro	on, entrepreneur, planning, staffing, ERP and epreneurship
CO2	Utilize the resources available e	effectively through ERP
CO3	Make use of IPRs and institutio	nal support in entrepreneurship

Year / SEM : 3 rd year / 5 th sem		Year of Study : 2019-20
Course Name: COMPUTER NETWORKS – 17CS52		
CO1	Explain principles of applicatio	n layer protocols
CO2	Outline transport layer services	and infer UDP and TCP protocols
CO3	Classify routers, IP and Routing	g Algorithms in network layer
CO4	Understand the Wireless and M	obile Networks covering IEEE 802.11 Standard



CO5

Describe Multimedia Networking and Network Management

Year / SEM : 3 rd year / 5 th sem		Year of Study : 2019-20
Course Name: DATABASE MANAGEMENT SYSTEM – 17CS53		
CO1	Summarize the concepts of data database using RDBMS.	base objects; enforce integrity constraints on a
CO2	Use Structured Query Language	e (SQL) for database manipulation.
CO3	Design and build simple databa	se systems
CO4	Develop application to interact	with databases.

Year / S	SEM : 3 rd year / 5 th sem	Year of Study : 2019-20
Course Name: AUTOMATA THEORY AND COMPUTABILITY – 17CS54		
CO1	Tell the core concepts in automata theory and Theory of Computation	
CO2	Explain how to translate betwee Deterministic and Non-determi	en different models of Computation (e.g., nistic and Software models).
CO3	Interpret Grammars and Autom classes and become knowledge (Regular, Context Free) and the	ata (recognizers) for different language able about restricted models of Computation ir relative powers.
CO4	Develop skills in formal reason model, with an emphasis on ser	ing and reduction of a problem to a formal nantic precision and conciseness
CO5	Classify a problem with respect	to different models of Computation.

Year / SEM : 3 rd year / 5 th sem		Year of Study : 2019-20
Course Name: ADVANCED JAVA AND J2EE- 17CS553		
CO1	Interpret the need for advanced in developing modular and effic	Java concepts like enumerations and collections cient programs
CO2	Build client-server applications	and TCP/IP socket programs
CO3	Illustrate database access and de API	etails for managing information using the JDBC
CO4	Describe how servlets fit into Ja	ava-based web application architecture
C05	Develop reusable software com	ponents using Java Beans



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Year / S	SEM : 3 rd year / 5 th sem	Year of Study : 2019-20
Course Name: ARTIFICIAL INTELLIGENCE- 17CS562		
CO1	Identify the AI based problems.	
CO2	Apply techniques to solve the A	I problems
CO3	Define learning and explain var	ious learning techniques
CO4	Discuss expert systems	

Year / SEM : 3 rd year / 5 th sem		Year of Study : 2019-20
Course Name: COMPUTER NETWORK LABORATORY- 17CSL57		
CO1	Analyze and Compare various n	ietworking protocols.
CO2	Demonstrate the working of dif	ferent concepts of networking.
CO3	Implement, analyze and evaluat	e networking protocols in NS2 / NS3

Year / SEM : 3 rd year / 5 th sem		Year of Study : 2019-20
Course Name: DBMS LABORATORY WITH MINI PROJECT – 17CSL58		
C01	Use Structured Query Language (SQL) for database Creation and manipulation	
CO2	Demonstrate the working of different concepts of DBMS	
CO3	Implement and test the project of	leveloped for an application.

Year / SEM : 3 rd year / 6 th sem		Year of Study : 2019-20
Course Name: CRYPTOGRAPHY, NET		WORK SECURITY AND CYBER LAW –
17CS61		
CO1	Discuss cryptography and its need to various applications	
CO2	Design and develop simple cryptography algorithms	
CO3	Understand cyber security and need cyber Law	

Year / SEM : 3 rd year / 6 th sem	Year of Study : 2019-20
Course Name: COMPUTER GRAPH	ICS AND VISUALIZATION – 17CS62



CO1	Design and implement algorithms for 2D graphics primitives and attributes.
CO2	Illustrate Geometric transformations on both 2D and 3D objects.
CO3	Understand the concepts of clipping and visible surface detection in 2D and 3D viewing, and Illumination Models.
CO 4	Discussabout suitable hardware and software for developing graphics packages using OpenGL.

Year / SEM : 3 rd year / 6 th sem		Year of Study : 2019-20
Course Name: SYSTEM SOFTWARE AND COMPILER DESIGN-17CS63		
CO1	Illustrate system software macroprocessors	such as assemblers, loaders, linkers and
CO2	Design and develop lexical ana	yzers, parsers and code generators
CO3	Discuss about lex and yacc tool software	s for implementing different concepts of system

Year / SEM : 3 rd year / 6 th sem		Year of Study : 2019-20
Course Name: OPERATING SYSTEMS – 17CS64		
C01	Demonstrate need for OS and different types of OS	
CO2	Discuss suitable techniques for management of different resources	
CO3	Illustrate processor, memory, storage and file system commands	
CO4	Explain the different concepts of OS in platform of usage through case studies	

Year / SEM : 3 rd year / 6 th sem		Year of Study : 2019-20
Course Name: OPERATION RESEARCH- 17CS653		
C01	Explain optimization techniques for various problems.	
CO2	Understand the given problem as transportation and assignment problem and solve.	
CO3	Illustrate game theory for decision support system.	

Year / SEM : 3 rd year / 6 th sem		Year of Study : 2019-20
Course Name: PYTHON APPLICATION PROGRAMMING- 17CS664		
C01	Understand Python syntax and control and functions.	semantics and be fluent in the use of Python flow
CO2	Demonstrate proficiency in han	dling Strings and File Systems.



CO3	Implement Python Programs using core data structures like Lists, Dictionaries and use Regular Expressions.
CO4	Interpret the concepts of Object-Oriented Programming as used in Python.
CO5	Implement exemplary applications related to Network Programming, Web Services and Databases in Python

Year / SEM : 3 rd year / 6 th sem		Year of Study : 2019-20
Course Name: SYSTEM SOFTWARE ANI		O OPERATING SYSTEM LABORATORY –
17CSL67		
CO1	Implement and demonstrate Lexer's and Parser's	
COI		
CON	Implement different algorithms required for management, scheduling, allocation	
02	and communication used in operating system	

Year / SEM : 3 rd year / 6 th sem		Year of Study : 2019-20
Course Name: COMPUTER GRAPHICS LABORATORY WITH MINI PROJECT –		
17CSL68		
CO1	Apply the concepts of compute	r graphics
CO2	Implement computer graphics a	pplications using OpenGL
CO3	Implement real world problems using OpenGL	

Year / SEM : 4 th year / 7 th sem		Year of Study : 2019-20
Course Name: WEB TECHNOLOGY AND ITS APPLICATIONS – 15CS71		
CO1	Adapt HTML and CSS syntax and semantics to build web pages.	
CO2	Construct and visually format tables and forms using HTML and CSS	
CO3	Develop Client-Side Scripts using JavaScript and Server-Side Scripts using PHP to generate and display the contents dynamically.	
CO4	Appraise the principles of object oriented development using PHP	
CO5	Inspect JavaScript frameworks like jQuery and Backbone which facilitates developer to focus on core features	



Year / SEM : 4 th year / 7 th sem		Year of Study : 2019-20
Course Name: ADVANCED COMPUTER ARCHITECTURES- 15CS72		
CO1	Explain the concepts of parallel computing and hardware technologies	
CO2	Compare and contrast the paral	el architectures
CO3	Illustrate parallel programming concepts	

Year / SEM : 4 th year / 7 th sem		Year of Study : 2019-20
Course Name: MACHINE LEARNING- 15CS73		
C01	Identify the problems for machine learning. And select the either supervised, unsupersvised or reinforcement learning.	
CO2	Explain theory of probability and statistics related to machine learning	
CO3	Investigate concept learning, A	NN, Bayes classifier, k nearest neighbor, Q,

Year / SEM : 4 th year / 7 th sem		Year of Study : 2019-20
Course Name: UNIX SYSTEM PROGRAMMING- 15CS744		
CO1	Ability to understand and reason out the working of Unix Systems	
CO2	Build an application/service over a Unix system.	

Year / S	SEM: 4 th year / 7 th sem	Year of Study : 2019-20	
	Course Name: STORAGE AREA NETWORKS- 15CS754		
CO1	Identify key challenges in managing information and analyze different storage networking technologies and virtualization		
CO2	Explain components and the implementation of NAS		
CO3	Describe CAS architecture and	types of archives and forms of virtualization	
CO4	Ilustrate the storage infrastructu	re and management activities	

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Year / SEM : 4 th year / 7 th sem		Year of Study : 2019-20	
Co	Course Name: MACHINE LEARNING LABORATORY- 15CSL76		
CO1	Understand the implementation	procedures for the machine learning algorithms.	
CO2	Design Java/Python programs for various Learning algorithms.		
CO3	Apply appropriate data sets to t	he Machine Learning algorithms.	
CO4	Identify and apply Machine Lea	arning algorithms to solve real world problems.	

Year / S	SEM: 4 th year / 7 th sem	Year of Study : 2019-20
Course Name: WEB TECHNOLOGY LABORATORY WITH MINI PROJECT– 15CSL77		
C01	Design and develop dynamic w and latest technical know-how's	eb pages with good aesthetic sense of designing s.
CO2	Have a good understanding of V other web services.	Web Application Terminologies, Internet Tools
CO3	Learn how to link and publish v	veb sites

Year / S	SEM: 4 th year / 8 th sem	Year of Study : 2019-20
Course Name: IOT TECHNOLOGY-15CS81		
CO1	Interpret the impact and challenges posed by IoT networks leading to new architectural models	
CO2	Compare and contrast the deployment of smart objects and the technologies to connect them to network.	
CO3	Appraise the role of IoT protocols for efficient network communication	
CO4	Elaborate the need for Data Analytics and Security in IoT.	
CO5	Illustrate different sensor techno identify the applications of IoT	ologies for sensing real world entities and inIndustry.



Year / S	SEM : 4 th year / 8 th sem	Year of Study : 2019-20	
	Course Name: BIG DATA ANALYTICS-15CS82		
CO1	Master the concepts of HDFS and MapReduce framework		
CO2	Investigate Hadoop related tools for Big Data Analytics and perform basic Hadoop Administration		
CO3	Recognize the role of Business Intelligence, Data warehousing and Visualization in decision making		
CO4	Infer the importance of core dat	a mining techniques for data analytics	
CO5	Compare and contrast different	Text Mining Techniques	

Year / SEM : 4 th year / 8 th sem		Year of Study : 2019-20
Course Name: MODERN INTERFACE DESIGN – 15CS832		
CO1	Design the user interface, design, menu creation and windows creation and connection between menu and windows	

Master of Technology in Computer Science & Engineering

Year / SEM : 1 st year / 1 st sem		Year of Study : 2019-20
Course Name: MATHEMATICAL FOUNDATION OF COMPUTER SCIENCE- 18SCS11		
CO1	To acquaint the students with mathematical/logical fundamentals including numerical techniques	
CO2	To understand probability, sampli applications of computer and info	ng and graph theory that serve as an essential tool for mation sciences.

Year / S	SEM: 1 st year / 1 st sem	Year of Study : 2019-20
Course Name: ADVANCES IN OPERATING SYSTEMS – 18SCS12		
CO1	Define the fundamentals of Operating Systems.	
CO2	Explain distributed operating system concepts that includes architecture, Mutual exclusion algorithms, Deadlock detection algorithms and agreement protocols	
CO3	Illustrate distributed resource management components viz. the algorithms for implementation of distributed shared memory, recovery and commit protocols	
CO4	Identify the components and mana Systems	gement aspects of Real time, Mobile operating



Year / S	SEM : 1 st year / 1 st sem	Year of Study : 2019-20
Course	Name ADVANCES IN DATA BA	SE MANAGEMENT SYSTEMS – 18SCS13
CO1	Define parallel and distributed databases and its applications.	
CO2	Show applications of Object Oriented database	
CO3	Explain basic concepts, principles of intelligent databases.	
CO4	Utilize the advanced topics of data warehousing and mining .	
CO5	Infer emerging and advanced data models	
CO6	Extend knowledge in research topics of databases.	

Year / SEM : 1 st year / 1 st sem		Year of Study : 2019-20
Course Name INTERNET OF THINGS - 18SCS14		
CO1	Define and explain basic issues, policy and challenges in the IoT	
CO2	Illustrate Mechanism and Key Technologies in IoT	
CO3	Explain the Standard of the IoT	
CO4	Explain resources in the IoT and d	eploy of resources into business
CO5	Demonstrate data analytics for IoT	,

Year / SEM : 1 st year / 1 st sem		Year of Study : 2019-20
Course Name ADVANCES IN DATA BASE MANAGEMENT SYSTEMS – 18SCS13		
CO1	Define parallel and distributed databases and its applications.	
CO2	Show applications of Object Oriented database	
CO3	Explain basic concepts, principles of intelligent databases.	
CO4	Utilize the advanced topics of data warehousing and mining .	
CO5	Infer emerging and advanced data models	
CO6	Extend knowledge in research top	cs of databases.



Course Name IOT and ADBMS Laboratory – 18SCSL16		
CO1	To provide students with contemporary knowledge in Data Compression and Coding	
CO2	To equip students with skills to analyze and evaluate different Data Compression and Coding methods	
CO3	To be instrumental to handle multi dimension data compression	
CO4	To acquire practical knowledge on advanced databases and its applications.	
CO5	To analyze and work on areas like Storage, Retrieval, Multi valued attributes, Triggers and other complex objects, Algorithms etc related to ADBMS.	
CO6	. To design and implement recent applications database for better interoperability	

Year / SEM : 1 st year / 2 ND sem		Year of Study : 2019-20
Course Name Managing Big Data-18SCS21		
CO1	Define big data for business intelli	gence
CO2	Analyze business case studies for big data analytics	
CO3	Explain managing of Big data Wit	hout SQL
CO4	Develop map-reduce analytics using	ng Hadoop and related tools

Year / SEM : 1 st year / 2 ND sem		Year of Study : 2019-20
Course Name Advanced Algorithms-18SCS22		
CO1	Define the graph search algorithm	S
CO2	Explain network flow and linear programming problems.	
CO3	Interpret hill climbing and dynamic programming design techniques.	
CO4	Develop recursive backtracking algorithms	
CO5	Define NP completeness and rand	omized algorithms

Year / SEM : 1 st year / 2 nd sem	Year of Study : 2019-20
Course Name Cloud Computing-18SCS23	



CO1	Define and Cloud, models and Services.
CO2	Compare and contrast programming for cloud and their applications
CO3	Explain virtuaization, Task Scheduling algorithms.
CO4	Apply ZooKeeper, Map-Reduce concept to applications.

Year / SEM : 1 st year / 2 nd sem		Year of Study : 2019-20
Course Name ADVANCES IN STORAGE AREA NETWORKS-18SCS241		
CO1	Define and contrast storage centric	e and server centric systems
CO2	Define metrics used for Designing	storage area networks
CO3	Illustrate RAID concepts	
CO4	Demonstrate, how data centers ma remote mirroring concepts for both	intain the data with the concepts of backup mainly n simple and complex systems.

Year / S	SEM: 1 st year / 2 nd sem	Year of Study : 2019-20	
Course Nam	Course Name TRENDS IN ARTIFICIAL INTELLIGENCE AND SOFT COMPUTING-18SCS252		
CO1	Describe Artificial Intelligence its utility and intelligent		
CO2	Describe a problem as a state space		
CO3	Use and implement search techniques		
CO4	Use knowledge representation tech	nniques for problem solving	
CO5	Solve AI problems using symbolic reasoning and game theory		
CO6	Describe and apply neural network problem domains	s, Describe and apply Fuzzy systems to various	

Year / SEM : 2 nd year / 3 rd sem		Year of Study : 2019-20
Course Name Machine Learning Techniques-18SCS31		
CO1	Explain basic concepts of learning and decision trees.	
CO2	Compare and contrast neural netw	orks and genetic algorithms
CO3	Apply the Bayesian techniques an	l instant based learning



CO4

Examine analytical learning and reinforced learning

Year / S	SEM: 2 nd year / 3 rd sem	Year of Study : 2019-20	
С	Course Name INFORMATION AND NETWORK SECURITY-18SCS322		
CO1	Explain standard algorithms used	to provide confidentiality, integrity and authenticity.	
CO2	Distinguish key distribution and m	anagement schemes.	
CO3	Deploy encryption techniques to s	ecure data in transit across data networks	
CO4	Implement security applications in	the field of Information technology	

Year / S	SEM: 2 nd year / 3 rd sem	Year of Study : 2019-20
Course Name APPLICATION AND WEB SECURITY-18SCS331		
CO1	Web application's vulnerability an	d malicious attacks
CO2	Basic concepts of Mapping the ap	olication
CO3	Illustrate different attacking illustr	ations.
CO4	Basic concepts of Attacking Data	Stores

2.6.1 Program outcomes, program specific outcomes and course outcomes

PO1 - Engineering Knowledge: Acquire knowledge on fundamentals of Electronics & Communication Engineering, Sciences, Mathematics and Computational aspects.

PO2 - Problem Analysis: Identify formulate and solve complex Electronics & Communication Engineering problems by choosing and applying appropriate analysis and modeling methods.

PO3 - Design/Development of solutions: Design and conduct hardware, software, simulation component or process to meet desired needs with realistic constraints including health, safety, cultural, societal and environmental considerations.

PO4 - Conduct Investigations of Complex problems: Carry out research, experiments, team projects and publish the outcomes in various symposia, conferences and journals.

PO5 - Modern Tool Usage: Use advanced tools like Matlab, Cadence, Xilinx, Masm, C & Embedded C, Kiel, CCS V3, V4 to solve complex electronics and interdisciplinary problems.

PO6 - The Engineer and Society: Demonstrate the understanding of impact of engineering solutions on the society and also will be aware of contemporary issues.

PO7 - Environment and Sustainability: Evaluate the impact of engineering solutions in diverse

PO8 - Ethics: Demonstrate knowledge of professional and ethical responsibilities while presenting sustainable solutions.

PO9 - Individual and Team Work: Work effectively as an individual and as a leader in interdisciplinary environments.

PO10 -Communication: Communicate effectively in both verbal and written form.

PO11 -Project Management and Finance: Apply managerial principles to his/her own work including financial implications and to manage project in multidisciplinary environments.

PO12 -Life-Long Learning: Participate and succeed in competitive examinations, develop confidence for self education and ability for life-long learning.

PO13 - Environmental scan through documents of planning commission and the Professional's society like IEEE, IETE, IAMR, AICTE, FICCI.

PROGRAM SPECIFIC OUTCOMES (PSOs):

Engineering Graduates will be able to:

PSO-1:	The ability to understand and apply principles of Electronics and	
	Communication Engineering in the analysis, design and development of	
	various types of integrated electronic systems as well as to interpret and	
	synthesize the experimental data leading to valid conclusions.	
PSO-2:	To solve real time problems with creative ideas, enabling the students to	
	have successful career in industry and also motivate for higher education to	
	promote research and development activities.	

Course Outcomes:

0	ur	se	N	am	le

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

Year / SEM : 2 nd year / 3 rd sem		Year of Study : 2019-20	
Course Name: Electronic Instrumentation- 17EC32			
CO1	Describe instrument measurement Ammeters, Voltmeters, Multimeter Voltmeters.	errors and calculate them & Describe the operation of ers and develop circuits for multirange Ammeters and	
CO2	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 & Describe functional concepts and operation of various Analog measuring instruments to measure field Strength, impedance stroposcopic speed in/out of phase O of coils insulation resistance		
CO3	Describe and discuss functioning and Transducers. Utilize AC a frequency measurements.	and types of Oscilloscopes, Signal generators nd DC bridges for passive component and	

Year / SEM : 2 nd year / 3 rd sem		Year of Study : 2019-20	
Course Name: Analog Electronics- 17EC33			
CO1	Describe the working principle and characteristics of BJT, FET, Single stage, cascaded and feedback amplifiers & Phase shift, Wien bridge, tuned and crystal oscillators using BJT/FET/UJT.		
CO2	Calculating the AC gain and impedance for BJT using re and h parameters models for CE and CC configuration & Determining the performance characteristics and parameters of BJT and FET amplifier using small signal model.		
CO3	Determine the parameters which responses of BJT and FET amplif efficiency of Class A and Class B	affect the low frequency and high frequency iers and draw the characteristics & Evaluate the power amplifiers and voltage regulators.	

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Year / SEM : 2 nd year / 3 rd sem		Year of Study : 2019-20	
Course Name: Digital Electronics- 17EC34			
CO1	Develop simplified switching equation using Karnaugh Maps and Quine-McClusky techniques & Explain the operation of decoders, encoders, multiplexers, demultiplexers, adders, subtractors and comparators.		
CO2	Explain the working of Latches and Flip Flops (SR, D, T and JK) & Design Synchronous/Asynchronous Counters and Shift registers using Flip Flops.		
CO3	Develop Mealy/Moore Models sequential circuits. Apply the kno Registers.	and state diagrams for the given clocked owledge gained in the design of Counters and	

Year / SEM : 2 nd year / 3 rd sem		Year of Study : 2019-20	
Course Name: Network Analysis- 17EC35			
CO1	Determine currents and voltages using source transformation/ source shifting/ mesh nodal analysis and reduce given network using star-delta transformation/ source transformation/ source shifting. 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.		
CO2	Calculate current and voltages for Apply Laplace transform to solve	or the given circuit under transient conditions. the given network.	
CO3	Evaluate for RLC elements/ frequency, quality factor, half per capacitor, current through the RLC network using specified two port r	ency response related parameters like resonant ower frequencies, voltage across inductor and C elements, in resonant circuits Solve the given network parameter like Z or Y or T or h.	

Year / SEM : 2 nd year / 3 rd sem		Year of Study : 2019-20	
Course Name: Engineering Electromagnetics- 17EC36			
CO1	Evaluate problems on electric field due to point, linear, volume charges by applying conventional methods or by Gauss law.		
CO2	Determine potential and energy with respect to point charge and capacitance using Laplace equation. Calculate magnetic field, force, and potential energy with respect to magnetic materials.		
CO3	Apply Maxwell's equation for tin conductors. Evaluate power associ	ne varying fields, EM waves in free space and ated with EM waves using Poynting theorem.	

Year / SEM : 2 nd year / 3 rd sem		Year of Study : 2019-20
Course Name: Analog Electronics Laboratory– 17ECL37		
	Test circuits of rectifiers, clipping circuits, clamping circuits and voltage regulators.	
CO1		


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 (Approved by AICTE, New Delhi, Govt. of Karnataka, Affiliated to Visvesvaraya Technological University, Belagavi)

 Determine the characteristics of BJT and FET amplifiers and plot its frequency

 CO2 response.

	Compute the performance parameters of amplifiers and voltage regulators Design
CO3	and test the basic BJT/FET amplifiers, BJT Power amplifier and oscillators.

Year / S	SEM : 2 nd year / 3 rd sem	Year of Study : 2019-20
Course Name: Digital Electronics Laboratory- 17ECL38		
CO1	Demonstrate the truth table of vari gates. Design and test various comparators, multiplexers.	ous expressions and combinational circuits using logic combinational circuits such as adders, subtractors,
CO2	Realize Boolean expression usi counters and shift registers	ng decoders. Construct and test flips-flops,
CO3	Simulate full adder and up/down c	ounters.

Year /	SEM : 2 nd year / 4 th sem Year of Study : 2019-20
	Course Name:
CO1	Use the concepts of analytic function and complex potentials to solve the problems arising in electromagnetic field theory.
CO2	Utilize conformal transformation and complex integral arising in aerofoil theory, fluid flow visualization and image processing.
CO3	Apply discrete and continuous probability distributions in analyzing the probability models arising in engineering field.
CO4	Make use of the correlation and regression analysis to fit a suitable mathematical model for the statistical data.
CO5	Construct joint probability distributions and demonstrate the validity of testing the hypothesis

Year / SEM : 2 nd year / 4 th sem		Year of Study : 2019-20
	Course Name: Signal	s And Systems- 17EC42
CO1	CO1 Classify the signals as continuous/discrete, periodic/aperiodic, even/odd, energy/pow and deterministic/random signals. Determine the linearity, causality, time-invariance a stability properties of continuous and discrete time systems.	



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(Approved b)	Y AIGIE, New Deini, Govt. of Karnataka, Anniated to visvesvaraya Technological University, Delagavi
CO2	Compute the response of a Continuous and Discrete LTI system using convolution integral and convolution sum. Determine the spectral characteristics of continuous and discrete time signal using Fourier analysis.
CO3	Compute Z-transforms, inverse Z- transforms and transfer functions of complex LTI systems.

Year / SEM : 2 nd year / 4 th sem		Year of Study : 2019-20
Course Name: Control Systems- 17EC43		
CO1	Develop the mathematical model of mechanical and electrical systems & Develop transfer function for a given control system using block diagram reduction techniques and signal flow graph method	
CO2	Determine the time domain specifications for first and second order systems Determine the stability of a system in the time domain using Routh-Hurwitz criterion and Root-locus technique.	
CO3	CO3 Determine the stability of a system in the frequency domain using Nyquist and bode plots Develop a control system model in continuous and discrete time using state variable techniques	

Year / SEM : 2 nd year / 4 th sem		Year of Study : 2019-20	
	Course Name: Principles Of Communication Systems- 17EC44		
CO1	Determine the performance of analog modulation schemes in time and frequenc domains & Determine the performance of systems for generation and detection of modulated analog signals.		
CO2	Characterize analog signals in time domain using Fourier transforms. (modulated signals.	e domain as random processes and in frequency Characterize the influence of channel on analog	
CO3	Determine the performance of an characteristics of pulse amplitud pulse code modulation systems.	nalog communication systems. Understand the e modulation, pulse position modulation and	

Year / SEM : 2 nd year / 4 th sem		Year of Study	/:2019-20
	Course Name: Linear Integrated Circuits- 17EC45		
CO1	Explain Op-Amp circuit and pa Impedances and Slew Rate. Desig & Difference Amplifier, and AC A	rameters including CMRR, gn Op-Amp based Inverting, Amplifiers including Voltage I	PSRR, Input & Output Non-inverting, Summing Follower.
CO2	Test circuits of Op-Amp based Voltage/ Current Sources & Sinks, Current, Instrumentation and Precision Amplifiers. Test circuits of Op-Amp based linear and non-linear circuits comprising of limiting, clamping, Sample & Hold, Differentiator/ Integrator Circuits, Peak Detectors, Oscillators and Multiplier & Divider.		
CO3	Design first & second order Low and Voltage Regulators using Opphase detector, VCO, DAC, ADC	Pass, High Pass, Band Pass, p-Amps. Explain applications and Timer.	Band Stop Filters s of linear ICs in



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Year / SEM : 2 nd year / 4 th sem	Year of Study : 2019-20
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Course Name: Microprocessors-17EC46			
01	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. Write 8086 Assembly level programs using the 8086 instruction set		
CO2	Write modular programs using procedures. Write 8086 Stack and Interrupts programming.		
CO3	Interface 8086 to Static memory chips and 8255, 8254, 0808 ADC, 0800 DAC, Keyboard, Display and Stepper motors. Use INT 21 DOS interrupt function calls to handle Keyboard and Display.		

Year / SEM : 2 nd year / 4 th sem		Year of Study : 2019-20
Course Name: Microprocessor Lab- 17ECL47		
CO1	Write and execute 8086 assembly level programs to perform data transfer, arithmetic ar logical operations. Understand assembler directives, branch, loop operations and DO 21H Interrupts	
CO2	Write and execute 8086 assembly level programs to sort and search elements in a given array. Perform string transfer, string reversing, searching a character in a string with string manipulation instructions of 8086.	
CO3	Utilize procedures and macros in p of 8086 with 7 segment display motor, ADC, DAC, and LDR for s	programming 8086. Demonstrate the interfacing , matrix keyboard, logical controller, stepper simple applications.

Year /	SEM : 2 nd year / 4 th sem	Year of Study : 2019-20	
	Course Name: Linear ICs And Communication Lab- 17ECL48		
CO1	Illustrate the pulse and flat top sampling techniques using basic circuits. Demonstrate addition and integration using linear ICs, and 555 timer operations to generate signals/pulses.		
	Demonstrate AM and FM operations and frequency synthesis.		
CO2			
CO3	Design and illustrate the operation and oscillators using linear IC.	1 of instrumentation amplifier, LPF, HPF, DAC	

Year / S	SEM : 3 rd year / 5 th sem	Year of Study : 2019-20
Course Name: Management And Entrepreneurship Development- 17ES51		ntrepreneurship Development– 17ES51
CO1	Understand the fundamental con- best Entrepreneurship model for the	cepts of Management and Entrepreneurship. Select a ne required domain of establishment.
CO2	Describe the functions of Managers Compare various types of Entrepren	s, Entrepreneurs and their social responsibilities neurs
CO3	Analyze the Institutional suppo agencies	rt by various state and central government



Year / S	SEM : 3 rd year / 5 th sem	Year of Study : 2019-20
Course Name: Digital Signal Processing – 17EC52		
CO1	Determine response of LTI systems using time domain and DFT techniques. Comp DFT of real and complex discrete time signals.	
	Computation of DFT using FFT algorithms and linear filtering approach.	
CO2		
	Solve problems on digital filter de	sign and realize using digital computations.
CO3		

Year /	SEM : 3 rd year / 5 th sem	Year of Study : 2019-20
Course Name: Verilog HDL- 17EC53		
CO1	Write Verilog programs in gate, d of Abstraction. Write simple progr	ataflow (RTL), behavioral and switch modeling levels ams in VHDL in different styles.
CO2	Design and verify the functionalit Identify the suitable Abstraction lev	y of digital circuit/system using test benches. rel for a particular digital design.
CO3	Write the programs more effectiv timing and delay Simulation.	ely using Verilog tasks and directives. Perform

Year / SEM : 3 rd year / 5 th sem		Year of Study : 2019-20
Course Name: Information Theory And Coding- 17EC54		
C01	Explain concept of Dependent & Rate of Information and Order of Encoding, Shannon Fano, Prefix a	Independent Source, measure of information, Entropy, of a source Represent the information using Shannon nd Huffman Encoding Algorithms
CO2	Model the continuous and discrete and joint probabilities Determine computed using Linear Block codes	e communication channels using input, output e a codeword comprising of the check bits s, cyclic codes & convolutional codes
CO3	Design the encoding and decoding convolutional codes, BCH and Go	g circuits for Linear Block codes, cyclic codes, lay codes.

Year / SEM : 3 rd year / 5 th sem		Year of Study : 2019-20
Course Name: Operating System- 17EC553		
CO1	Explain the goals, structure, operatechniques to find performance factors	tion and types of operating systems. Apply scheduling stors.
CO2	Explain organization of file syste contiguous and non-contiguous men	ms and IOCS. Apply suitable techniques for nory allocation.



RajaRajeswari College of Engineering Image: Marc All (Approved by AICTE, New Delhi, Govt. of Karnataka, Affiliated to Visvesvaraya Technological University, Belagavi) Describe message passing, deadlock detection and prevention methods.

CO3

Year / S	SEM : 3 rd year / 5 th sem	Year of Study : 2019-20
Course Name: Automotive Electronics – 17EC561		
CO1	Acquire an overview of automoti Engine Control in today's automot	ve components, subsystems, and basics of Electronic ive industry.
CO2	Use available automotive sens microcontrollers / microprocessors the networking of various mode protocols and diagnostics of the sub	ors and actuators while interfacing with during automotive system design. Understand ales in automotive systems, communication systems.
CO3	Design and implement the electr smartness to the automobiles, pr future Automotive Electronic Syst	onics that attribute the reliability, safety, and oviding add-on comforts and get fair idea on ems.

Year /	SEM : 3 rd year / 5 th sem	Year of Study : 2019-20	
	Course Name: 8051 Microcontroller – 17EC563		
CO1	Explain the difference between 8051 Microcontroller, Interfacing 8051. Write 8051 Assembly level	Microprocessors & Microcontrollers, Architecture of of 8051 to external memory and Instruction set of programs using 8051 instruction set.	
CO2	Explain the Interrupt system, ope 8051. Write 8051 Assembly langua using 8051 timers, to send & rec- generate an external interrupt using	ration of Timers/Counters and Serial port of ge program to generate timings and waveforms eive serial data using 8051 serial port and to a switch.	
CO3	Write 8051 C programs to gener interrupt and to send & receive ser switches, simple LEDs, ADC 080 I/O ports.	rate square wave on 8051 I/O port pin using rial data using 8051 serial port. Interface simple 4, LCD and Stepper Motor to 8051 using 8051	

Year /	SEM : 3 rd year / 5 th sem	Year of Study : 2019-20
Course Name: DSP Lab – 17ECL57		
C01	Understand the concepts of analog to digital conversion of signals and frequency domain sampling of signals. Modelling of discrete time signals and systems and verification of its properties and results.	
CO2	Implementation of discrete comported results.	utations using DSP processor and verify the



CO3

 RajaRajeswari College of Engineering (Intersection)

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 (CO3)

Year / S	SEM : 3 rd year / 5 th sem	Year of Study : 2019-20
Course Name: HDL Lab – 17ECL58		
CO1	Write the Verilog/VHDL programs to simulate Combinational circuits in Dataflow Behavioral and Gate level Abstractions. Describe sequential circuits like flip flops and counters in Behavioral description and obtain simulation waveforms.	
CO2	Synthesize Combinational and Sequential circuits on programmable ICs and test the hardware.	
CO3	Interface the hardware to the progr	ammable chips and obtain the required output.

Year / SEM : 3 rd year / 6 th sem		Year of Study : 2019-20	
	Course Name: Digital Communication- 17EC61		
C01	Associate and apply the concepts channels. Analyze and compute p and bandpass symbol under ideal a	s of Bandpass sampling to well specified signals and performance parameters and transfer rates for low pas and corrupted non band limited channels.	
CO2	Test and validate symbol processi under ideal and corrupted bandlimit	ng and performance parameters at the receiver ted channels.	
CO3	Demonstrate by simulation and corrupted and distorted symbols and estimated at receiver to meet s	emulation that bandpass signals subjected to in a bandlimited channel, can be demodulated specified performance criteria.	

Year / SEM : 3 rd year / 6 th sem		Year of Study : 2019-20
Course Name: ARM Microcontroller & Embedded Systems- 17EC62		
C01	Describe the architectural featur Cortex M3. Apply the knowledge applications.	es and instructions of 32 bit microcontroller ARM gained for Programming ARM Cortex M3 for different
CO2	Understand the basic hardware con the characteristics and attributes of	nponents and their selection method based on an embedded system.



CO3

 RajaRajeswari College of Engineering (Intersity, Belagavi)

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 Develop the hardware /software co-design and firmware design approaches.

 CO3

Year / S	SEM: 3 rd year / 6 th sem	Year of Study : 2019-20
Course Name: VLSI Design-17EC63		
CO1	Demonstrate understanding of M technology scaling. Draw the bas knowledge of physical design aspe	IOS transistor theory, CMOS fabrication flow and ic gates using the stick and layout diagrams with the acts.
CO2	Interpret Memory elements alor knowledge of FPGA based system	g with timing considerations. Demonstrate lesign
CO3	Interpret testing and testability subsystems and architectural issue	issues in VLSI Design Analyze CMOS s with the design constraints.

Year /	SEM : 3 rd year / 6 th sem	Year of Study : 2019-20
Course Name: Computer Communication Networks – 17EC64		nmunication Networks – 17EC64
CO1	Identify the protocols and services associated with the transport layer	of Data link layer. Identify the protocols and functions services.
CO2	Describe the layering architecture of computer networks and distinguish between the OSI reference model and TCP/IP protocol suite. Distinguish the basic network configurations and standards associated with each network.	
CO3	Construct a network model and d routing algorithms.	etermine the routing of packets using different

Year /	SEM : 3 rd year / 6 th sem	Year of Study : 2019-20
Course Name: Cellular Mobile Communications- 17EC651		
CO1	Apply the understanding of statistical characterization of urban mobile channels t compute the performance for simple modulation schemes. Demonstrate the limitations of GSM, GPRS and CDMA to meet high data rate requirements and limited improvement that are needed.	
CO2	Analyze the call process procedure for all scenarios in GSM or CDMA	e between a calling number and called number based systems



CO3

 RajaRajeswari College of Engineering (December 2014)

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 Test and validate voice and data call handling for various scenarios in GSM and CDMA systems for national and international interworking situations.

Year /	SEM : 3 rd year / 6 th sem	Year of Study : 2019-20	
	Course Name: Digital Switching Systems- 17EC654		
C01	Describe the electromechanical st switching.	witching systems and its comparison with the digita	
CO2	Determine the telecommunication technologies associated with the date	n traffic and its measurements. Define the a switching operations.	
CO3	Describe the software aspects of sw	witching systems and its maintenance.	

Year / SEM : 3 rd year / 6 th sem		Year of Study : 2019-20	
	Course Name: Digital System Design Using Verilog- 17EC663		
C01	Construct the combinational cir devices. Describe Verilog model f	cuits, using discrete gates and programmable logic or sequential circuits and test pattern generation	
CO2	Design a semiconductor memory for specific chip design. Design embedded systems using small microcontrollers, larger CPUs/DSPs, or hard or soft processor cores.		
CO3	Synthesize different types of pr embedded system.	ocessor and I/O controllers that are used in	

Year /	SEM : 3 rd year / 6 th sem	Year of Study : 2019-20	
	Course Name: Embedded Controller Lab – 17ECL67		
CO1	Understand the instruction set of software tool required for program	f 32 bit microcontroller ARM Cortex M3, and the ming in Assembly and C language.	
CO2	Develop assembly language programs using ARM Cortex M3 for different applications. Interface external devices and I/O with ARM Cortex M3.		
CO3	Develop C language programs applications.	and library functions for embedded system	



Year / SEM : 3 rd year / 6 th sem		Year of Study : 2019-20	
	Course Name: Computer Networks Lab – 17ECL68		
CO1	Use the network simulator for learning and practice of networking algorithms. Illustrative operations of network protocols and algorithms using C programming.		
CO2	Simulate the network with different configurations to measure the performance parameters.		
CO3	Implement the data link and routing protocols using C programming.		

Year / SEM : 4 th year / 7 th sem		Year of Study : 2019-20
Course Name: MICROWAVES AND ANTENNAS – 15EC71		ES AND ANTENNAS – 15EC71
CO1	Describe the use and advanta parameters related to microway	ges of microwave transmission Analyze various e transmission lines and waveguides.
CO2	Identify microwave devices for several applications. Analyze various antenna parameters necessary for building an RF system	
CO3	Recommend various antenna co	onfigurations according to the applications



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Year / S	SEM : 4 th year / 7 th sem	Year of Study : 2019-20
Course Name: DIGITAL IMAGE PROCESSING- 15EC72		
CO1	Understand image formation and gray and color image data. Apply frequency (Fourier) domains.	the role human visual system plays in perception of y image processing techniques in both the spatial and
CO2	Design image analysis techniques in the form of image segmentation and to evaluate the Methodologies for segmentation.	
CO3	Conduct independent study and an	alysis of Image Enhancement techniques.

Year /	SEM : 4 th year / 7 th sem	Year of Study : 2019-20	
Course Nam	Course Name: POWER ELECTRONICS- 15EC73		
CO1	Describe the characteristics of di applications associated with it.	fferent power devices and identify the various	
CO2	Illustrate the working of power circuit as DC-DC converter. Illustrate the operation of inverter circuit and static switches.		
CO3	Determine the output response options. Determine the respon inductive loads.	of a thyristor circuit with various triggering se of controlled rectifier with resistive and	

Year / S	SEM : 4 th year / 7 th sem	Year of Study : 2019-20	
(Course Name: MULTIMEDIA COMMUNICATION- 15EC741		
C01	Understand basics of different Understand different compression	at multimedia networks and applications. techniques to compress audio and video.	
CO2	Describe multimedia Communica types to represent them in digital f	tion across Networks. Analyse different media orm.	
CO3	Compress different types of te techniques and analyse DMS.	xt and images using different compression	



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Year /	SEM : 4 th year / 7 th sem	Year of Study : 2019-20	
	Course Name: CRYPTOGRAPHY- 15EC744		
	Use basic cryptographic algorithm	s to encrypt the data.	
CO1			
CO2	Generate some pseudorandom num	bers required for cryptographic applications.	
CO3	Provide authentication and protect	ion for encrypted data.	

Year /	SEM : 4 th year / 7 th sem	Year of Study : 2019-20
Course Name: IoT & WIRELESS SENSOR NETWORKS–15EC752		
CO1	Describe the OSI Model for the IoT/M2M Systems. · Understand the architecture and design principles for IoT.	
	Learn the programming for IoT Applications.	
CO2		
CO3	Identify the communication protoc	cols which best suits the WSNs.

Year / SEM : 4 th year / 7 th sem		Year of Study : 2019-20	
Course Name: SATELLITE COMMUNICATION- 15EC755			
CO1	Describe the satellite orbits and its associated with it. Describe the es satellite subsystem and earth station	s trajectories with the definitions of parameters lectronic hardware systems associated with the n.	
CO2	Describe the various applications of satellite with the focus on national satellite system.		
CO3	Compute the satellite link paramet the illustration of multiple access te	ters under various propagation conditions with chniques.	

Year / SEM : 4 th year / 8 th sem		Year of Study : 2019-20
Course Name: Wireless Cellular and LTE 4G Broadband– 15EC81		
CO1	Understand the system architecture and the functional standard specified in LTE 4G. · Analyze the role of LTE radio interface protocols and EPS Data convergence protocols to set up, reconfigure and release data and voice from users. ·	
CO2	CO2 Demonstrate the UTRAN and EPS handling processes from set up to release including mobility management for a variety of data call scenarios.	



Test and Evaluate the Performance of resource management and packet data processing and transport algorithms.

Year / SEM : 4 th year / 8 th sem		Year of Study : 2019-20	
Course Name: FIBER OPTICS and NETWORKS – 15EC82			
CO1	Classification and working of c propagation. Describe the transmi communication.	optical fiber with different modes of signal ssion characteristics and losses in optical fiber	
CO2	Describe the construction and multiplexers and amplifiers. 4. I characteristics of optical sources an	working principle of optical connectors, Describe the constructional features and the d detectors.	
CO3	Illustrate the networking aspects associated with it.	of optical fiber and describe various standards	

Year / SEM : 4 th year / 8 th sem		Year of Study : 2019-20
Course Name: Radar Engineering– 15EC833		
CO1	Understand the radar fundamentals pulse Doppler radars, their application	s and radar signals. \cdot Explain the working principle of ons and limitations \cdot
CO2	Describe the working of various ra-	dar transmitters and receivers.
CO3	Analyze the range parameters performance	of pulse radar system which affect the system



Department of Mechanical Engineering

2.6.1 Program outcomes, program specific outcomes and course outcomes

ProgramOutcomes:



PO 1- Demonstrate knowledge of mathematics such as multi-variable calculus, Differential equations, science and engineering.

PO-2 Demonstrate an ability to identify, formulate and solve mechanical engineering problems.

PO-3 Model, analyze, design and realize physical systems, components or processes.

PO-4 Plan and conduct an experimental program and evaluate the results.

PO-5 Use modern engineering tools, software and equipment to analyze problems.

PO-6 Understand the global, societal context of engineering.

PO-7 Provide mechanical engineering solutions to green and sustainable development.

PO-8 Demonstrate knowledge of professional and ethical responsibilities.

PO-9 Work with others to accomplish common goals.

PO-10 Communicate effectively in both verbal and written form

PO-11 Develop confidence for self education and ability for life-long learning.

PO-12 Complete a project with financial management skill.



PROGRAM SPECIFIC OUTCOMES (PSOs):

Engineering Graduates will be able to:

PSO-1:	Students acquire knowledge in basic science, technical and managerial skills that develop self-confidence for lifelong learning.
PSO-2:	Students acquire theoretical knowledge of advance engineering tools in Design, Thermal and Manufacturing Science that they are capable of applying it for solving real time problems.







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Course Outcomes:

Year /	SEM : 2 nd year / 3 rd sem Year of Study : 2019-20
	Course Name:
CO1	Use Laplace transform and inverse Laplace transform in solving differential/ integral equation arising in network analysis, control systems and other fields of engineering.
CO2	Demonstrate Fourier series to study the behaviour of periodic functions and their applications in system communications, digital signal processing and field theory.
CO3	Make use of Fourier transform and Z-transform to illustrate discrete/continuous function arising in wave and heat propagation, signals and systems.
CO4	Solve first and second order ordinary differential equations arising in engineering problems using single step and multistep numerical methods.
C05	Determine the externals of functionals using calculus of variations and solve problems arising in dynamics of rigid bodies and vibrational analysis.

Mechanics of Materials Sub Code:18M	
CO1	Understand simple, compound, thermal stresses and strains their relations and strain
	energy.
CO2	Analyse structural members for stresses, strains and deformations.
CO3	Analyse the structural members subjected to bending and shear loads.
CO4	Analyse shafts subjected to twisting loads.
CO5	Analyse the short columns for stability.

Basic	ermodynamics Sub Code: 18ME3		
CO1	Explain fundamentals of thermodynamics and evaluate energy interactions across the		
	oundary of thermodynamic systems.		
CO2	Evaluate the feasibility of cyclic and non-cyclic processes using 2nd lawo		
	hermodynamics.		
CO3	Apply the knowledge of entropy, reversibility and irreversibility to solve numerical		
	problems and apply 1st law of thermodynamics to closed and open systems and determine		
	uantity of energy transfers and change in properties.		



CO4	Interpret the behavior of pure substances and its application in practical problems
CO5	Recognize differences between ideal and real gases and evaluate thermodynamic
	properties of ideal and real gas mixtures using various relations.

Material ScienceSub Code:18ME34	
CO1	Understand the mechanical properties of metals and their alloys.
CO2	Analyze the various modes of failure and understand the microstructures offerrous and nonferrous
<u> </u>	
CO3	Describe the processes of heat treatment of various alloys.
CO4	Acquire the Knowledge of composite materials and their production process as well as
04	applications.
	Understand the properties and potentialities of various materials available and material
CO5	selection
	procedures

Metal	CuttingandForming Sub Code:18ME35A
CO1	Describe the casting process and prepare different types of cast products.
CO2	Acquire knowledge on Pattern, Core, Gating, Riser system and to use Jolt, Squeeze, Sand
	Slinger moulding machines.
CO3	Compare the Gas fired pit, Resistance, Coreless, Electrical and Cupola Metal Furnaces.
CO4	CO4: Compare the Gravity, Pressure die, Centrifugal, Squeeze, slush and Continuous
	Metal mould castings.
CO5	Understand the Solidification process and Casting of Non-Ferrous Metals.
CO6	Describe the Metal Arc, TIG, MIG, Submerged and Atomic Hydrogen Welding processes
	etc. used in manufacturing.
	Describe methods for the quality assurance of components made of casting and joining
CO7	process Explain the construction & specification of various machine tools. Discuss
	different cutting tool materials, tool nomenclature & surface finish

Computer AidedMachineDrawing

Sub Code:18ME36A

Identify the national and international standards pertaining to machine drawing. **CO1**



CO2	Understand the importance of the linking functional and visualization aspects in the
	preparation of the part drawings
CO3	Apply limits and tolerances to assemblies and choose appropriate fits for given assemblies.
CO4	Interpret the Machining and surface finish symbols on the component drawings.
CO5	Preparation of the part or assembly drawings as per the conventions.

MaterialsTestingLabSub Code: 18MEL	
CO1	Acquire experimentation skills in the field of material testing.
CO2	Develop theoretical understanding of the mechanical properties of materials by performing
	Experiments.
CO3	Apply the knowledge to analyze a material failure and determine the failure inducing
	agent/s.
CO4	Apply the knowledge of testing methods in related areas.
CO5	Understand how to improve structure/behavior of materials for various industrial
	applications.

Found	ry andForgingLab Sub Code: 18MEI	_38
Α		
CO1	Demonstrate various skills in preparation of molding sand for conducting tensile, shear	
	and Compression tests using Universal sand testing machine.	
CO2	Demonstrate skills in determining permeability, clay content and Grain Fineness Numb	er
	of base sands.	
CO3	Demonstrate skills in preparation of forging models involving upsetting, drawing and	
	bending Operations.	

Year /	SEM : 2 nd year / 4 th sem Year of Study : 2019-20
Course Name:	
C01	Use the concepts of analytic function and complex potentials to solve the problems arising in electromagnetic field theory.
CO2	Utilize conformal transformation and complex integral arising in aerofoil theory, fluid flow visualization and image processing.



CO3	Apply discrete and continuous probability distributions in analyzing the probability models arising in engineering field.
CO4	Make use of the correlation and regression analysis to fit a suitable mathematical model for the statistical data.
CO5	Construct joint probability distributions and demonstrate the validity of testing the hypothesis

Appli	edThermodynamics Sub Code:18ME42
CO1	Apply thermodynamic concepts to analyze the performance of gas power cycles.
CO2	Apply thermodynamic concepts to analyze the performance of vapour power cycles.
CO3	Understand combustion of fuels and performance of I C engines.
CO4	Understand the principles and applications of refrigeration systems.
CO5	Apply Thermodynamic concepts to determine performance parameters of refrigeration and
	air-conditioning systems.
CO6	Understand the working principle of Air compressors and Steam nozzles, applications,
	relevance of air and identify methods for performance improvement

FluidN	FluidMechanics Sub Code:18ME43	
CO1	Identify and calculate the key fluid properties used in the analysis of fluid behavior.	
CO2	Explain the principles of pressure, buoyancy and floatation	
CO3	Apply the knowledge of fluid statics, kinematics and dynamics while addressingproblems	
	of mechanical and chemical engineering.	
CO4	Describe the principles of fluid kinematics and dynamics.	
CO5	Explain the concept of boundary layer in fluid flow and apply dimensional analysis to	
	form dimensionless numbers in terms of input output variables.	
CO6	Illustrate and explain the basic concept of compressible flow and CFD	

Kinematicsof Machines Sub Code:18ME		Sub Code:18ME44
CO1	Knowledge of mechanisms and their motion.	
CO2	Understand the inversions of four bar mechanisms.	
CO3	Analyse the velocity, acceleration of links and joints of mechanisms.	
CO4	Analysis of cam follower motion for the motion specifications.	

- CO5 Understand the working of the spur gears.
- **CO6** Analyse the gear trains speed ratio and torque

Metal O	Metal CuttingandForming Sub Code:18ME45	
CO1	Explain the construction & specification of various machine tools.	
CO2	Discuss different cutting tool materials, tool nomenclature & surfac	e finish.
CO3	Apply mechanics of machining process to evaluate machining time.	
CO4	Analyze tool wear mechanisms and equations to enhance tool life an	ld minimize
	machining cost.	
CO5	Understand the concepts of different metal forming processes.	
CO6	Apply the concepts of design of sheet metal dies to design different	dies for simple sheet
	Metal	

Mecha	Mechanical MeasurementsandMetrology Sub Code:18ME46		
CO1	Understand the objectives of metrology, methods of measurement, standards of		
	measurement & various measurement parameters.		
CO2	Explain tolerance, limits of size, fits, geometric and position tolerar	ices, gauges and their	
	Design		
CO3	Understand the working principle of different types of comparators		
CO4	Describe measurement of major & minor diameter, pitch, angle and effective diam		
	screw threads.		
CO5	Explain measurement systems, transducers, intermediate m	odifying devices and	
	terminating devices.		
CO6	Describe functioning of force, torque, pressure, strain and temperature measuring device		

Mecha	anical Measurements and Metrology Lab	Sub Code:18ME47B
CO1	Understand Calibration of pressure gauge, thermocouple, LVDT, loa	d cell, micrometer.
CO2	Apply concepts of Measurement of angle using Sine Centre/ Sine Ba	r/ Bevel Protractor,
	alignment using Autocollimator/ Roller set.	
CO3	Demonstrate measurements using Optical Projector/Tool maker mice	roscope, Optical flats.
CO4	Analyse tool forces using Lathe/Drill tool dynamometer.	
CO5	Analyse Screw thread parameters using 2-Wire or 3-Wire method, g	ear tooth profileusing



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gear tooth Vernier/Gear tooth micrometer

CO6 Understand the concepts of measurement of surface roughness

MachineShop Sub Code:18ME	
CO1	To read working drawings, understand operational symbols and execute machining
	operations.
CO2	Prepare fitting models according to drawings using hand tools- V-block, marking gauge,
	files, hack saw, drills etc.
CO3	Understand integral parts of lathe, shaping and milling machines and various accessories
	and attachments used.
CO4	Select cutting parameters like cutting speed, feed, depth of cut, and tooling for various
	machining operations.
	Perform cylindrical turning operations such as plain turning, taper turning, step turning,
CO5	thread Cutting, facing, knurling, internal thread cutting, eccentric turning and estimate
	cutting time.
CO6	Perform machining operations such as plain shaping, inclined shaping, keyway cutting,
	Indexing and Gear cutting and estimate cutting time

Management AndEngineeringEconomicsSub Code:17ME51CO1Explain the development of management and the role it plays at different levels in an
organization.CO2Comprehend the process and role of effective planning, organizing and staffing for the
development of an organization.CO3Understand the necessity of good leadership, communication and coordination for
establishing effective control in an
Organization.CO4Understand engineering economics demand supply and its importance in economics
decision making and problem solving.



Calculate present worth, annual worth and IRR for different alternatives in economic

 CO5
 Calculate present worth, annual worth and IRR for different alternatives in economic decision making.

 CO6
 Understand the procedure involved in estimation of cost for a simple component, product costing and depreciation, its methods

Dynan	nicsofMachinery Sub Code:17ME52
CO1	Determine the forces and couples for static and dynamic conditions of four bar and slider
	crank mechanisms to keep the system in equilibrium
CO2	Determine magnitude and angular position of balancing masses under static and dynamic
	condition of rotating masses in same and different planes
CO3	Determine unbalanced primary, secondary forces and couples in single and multi-cylinder
	Engine
CO4	Determine sensitiveness, isochronisms, effort and power of porter and hartnell governors
CO5	Determine gyroscopic couple and effects related to 2, 4 wheeler, plane disc, ship and aero
	Planes
CO6	Understand types of vibration, SHM and methods of finding natural frequencies of simple
	mechanical systems
CO7	Determine equation of motion, natural frequency, damping factor, logarithmic decrement
	of damped free vibration (SDOF) systems
CO8	Determine the natural frequency, force and motion transmissibility of single degree
	freedom systems
CO9	Determine equation of motion of rotating and reciprocating unbalance systems,
	magnification factor, and transmissibility of forced vibration (SDOF) systems

Turbo	TurboMachinesSub Code:17ME53	
CO1	Able to give precise definition of turbo machinery	
CO2	Identify various types of turbo machinery	
CO3	Apply the Euler's equation for turbo machinery to analyses energy transfer in turbo	
	Machines	
CO4	Understand the principle of operation of pumps, fans, compressors and turbines	
CO5	Perform the preliminary design of turbo machines (pumps, rotary compressors and	
	turbines)	
CO6	Analyze the performance of turbo machinery	



Design	ofMachineElements-I Sub Code:17ME54
CO1	Describe the design process, choose materials
CO2	Apply the codes and standards in design process
CO3	Analyze the behavior of machine components under static, impact, fatigue loading using
	failure theories
CO4	Design shafts, joints, couplings
CO5	Design of riveted and welded joints
CO6	Design of threaded fasteners and power screws

NonTr	aditionalMachining Sub Code:17ME554
CO1	Understand the compare traditional and non-traditional machining process and recognize
	the need for Non-traditional machining process.
CO2	Understand the constructional features, performance parameters, process characteristics,
	applications, advantages and limitations of USM, AJM and WJM.
CO3	Identify the need of Chemical and electro-chemical machining process along with the
	constructional features, process parameters, process characteristics, applications,
	advantages and limitations
CO4	Understand the constructional feature of the equipment, process parameters, process
	characteristics, applications, advantages and limitations EDM &PAM
CO5	Understand the LBM equipment, LBM parameters, and characteristics. EBM equipment
	and mechanism of metal removal, applications, advantages and limitations LBM & EBM

EnergyAndEnvironmentSub Code:17ME	
CO1	Summarize the basic concepts of energy, its distribution and general Scenario
CO2	Explain different energy storage systems, energy management, audit and economic analysis
CO3	Summarize the environment eco system and its need for awareness
CO4	Identify the various types of environment pollution and their effects
CO5	Discuss the social issues of the environment with associated acts

Fluid I	Mechanics & MachineryLab	Sub Code:17MEL57
CO1	Perform experiments to determine the coefficient of discharge of flo	w measuring devices



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 2
 Conduct experiments on hydraulic turbines and pumps to draw characteristics

 CO2 CO3 Test basic performance parameters of hydraulic turbines and pumps and execute the

	knowledge in real life situations
CO4	Determine the energy flow pattern through the hydraulic turbines and pumps
CO5	Exhibit his competency towards preventive maintenance of hydraulic machines

Energ	EnergyConversionLab Sub Code:17MEL5	
CO1	Perform experiments to determine the properties of fuels and oils	
CO2	Conduct experiments on engines and draw characteristics	
CO3	Test basic performance parameters of I.C. Engine and implement the knowledge in	
	industry	
CO4	Identify exhaust emission, factors affecting them and report the remedies	
CO5	Determine the energy flow pattern through the I C Engine	
CO6	Exhibit his competency towards preventive maintenance of IC engines	

Finite	ElementAnalysis Sub Code:17ME61
CO1	Understand the concepts behind formulation methods in FEM
CO2	Identify the application and characteristics of FEA elements such as bars, beams, plane
	and iso-parametric elements
CO3	Develop element characteristic equation and generation of global equation
CO4	Able to apply suitable boundary conditions to a global equation for bars, trusses, beams,
	circular shafts, heat transfer, fluid flow, axi symmetric and dynamic problems and solve
	them displacements, stress and strains induced

ComputerIntegratedManufacturing Sub Code:17ME6	
CO1	Able to define Automation, CIM, CAD, CAM and explain the differences between these
	concepts. Solve simple problems of transformations of entities on computer screen
CO2	Explain the basics of automated manufacturing industries through mathematical models
	and analyze different types of automated flow lines
CO3	Analyze the automated flow linesto reduce down time and enhance productivity
CO4	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



RajaRajeswari College of Engineering (Approved by AICTE, New Delhi, Govt. of Karnataka, Affiliated to Visvesvaraya Technological University, Belagavi) Visualize and appreciate the modern trends in Manufacturing like additive manufacturing,

Industry 4.0 and applications of Internet of Things leading to Smart Manufacturing

HeatTransferSub Code:17ME	
CO1	Understand the basic modes of heat transfer
CO2	Compute temperature distribution in steady-state and unsteady-state heat conduction
CO3	Understand and interpret heat transfer through extended surfaces
CO4	Interpret and compute forced and free convective heat transfer
CO5	Explain the principles of radiation heat transfer and understand the numerical formula for
	heat conduction problems
CO6	Design heat exchangers using LMTD and NTU methods

Design	Design of MachineElementsII Sub Code:17ME64	
CO1	Apply engineering design tools to product design	
CO2	Design mechanical systems involving springs, belts and pulleys	
CO3	Design different types of gears and simple gear boxes for different applications	
CO4	Design brakes and clutches	
CO5	Design hydrodynamic bearings for different applications.	
CO6	Select Anti friction bearings for different applications using the manufacturers, catalogue.	,
CO7	Develop proficiency to generate production drawings using CAD software	
CO8	Become good design engineers through learning the art of working in a team with moralit	y
	and ethics	

Metal	Metal Forming Sub Code:17ME6	
C01	Able to understand the concept of different metal forming process	
CO2	Able to approach metal forming processes both analytically and numerically	
CO3	Able to design metal forming processes	
CO4	Able to develop approaches and solutions to analyze metal forming processes and the	
	associated problems and flaws	

AutomobileEngineering		Sub Code:17ME655
CO1	To identify the different parts of an automobile and it's working	



 RajaRajeswari College of Engineering (Construction of Karnataka, Affiliated to Visvesvaraya Technological University, Belagavi)

 CO2

 To understand the working of transmission and braking systems

CO3	To comprehend the working of steering and suspension systems
CO4	To learn various types of fuels and injection systems
CO5	To know the cause of automobile emissions ,its effects on environment and methods to
	reduce the emissions

INDUS	INDUSTRIALSAFETY Sub Code:17ME662	
CO1	Understand the basic safety terms	
CO2	Identify the hazards around the work environment and industries	
CO3	Use the safe measures while performing work in and around the work area of the available	
	laboratories	
CO4	Able to recognize the sign boards and its application	
CO5	Able to demonstrate the portable extinguishers used for different class of fires	
	Able to write the case studies by sharing experience of the employees working in	
CO6	housekeeping, laboratories like workshops, electrical labs, machine shops, electronics and	
	computer laboratories	
CO 7	Able to understand and report the case studies from various references (text books, news	
	report, journals, visiting industries like power stations, manufacturing and maintenance)	

TotalQualityManagement Su		Sub Code:17ME664
C01	Explain the various approaches of TQM	
CO2	Infer the customer perception of quality	
CO3	Analyze customer needs and perceptions to design feedback systems	
CO4	Apply statistical tools for continuous improvement of systems	
CO5	Apply the tools and technique for effective implementation of TQM	

HeatTransferLab Sub Code:17MEL	
CO1	Perform experiments to determine the thermal conductivity of a metal rod
CO2	Conduct experiments to determine convective heat transfer coefficient for free and forced
	convection and correlate with theoretical values
CO3	Estimate the effective thermal resistance in composite slabs and efficiency in pin-fin
CO4	Determine surface emissivity of a test plate



RajaRajeswari College of Engineering (Approved by AICTE, New Delhi, Govt. of Karnataka, Affiliated to Visvesvaraya Technological University, Belagavi) Estimate performance of a refrigerator and effectiveness of fin

CO5

Calculate temperature distribution of study and transient heat conduction through plane **CO6** wall, cylinder and fin using numerical approach

Model	Modeling and Analysis LabSub Code: 17ME60	
CO1	Demonstrate the basic features of an analysis package	
CO2	Use the modern tools to formulate the problem, and able to create geometry, discretize,	
	apply boundary condition to solve problems of bars, truss, beams, plate to find stress with	
	different loading conditions	
CO3	Demonstrate the deflection of beams subjected to point, uniformly distributed and varying	
	loads further to use the available results to draw shear force and bending moment diagrams	
CO4	Analyze the given problem by applying basic principle to solve and demonstrate 1D and	
	2D heat transfer with conduction and convection boundary conditions	
CO5	Carry out dynamic analysis and finding natural frequencies for various boundary	
	conditions and also analyze with forcing function	

Energ	EnergyEngineering SUB Code:15ME7	
CO1	Discuss the layout of thermal power plant and working principle of various types of	
	boilers.	
CO2	Explain the working of diesel and gas turbine power plant along with optimization	
	technique	
CO3	Discuss the various types of nuclear reactors used in nuclear power plant .Summarize the	
	principles and working of various renewable energy power plants.	
CO4	Explain the energy, economic and environmental issues of power plants Paraphrase the	
	different types of power plant, its function and issues related	

FluidP	PowerSystems SUI	B Code:15ME72
CO1	Describe the construction, structure & working Principle of various Hydra	ulic pumps,
	motors and Actuators and their Performance Characteristics	
CO2	Comprehend & Analyze Single & Double Acting Hydraulic Cylinder circuit	ts and their
	Control Components and Maintenance of Hydraulic Systems	



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 CO3 Describe the construction, structure & working Principle of various Pneumatic Actuators,
 Pneumatic Control Valves Applications

CO4 Recall the Signal Processing Elements such as OR & AND gates in pneumatic applications and Multi cylinder applications and Electro-Pneumatic Control

Contro	blEngineeringSUB Code:15ME73
	Identify the type of control system, their applications, limitations, Concept soffeed back,
CO1	Types of controllers and also arrive at the transfer functions of the given physical system
	(i.e. Mechanical, Electrical, Thermal, Hydraulic) models by writing Differential
	Equations using Laplace Transformation
CO2	Produce the Transfer Function by Block Reduction Technique and also using Mason's
	Formula for Signal Flow Graph and also Interpret the S-plane with the terms like settling
	time, rise-time and overshoot to step-response. Apply Routh-Hurwitz criterion to
	determine the stability of time- invariant systems
CO3	Apply frequency domain analysis techniques, and design control systems to achieve
	specific dynamic characteristics, Possess knowledge of stability and controls, Determine
	the stability of control systems using Nyquist methods and also by using Bode Attenuation
	diagrams
CO4	Determine the stability of control systems using Root-Locus Technique and feedback
	control systems using frequency domain and state-variable methods. Possess knowledge of
	stability and controls

Tribol	ogy SUB Code:15ME742		
CO1	Identify the type of control system, their applications, limitations, Concepts of feedback,		
	Types of controllers and also arrive at the transfer functions of the given physical system		
	(i.e. Mechanical, Electrical, Thermal, Hydraulic) models by writing Differential		
	Equations using Laplace Transformation		
CO2	Produce the Transfer Function by Block Reduction Technique and also using Mason's		
	Formula for Signal Flow Graph and also Interpret the S-plane with the terms like settling		
	time, rise-time and overshoot to step-response. Apply Routh-Hurwitz criterion to		
	determine the stability of time- invariantsystems		

	(A	RajaRajeswari College of Engineering ()
Commendad of Politica	CO3	Apply frequency domain analysis techniques, and design control systems to achieve specific dynamic characteristics, Possess knowledge of stability and controls, Determine the stability of control systems using Nyquist methods and also by using Bode Attenuation diagrams
	CO4	Determine the stability of control systems using Root-Locus Technique and feedback control systems using frequency domain and state-variable methods. Possess knowledge of stability and controls

Mecha	stronics SUB Code: 15ME753	
CO1	Identify the type of control system, their applications, limitations, Concepts of feedback,	
	Types of controllers and also arrive at the transfer functions of the given physical system	
	(i.e. Mechanical, Electrical, Thermal, Hydraulic) models by writing Differential	
	Equations using Laplace Transformation	
CO2	Produce the Transfer Function by Block Reduction Technique and also using Mason's	
	Formula for Signal Flow Graph and also Interpret the S-plane with the terms like settling	
	time, rise-time and overshoot to step-response. Apply Routh-Hurwitz criterion to	
	determine the stability of time- invariant systems	
CO3	Apply frequency domain analysis techniques, and design control systems to achieve	
	specific dynamic characteristics, Possess knowledge of stability and controls, Determine	
	the stability of control systems using Nyquist methods and also by using Bode Attenuation	
	diagrams	
CO4	Determine the stability of control systems using Root-Locus Technique and feedback	
	control systems using frequency domain and state-variable methods. Possess knowledge of	
	stability and controls	

DESIGNLAB SUB Code:15MEL76		
C01	Understand the concept of natural frequency and damping coefficient in a single DOF	
	vibrating system	
CO2	Students are able analyze the balancing of rotating and reciprocating masses by using	
	static and dynamic balance	



RajaRajeswari College of Engineering (Approved by AICTE, New Delhi, Govt. of Karnataka, Affiliated to Visvesvaraya Technological University, Belagavi) CO3 Ability to demonstrate the concept of stress concentration for different photo- elastic

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	materials
CO4	Students are able to determine pressure distribution in journal bearings

CIM &	AUTOMOTAION LAB SUB Code:15MEL77	
	Ability to identify the type of machining center for the geometry given (cylindrical or	
CO1	prismatic), write the part program, explain the instructions, examine for the error in	
	theprogram and choose right G and M codes to optimize the program and construct the	
	final geometry by running the simulation using the software	
CO2	To practically relate to concepts discussed in Computer Integrated Manufacturing course	
	to write CNC part programs using SWAN SOFT CNC simulation packagefor	
	simulation of machining operations such as Turning, Drilling & Milling. To understand &	
	write programs for Flexible Manufacturing Systems & Robotics	

Opera	tionResearch Sub Code:15ME81	
CO1	Understand the meaning, definitions, scope, need, phases and techniques of operations	
	research.	
CO2	Formulate as L.P.P and derive optimal solutions to linear programming problems by	
	graphical method, Simplex method, Big-M method and Dual Simplex method.	
CO3	Formulate as Transportation and Assignment problems and derive optimum solutions for	
	transportation, Assignment and travelling salesman problems.	
CO4	Solve problems on game theory for pure and mixed strategy under competitive	
	environment.	
CO5	Solve waiting line problems for M/M/1 and M/M/K queuing models.	
CO6	Construct network diagrams and determine critical path, floats for deterministic and PERT	
	networks including crashing of Networks.	
CO7	Determine minimum processing times for sequencing of n jobs-2 machines, n jobs-	
	3machines,n jobs-m machinesand 2 jobs-n machines using Johnson's algorithm.	
Additi	veManufacturing Sub Code:15ME82	
CO1	Understand the different process of Additive Manufacturing. using Polymer, Powder and	
	Nano materials manufacturing.	
CO2	Analyse the different characterization techniques.	



RajaRajeswari College of Engineering (2010) (Approved by AICTE, New Delhi, Govt. of Karnataka, Affiliated to Visvesvaraya Technological University, Belagavi) Describe the various NC, CNC machine programing and Automation techniques.

Experi	mentalStressAnalysis SUB Code:15832	
CO1	Explain characterize the elastic behavior of solid bodies.	
CO2	Describe stress strain analysis of mechanical systems using electrical resistance strain	
	gauges.	
CO3	Discuss skills for experimental investigations an accompanying laboratory course is	
	desirable	
CO4	Discuss experimental investigations by predictions by other methods.	
CO5	Describe various coating techniques	

Internship/ProfessionalPracticeSUB Code:15ME84		
CO1	Acquire practical experience within industry in which the internship is done.	
CO2	Apply knowledge and skills learned to classroom work.	
CO3	Experience the activities and functions of professionals.	
CO4	Develop and refine oral and written communication skills.	

CO1	Describe the project and be able to defend it.	
CO2	Develop critical thinking and problem solving skills.	
CO3	Learn to use modern tools and techniques.	
CO4	Communicate effectively and to present ideas clearly and coherently both in written and	
	oral forms.	

SeminarSUB Code:15MES86		
CO1	Develop knowledge in the field of Biomedical Engineering and other disciplines through	
	independent learning and collaborative study.	
CO2	Identify and discuss the current, real-time issues and challenges in engineering &	
	technology.	
CO3	Develop written and oral communication skills.	
CO4	Explore concepts in larger diverse social and academic contexts.	



Department of Information Science and Engineering

2.6.1 Program outcomes, program specific outcomes and course outcomes

ProgramOutcomes:



PO1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2: Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations

PO4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.



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

PO6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11: Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12: Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.



PROGRAM SPECIFIC OUTCOMES(PSOs):

Engineering Graduates will be able to:

PSO-1:	Understand the principles of Information Science and Engineering and enrich knowledge in recent advancements and developments in Information Technology.
PSO-2:	Competent in programming and computing skills, ability to apply software development methodologies and modeling to solve real world problems in the field of Information Technology.



Course Outcomes:

Year / SEM : 2ndyear / 3rdsemYear of Study : 2019-20		
Course Name:		
CO1	Use Laplace transform and inverse Laplace transform in solving differential/ integral equation arising in network analysis, control systems and other fields of engineering.	
CO2	Demonstrate Fourier series to study the behaviour of periodic functions and their applications in system communications, digital signal processing and field theory.	
CO3	Make use of Fourier transform and Z-transform to illustrate discrete/continuous function arising in wave and heat propagation, signals and systems.	
CO4	Solve first and second order ordinary differential equations arising in engineering problems using single step and multistep numerical methods.	
C05	Determine the externals of functionals using calculus of variations and solve problems arising in dynamics of rigid bodies and vibrational analysis.	

Year / SEM : 2 nd year / 3 rd sem		Year of Study : 2019-20
Course Name:DATA STRUCTURES AND APPLICATIONS-18CS32		
CO1	Use different types of data structures, operations and algorithms	
CO2	Apply searching and sorting operations on files	
CO3	Use stack, Queue, Lists, Trees and Graphs in problem solving	
CO4	Implement all data structures in a high-level language for problem solving.	

Year / SEM : 2 nd year / 3 rd sem		Year of Study : 2019-20
Course Name: ANALOG AND DIGITAL ELECTRONICS – 18CS33		
CO1	Design and analyze application of analog circuits using photo devices, timer IC, power supply and regulator IC and op-amp.	
CO2	Explain the basic principles of A/D and D/A conversion circuits and develop the same.	
CO3	Simplify digital circuits using K	Carnaugh Map , and Quine-McClusky Methods
CO4	Explain Gates and flip flops and processing circuits, registers an	1 make us in designing different data d counters and compare the types.
CO5	Develop simple HDL programs	



Year / S	SEM : 2 nd year / 3 rd sem		Year of Study	y : 2019- :	20
Course Name: COMPUTER ORGANIZATION – 18CS34					
CO1	Explain the basic organization of	of a compute	er system.		
CO2	Demonstrate functioning of Input/output,andmemory.	different s	sub systems,	such a	as processor,
CO3	Illustrate hardwired control and micro programmed control, pipelining, embedded and other computing systems.				
CO4	Design and analyse simple arith	metic and lo	ogical units.		

Year /	SEM : 2 nd year / 3 rd sem	Year of Study : 2019-20	
Course Name: SOFTWARE ENGINEERING- 18CS35			
CO1	Design a software system, component, or process to meet desired needs within realistic constraints.		
CO2	Assess professional and ethical responsibility		
CO3	Function on multi-disciplinary teams		
CO4	Use the techniques, skills, and modern engineering tools necessary for engineering practice		
CO5	Analyze, design, implement, verify, validate, implement, apply, and maintain software systems or parts of software systems		

Year /	SEM : 2 nd year / 3 rd sem	Year of Study : 2019-20
Course Name: DISCRETE MATHEMATICAL STRUCTURES – 18CS36		
CO1	Use propositional and predicate logic in knowledge representation and truth verification	
CO2	Demonstrate the application of discrete structures in different fields of computer science.	
CO3	Solve problems using recurrence relations and generating functions.	
CO4	Application of different mathematical proofs techniques in proving theorems in the courses	
C05	Compare graphs, trees and their applications.	

Year / SEM : 2 nd year / 3 rd sem		Year of Study : 2019-20	
Course Name: ANALOG AND DIGITAL ELECTRONICS LABORATORY – 18CSL37			
CO1	Use appropriate design equations / methods to design the given circuit		


CO2	Examine and simulators.	d verify	the design of	both analog a	nd digital ci	rcuits using	
CO3	Make us of a testing of cir	electron rcuits f	nic components or the given the	, ICs, instrum appropriate	nents and too inputs.	ols for design a	nd
CO4	Compile tool/instrum schematics, graphs and t	a ents/so progran ables, i	laboratory ftware/compon m listing, proce nterpreting and	journal ents used, de dure followe concluding t	which sign equation d, relevant the findings.	includes; ons used and d neory, results a:	aim, esigns, s

Year / SEM : 2 nd year / 3 rd sem		Year of Study : 2019-20	
Course Name: DATA STRUCTURES LABORATORY – 18CSL38			
CO1	Analyze and Compare various linear and non-linear data structures		
CO2	Code, debug and demonstrate the working nature of different types of data structures and their applications		
CO3	Implement, analyze and evaluate the searching and sorting algorithms		
CO4	Choose the appropriate data structure for solving real world problems		
Year / SEM : 2 nd year / 4 th sem		Year of Study : 2019-20	
Course Name: DESIGN AND ANALYSIS OF ALGORITHMS – 18CS42			
CO1	Describe computational solution to well known problems like searching, sorting etc.		
CO2	Estimate the computational complexity of different algorithms.		
CO3	Devise an algorithm using appropriate design strategies for problem solving.		

Year /	SEM : 2 nd year / 4 th sem Year of Study : 2019-20				
	Course Name:				
CO1	Use the concepts of analytic function and complex potentials to solve the problems arising in electromagnetic field theory.				
CO2	Utilize conformal transformation and complex integral arising in aerofoil theory, fluid flow visualization and image processing.				
CO3	Apply discrete and continuous probability distributions in analyzing the probability models arising in engineering field.				
CO4	Make use of the correlation and regression analysis to fit a suitable mathematical model for the statistical data.				
CO5	Construct joint probability distributions and demonstrate the validity of testing the hypothesis				



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Year / SEM : 2 nd year / 4 th sem		Year of Study : 2019-20	
Course Name: OPERATING SYSTEMS – 18CS43			
CO1	Demonstrate need for OS and different types of OS		
CO2	Apply suitable techniques for management of different resources		
CO3	Use processor, memory, storage and file system commands.		
CO4	Realize the different concepts of OS in platform of usage through case studies		

Year / SEM : 2 nd year / 4 th sem		Year of Study : 2019-20
Course Name: MICROCONTROLLER AND EMBEDDED SYSTEMS – 18CS44		
C01	Describe the architectural feature	res and instructions of ARM microcontroller
CO2	Apply the knowledge gained for Programming ARM for different applications.	
CO3	Interface external devices and I/O with ARM microcontroller.	
CO4	Interpret the basic hardware components and their selection method based on the characteristics and attributes of an embedded system.	
CO5	Develop the hardware /software co-design and firmware design approaches.	
C06	Demonstrate the need of real tin applications	ne operating system for embedded system

Year / SEM : 2 nd year / 4 th sem		Year of Study : 2019-20
Course Name: OBJECT ORIENTED CONCEPTS – 18CS45		ENTED CONCEPTS – 18CS45
CO1	Explain the object-oriented concepts and JAVA.	
CO2	Develop computer programs to solve real world problems in Java.	
СО3	O3 Develop simple GUI interfaces for a computer program to interact with users and to understand the event-based GUI handling principles using swings.	

Year / SEM : 2 nd year / 4 th sem		Year of Study : 2019-20	
Course Name: DATA COMMUNICATION – 18CS46			
CO1	Explain the various components	s of data communication.	
CO2	Explain the fundamentals of digital communication and switching.		
CO3	Compare and contrast data link layer protocols.		
CO4	CO4 Summarize IEEE 802.xx standards		



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Year / SEM : 2 nd year / 4 th sem		Year of Study : 2019-20
Course Name: DESIGN AND ANALYSIS O		F ALGORITHM LABORATORY- 18CSL47
CO1	Design algorithms using approp dynamic programming, etc.)	briate design techniques (brute-force, greedy,
CO2	Implement a variety of algorithms such assorting, graph related, combinatorial, etc., in a high level language.	
CO3	Analyze and compare the performance of algorithms using language features	
CO4	Apply and implement learned a solve real-world problems.	lgorithm design techniques and data structuresto

Year / SEM : 2 nd year / 4 th sem		Year of Study : 2019-20
Course Name: MICROCONTROLLER AN		D EMBEDDED SYSTEMS LABORATORY -
18CSL48		
CO1	Develop and test program using ARM7TDMI/LPC2148.	
CO2 Conduct the following experiments on an ARM7TDMI/LPC2148eva board using evaluation version of Embedded 'C' & Keil Uvision-4tool/co		ments on an ARM7TDMI/LPC2148evaluation of Embedded 'C' & Keil Uvision-4tool/compiler.

Year / SEM : 3 rd year / 5 th sem		Year of Study : 2019-20
Course Name: MANAGEMENT AND EN		FREPRENEURSHIP FOR IT INDUSTRY –
17C851		
CO1	Define management, organization, entrepreneur, planning, staffing, ERP and outline their importance in entrepreneurship	
CO2	Utilize the resources available effectively through ERP	
CO3	Make use of IPRs and institutional support in entrepreneurship	

Year / S	SEM : 3 rd year / 5 th sem	Year of Study : 2019-20		
Course Name: COMPUTER NETWORKS – 17CS52				
CO1	Explain principles of applicatio	n layer protocols		
CO2	Outline transport layer services and infer UDP and TCP protocols			
CO3	Classify routers, IP and Routing Algorithms in network layer			
CO4	Understand the Wireless and Mobile Networks covering IEEE 802.11 Standard			
C05	Describe Multimedia Networking and Network Management			



Year / SEM : 3 rd year / 5 th sem		Year of Study : 2019-20	
Course Name: DATABASE MANAGEMENT SYSTEM – 17CS53			
CO1	Summarize the concepts of data database using RDBMS.	base objects; enforce integrity constraints on a	
CO2	Use Structured Query Language (SQL) for database manipulation.		
CO3	Design and build simple databa	se systems	
CO4	Develop application to interact	with databases.	

Year / SEM : 3 rd year / 5 th sem		Year of Study : 2019-20
Course Name: AUTOMATA THEORY AND COMPUTABILITY – 17CS54		
CO1	Tell the core concepts in automata theory and Theory of Computation	
CO2	Explain how to translate between different models of Computation (e.g., Deterministic and Non-deterministic and Software models).	
CO3	Interpret Grammars and Automata (recognizers) for different language classes and become knowledgeable about restricted models of Computation (Regular, Context Free) and their relative powers.	
CO4	Develop skills in formal reasoning and reduction of a problem to a formal model, with an emphasis on semantic precision and conciseness	
CO5	Classify a problem with respect to different models of Computation.	

Year / SEM : 3 rd year / 5 th sem		Year of Study : 2019-20
Course Name: ADVANCED JAVA AND J2EE- 17CS553		
CO1	Interpret the need for advanced Java concepts like enumerations and collections in developing modular and efficient programs	
CO2	Build client-server applications and TCP/IP socket programs	
CO3	Illustrate database access and details for managing information using the JDBC API	
CO4	Describe how servlets fit into Java-based web application architecture	
CO5	Develop reusable software components using Java Beans	



Year / SEM : 3 rd year / 5 th sem		Year of Study : 2019-20
Course Name: ARTIFICIAL INTELLIGENCE- 17CS562		
C01	Identify the AI based problems.	
CO2	Apply techniques to solve the AI problems	
CO3	Define learning and explain var	ious learning techniques
CO4	Discuss expert systems	

Year / SEM : 3 rd year / 5 th sem		Year of Study : 2019-20
Course Name: COMPUTER NETWORK LABORATORY- 17CSL57		
C01	Analyze and Compare various networking protocols.	
CO2	Demonstrate the working of different concepts of networking.	
CO3	Implement, analyze and evaluat	e networking protocols in NS2 / NS3

Year / SEM : 3 rd year / 5 th sem		Year of Study : 2019-20
Course Name: DBMS LABORATORY WITH MINI PROJECT – 15CSL58		
CO1	Use Structured Query Language (SQL) for database Creation and manipulation	
CO2	Demonstrate the working of dif	ferent concepts of DBMS
CO3	Implement and test the project of	leveloped for an application.

Year / SEM : 3 rd year / 6 th sem		Year of Study : 2019-20
Course Name: CRYPTOGRAPHY, NETWORK SECURITY AND CYBER L		WORK SECURITY AND CYBER LAW –
17CS61		
CO1	Discuss cryptography and its need to various applications	
CO2	Design and develop simple cryptography algorithms	
CO3	Understand cyber security and r	need cyber Law

Year / SEM : 3 rd year / 6 th sem	Year of Study : 2019-20
Course Name: COMPUTER GRAPHICS AND VISUALIZATION – 17CS62	



CO1	Design and implement algorithms for 2D graphics primitives and attributes.
CO2	Illustrate Geometric transformations on both 2D and 3D objects.
CO3	Understand the concepts of clipping and visible surface detection in 2D and 3D viewing, and Illumination Models.
CO 4	Discussabout suitable hardware and software for developing graphics packages using OpenGL.

Year / SEM : 3 rd year / 6 th sem		Year of Study : 2019-20
Course Name: SYSTEM SOFTWARE AND COMPILER DESIGN-17CS63		
CO1	Illustrate system software macroprocessors	such as assemblers, loaders, linkers and
CO2	Design and develop lexical ana	yzers, parsers and code generators
CO3	Discuss about lex and yacc tool software	s for implementing different concepts of system

Year / SEM : 3 rd year / 6 th sem		Year of Study : 2019-20
Course Name: OPERATING SYSTEMS – 17CS64		
C01	Demonstrate need for OS and d	ifferent types of OS
CO2	Discuss suitable techniques for management of different resources	
CO3	Illustrate processor, memory, storage and file system commands	
CO4	Explain the different concepts of OS in platform of usage through case studies	

Year / SEM : 3 rd year / 6 th sem		Year of Study : 2019-20
Course Name: OPERATION RESEARCH- 17CS653		
C01	Explain optimization techniques for various problems.	
CO2	Understand the given problem as transportation and assignment problem and solve.	
CO3	Illustrate game theory for decision support system.	

Year / SEM : 3 rd year / 6 th sem		Year of Study : 2019-20
Course Name: PYTHON APPLICATION PROGRAMMING-17CS664		
C01	Understand Python syntax and control and functions.	semantics and be fluent in the use of Python flow
CO2	Demonstrate proficiency in han	dling Strings and File Systems.



(II III III III III III III III III II	
CO3	Implement Python Programs using core data structures like Lists, Dictionaries and use Regular Expressions.
CO4	Interpret the concepts of Object-Oriented Programming as used in Python.
CO5	Implement exemplary applications related to Network Programming, Web Services and Databases in Python

Year / SEM : 3 rd year / 6 th sem		Year of Study : 2019-20
Course Name: SYSTEM SOFTWARE ANI		O OPERATING SYSTEM LABORATORY –
17CSL67		
CO1	Implement and demonstrate Lexer's and Parser's	
COI		
CO2	Implement different algorithms required for management, scheduling, allocation	
	and communication used in ope	erating system

Year / SEM : 3 rd year / 6 th sem		Year of Study : 2019-20	
Course Na	Course Name: COMPUTER GRAPHICS LABORATORY WITH MINI PROJECT –		
17CSL68			
	Apply the concepts of compute	r graphics	
CO1			
CO2	Implement computer graphics a	pplications using OpenGL	
CO3	Implement real world problems	using OpenGL	

Year / SEM : 4 th year / 7 th sem		Year of Study : 2019-20
Course Name: TECHNOLOGY AND ITS APPLICATIONS – 15CS71		
CO1	Adapt HTML and CSS syntax a	ind semantics to build web pages.
CO2	Construct and visually format ta	ables and forms using HTML and CSS
CO3	Develop Client-Side Scripts usi to generate and display the cont	ng JavaScript and Server-Side Scripts using PHP cents dynamically.
CO4	Appraise the principles of object	t oriented development using PHP
CO5	Inspect JavaScript frameworks developer to focus on core featu	like jQuery and Backbone which facilitates ares



Year / SEM : 4 th year / 7 th sem		Year of Study : 2019-20
Course Name: ADVANCED COMPUTER ARCHITECTURES-15CS72		
CO1	Explain the concepts of parallel	computing and hardware technologies
CO2	Compare and contrast the paral	el architectures
CO3	Illustrate parallel programming	concepts

Year / SEM : 4 th year / 7 th sem		Year of Study : 2019-20
Course Name: MACHINE LEARNING- 15CS73		
C01	Identify the problems for mach unsupersvised or reinforcement	ne learning. And select the either supervised, learning.
CO2	Explain theory of probability an	nd statistics related to machine learning
CO3	Investigate concept learning, A	NN, Bayes classifier, k nearest neighbor, Q,

Year / SEM : 4 th year / 7 th sem		Year of Study : 2019-20
Course Name: UNIX SYSTEM PROGRAMMING- 15CS744		
CO1	Ability to understand and reaso	n out the working of Unix Systems
CO2	Build an application/service over	er a Unix system.

Year / S	SEM: 4 th year / 7 th sem	Year of Study : 2019-20	
	Course Name: STORAGE AREA NETWORKS- 15CS754		
CO1	Identify key challenges in mana networking technologies and vi	ging information and analyze different storage rtualization	
CO2	Explain components and the im	plementation of NAS	
CO3	Describe CAS architecture and	types of archives and forms of virtualization	
CO4	Ilustrate the storage infrastructu	re and management activities	

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Year / SEM : 4 th year / 7 th sem		Year of Study : 2019-20
Course Name: MACHINE LEARNING LABORATORY- 15CSL76		
CO1	Understand the implementation	procedures for the machine learning algorithms.
CO2	Design Java/Python programs f	or various Learning algorithms.
CO3	Apply appropriate data sets to t	he Machine Learning algorithms.
CO4	Identify and apply Machine Lea	arning algorithms to solve real world problems.

Year / SEM : 4 th year / 7 th sem		Year of Study : 2019-20
Course Name: WEB TECHNOLOGY LABORATORY WITH MINI PROJECT– 15CSL77		
C01	Design and develop dynamic w and latest technical know-how's	eb pages with good aesthetic sense of designing s.
CO2	Have a good understanding of V other web services.	Web Application Terminologies, Internet Tools
CO3	Learn how to link and publish v	veb sites

Year / S	SEM : 4 th year / 8 th sem	Year of Study : 2019-20
Course Name: IOT TECHNOLOGY-15CS81		
CO1	Interpret the impact and challen architectural models	ges posed by IoT networks leading to new
CO2	Compare and contrast the deplo connect them to network.	yment of smart objects and the technologies to
CO3	Appraise the role of IoT protoco	ols for efficient network communication
CO4	Elaborate the need for Data Ana	alytics and Security in IoT.
CO5	Illustrate different sensor techno identify the applications of IoT	ologies for sensing real world entities and inIndustry.



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rear / S	SENT: 4 th year / 8 th sem	Year of Study : 2019-20
Course Name: BIG DATA ANALYTICS- 15CS82		
CO1	Master the concepts of HDFS a	nd MapReduce framework
CO2	Investigate Hadoop related tool Hadoop Administration	s for Big Data Analytics and perform basic
CO3	Recognize the role of Business in decision making	Intelligence, Data warehousing and Visualization
CO4	Infer the importance of core dat	a mining techniques for data analytics
CO5	Compare and contrast different	Text Mining Techniques

Year / SEM : 4 th year / 8 th sem		Year of Study : 2019-20
	Course Name: MODERN INT	TERFACE DESIGN – 15CS832
CO1	Design the user interface, desig connection between menu and	n, menu creation and windows creation and windows



Department of Electrical and Electronics and Engineering

2.6.1 Program outcomes, program specific outcomes and course outcomes

ProgramOutcomes:



PO1. Apply knowledge of mathematics and science, with fundamentals of Computer Science & Engineering to be able to solve complex engineering problems related to CSE.

PO2. Apply mathematical foundations, algorithmic principles, and computer Science theory in the modelling and design of computer based systems in a way that demonstrates comprehension of tradeoffs involved in design choices.

PO3. Analyze a problem, and identify and define the computing requirements appropriate to its solution

PO4.Design and development principles in the construction of software systems of varying complexity

PO5. Design, implement, and evaluate a software or a software/hardware system, component, or process to meet desired needs within realistic constraints such as memory, runtime efficiency, as



(Approved by AICTE, New Delhi, Govt. of Karnataka, Affiliated to Visvesvaraya Technological University, Belagavi) well as appropriate constraints related to economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability considerations;

PO6. Use the techniques, skills, and modern engineering tools necessary for practice as a CSE professional;

PO7. Work effectively as an individual, and as a member or leader in diverse teams and in multidisciplinary environment

PO8. Demonstrate knowledge of contemporary issues and understand professional, ethical,legal, security and social issues andresponsibilities

PO9. Analyze the local and global impact of computing on individuals, organizations, and society;

PO10. Demonstrate knowledge and understanding of the engineering and management principles including financial implications and apply these to his/her work, as a member and leader in a team, and to manage project work as part of a multidisciplinaryteam

PO11. Communicate effectively in both verbal and written forms;

PO12. Recognize the need for, and be motivated to engage in life-long learning and continuing professional development

PROGRAM SPECIFIC OUTCOMES(PSOs):

Engineering Graduates will be able to:

PSO-1:	The graduate will succeed in industries/technical profession and/or pursue post graduate program in Electrical & Electronics Engineering and allied fields by providing solid foundation in fundamentals of Mathematics, Science and Electrical & Electronics Engineering using modern tools and equipment to correlate theoretical aspects with practical needs.
PSO-2:	Graduates will be thorough professionals equipped with sound leadership, interdisciplinary teamwork, communication skills, and ethical practices along with concerns for environment and societal well being.
PSO-3:	Graduates will possess the capability to acquire new knowledge through skills of analysis, synthesis and knowledge generation, transmission and distribution in designing electrical systems to solve engineering problems and remain life-long learners in an increasingly technology-dependent society.



Course Outcomes:

Year /	SEM : 2 nd year / 3 rd sem Year of Study : 2019-20
	Course Name:
CO1	Use Laplace transform and inverse Laplace transform in solving differential/ integral equation arising in network analysis, control systems and other fields of engineering.
CO2	Demonstrate Fourier series to study the behaviour of periodic functions and their applications in system communications, digital signal processing and field theory.
CO3	Make use of Fourier transform and Z-transform to illustrate discrete/continuous function arising in wave and heat propagation, signals and systems.
CO4	Solve first and second order ordinary differential equations arising in engineering problems using single step and multistep numerical methods.
CO5	Determine the externals of functionals using calculus of variations and solve problems arising in dynamics of rigid bodies and vibrational analysis.

Year /	SEM : 2 nd year / 3 rd sem	Year of Study : 2019-20
Course Name: TRANSFORM CALCULUS, FOURIER SERIES AND NUMERICAL TECHNIQUES(18MAT31)		
CO1	Use Laplace transform and inve integral equation arising in netw engineering.	erse Laplace transform in solving differential/ vork analysis, control systems and other fields of
CO2	Demonstrate Fourier series to s and their applications in system and field theory.	tudy the behaviour of periodic functions communications, digital signal processing
CO3	Make use of Fourier transform discrete/continuous function are and systems.	and Z-transform to illustrate sing in wave and heat propagation, signals
CO4	Solve first and second order ord engineering problems using sin	linary differential equations arising in gle step and multistep numerical methods.
C05	Determine the externals of funct solve problems arising in dynar analysis.	tionals using calculus of variations and nics of rigid bodies and vibrational



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Year / S	SEM : 2 nd year / 3 rd sem	Year of Study : 2019-20
Cours	e Name: ELECTRIC CIRCUI	Γ ANALYSISTECHNIQUES(18EE32)
CO1	Understand the basic concepts, networks and reduce the comple transformation and network red	basic laws and methods of analysis of DC and AC exity of network using source shifting, source uction using transformations
CO2	Solve complex electric circuits	using network theorems.
CO3	Discuss resonance in series and initial conditions and their evalu	parallel circuits and also the importance of ation.
CO4	Synthesize typical waveforms u	sing Laplace transformation.
CO5	Solve unbalanced three phase sy of two port networks.	stems and also evaluate the performance

Year /	SEM : 2 nd year / 3 rd sem	Year of Study : 2019-20
С	Course Name: TRANSFORMERS AND GENERATORS(18EE33)	
CO1	Understand the construction and Autotransformer	d operation of 1-phase, 3-Phase transformers and
CO2	Analyze the performance of tran phase conversion, 3-phase conn	nsformers by polarity test, Sumpner's Test, ection, and parallel operation
CO3	Understand the construction and	d working of AC and DC Generators.
CO4	Analyze the performance of the operation.	AC Generators on infinite bus and parallel
C05	Determine the regulation of AC ZPF Methods	Generator by Slip test, EMF, MMF, and



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Year /	SEM : 2 nd year / 3 rd sem	Year of Study : 2019-20
Course Name: ANALOG ELECTRONIC CIRCUITS(18EE34)		
CO1	Obtain the output characteristic	s of clipper and clamper circuits.
CO2	Design and compare biasing cir transistor switching	cuits for transistor amplifiers & explain the
CO3	Explain the concept of feedback	, its types and design of feedback circuits
CO4	Design and analyze the power a different frequencies.	mplifier circuits and oscillators for
CO5	Design and analysis of FET and	MOSFET amplifiers

Year / SEM : 2 nd year / 3 rd sem		Year of Study : 2019-20	
	Course Name: DIGITAL SYSTEM DESIGN(18EE35)		
C01	Develop simplified switching e QuineMcClusky techniques	quation using Karnaugh Maps and	
CO2	Design Multiplexer, Encoder, E Comparator as digital combinat	Decoder, Adder, Subtractors and ional control circuits.	
CO3	Design flip flops, counters, shif	t registers as sequential control circuits.	
CO4	Develop Mealy/Moore Models sequential circuits.	and state diagrams for the given clocked	
CO5	Explain the functioning of Read Programmable ROM, EPROM	l only and Read/Write Memories, and Flash memory.	



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Year / S	SEM : 2 nd year / 3 rd sem	Year of Study : 2019-20
Course Na	ame: ELECTRICAL AND ELI	ECTRONIC MEASUREMENTS (18EE36)
CO1	Measure resistance, inductance earth resistance.	and capacitance using bridges and determine
CO2	Explain the working of various Energy & understand the adjust meters.	meters used for measurement of Power, ments, calibration & errors in energy
CO3	Understand methods of extendi transformers.	ng the range of instruments & instrument
CO4	Explain the working of differen	t electronic instruments.
CO5	Explain the working of differen	t display and recording devices.

Year / SEM : 2 nd year / 3 rd sem		Year of Study : 2019-20
Course Name: ELECTRICAL MACHINES LABORATORY - 1 (18EEL37)		HINES LABORATORY - 1 (18EEL37)
CO1	Evaluate the performance of tra	nsformers from the test data obtained.
CO2	Connect and operate two single rating in parallel.	phase transformers of different KVA
CO3	Connect single phase transform conversion.	ers for three phase operation and phase
CO4	Compute the voltage regulation data obtained in the laboratory.	of synchronous generator using the test
CO5	Evaluate the performance of syn assess the performance of synch	nchronous generators from the test data and pronous generator connected to infinite bus.

Year / S	SEM : 2 nd year / 3 rd sem	Year of Study : 2019-20
Course Name: ELECTRONICS LABORATORY (18EEL38)		
CO1	Design and test rectifier circuits	with and without capacitor filters.
CO2	Determine h-parameter models	of transistor for all modes.



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CO3	Design and test BJT and FET amplifier and oscillator circuits.
CO4	Realize Boolean expressions, adders and subtractors using gates.
CO5	Design and test Ring counter/Johnson counter, Sequence generator and 3 bit counters.

Year / SEM : 2 nd year / 4 th sem		Year of Study : 2019-20
Course Name: ADDITIONAL MATHEMATICS – I (18MATDIP31) only for lateral entry students		
CO1	Apply concepts of complex nur arising in related area	nbers and vector algebra to analyze the problems
CO2	Use derivatives and partial deri multivariate functions.	vatives to calculate rate of change of
CO3	Analyze position, velocity and vector valued functions	acceleration in two and three dimensions of
CO4	Learn techniques of integration triple integrals.	including the evaluation of double and
CO5	Identify and solve first order or	dinary differential equations.

Year / SEM : 2 nd year / 4 th sem		Year of Study : 2019-20
Course Name: COMPLEX ANALYSIS, PROBABILITY AND STATISTICAL METHODS (18MAT41)		
CO1	Use the concepts of analytic function and complex potentials to solve the problems arising in electromagnetic field theory	
CO2	Utilize conformal transformation and complex integral arising in aerofoil theory, fluid flow visualization and image processing.	
CO3	Apply discrete and continuous probability models arising in en	probability distributions in analyzing the gineering field.
CO4	Make use of the correlation and regression analysis to fit a suitable mathematical model for the statistical data	



RajaRajeswari College of Engineering (Approved by AICTE, New Delhi, Govt. of Karnataka, Affiliated to Visvesvaraya Technological University, Belagavi) Construct joint probability distributions and demonstrate the validity of

testing the hypothesis.

Year /	SEM : 2 nd year / 4 th sem Year of Study : 2019-20
	Course Name:
CO1	Use the concepts of analytic function and complex potentials to solve the problems arising in electromagnetic field theory.
CO2	Utilize conformal transformation and complex integral arising in aerofoil theory, fluid flow visualization and image processing.
CO3	Apply discrete and continuous probability distributions in analyzing the probability models arising in engineering field.
CO4	Make use of the correlation and regression analysis to fit a suitable mathematical model for the statistical data.
CO5	Construct joint probability distributions and demonstrate the validity of testing the hypothesis

Year / SEM : 2 nd year / 4 th sem		Year of Study : 2019-20
Course Name: POWER GENERATION AND ECONOMICS (18EE42)		
CO1	Describe the working of hydroe functions of major equipment o	electric, steam, nuclear power plants and state f the power plants.
CO2	Classify various substations and equipments in substations.	l explain the functions of major
CO3	Explain the types of grounding	and its importance.
CO4	Infer the economic aspects of p	ower system operation and its effects.
CO5	Explain the importance of powe	er factor improvement.

Year of Study : 2019-20 Year / SEM : 2ndyear / 4 th sem **Course Name: TRANSMISSION AND DISTRIBUTION (18EE43)**



Seman Care	Approved by AICTE, New Delhi, Govt. of Karnataka, Affiliated to Visvesvaraya Technological University
CO1	Explain transmission and distribution scheme, identify the importance of different transmission systems and types of insulators
CO2	Analyze and compute the parameters of the transmission line for different configurations.
CO3	Assess the performance of overhead lines.
CO4	Interpret corona, explain the use of underground cables.
CO5	Classify different types of distribution systems; examine its quality & reliability

Year / SEM : 2 nd year / 4 th sem		Year of Study : 2019-20	
	Course Name: ELECTRIC MOTORS (18EE44)		
CO1	Explain the construction, operation and classification of DC Motor, AC motor and Special purpose motors.		
CO2	Describe the performance characteristics & applications of Electric motors.		
CO3	Demonstrate and explain the modelermine losses and efficiency	ethods of testing of DC machines and	
CO4	Control the speed of DC motor	and induction motor.	
C05	Explain the starting methods, ec torque angle, effect of change in and damping of synchronous m	quivalent circuit and phasor diagrams, n excitation and change in load, hunting otors	

Year / SEM : 2 nd year / 4 th sem		Year of Study : 2019-20
Course Name: ELECTROMAGNETIC FIELD THEORY (18EE45)		
CO1	Use different coordinate systems, Coulomb's Law and Gauss Law for the evaluation of electric fields produced by different charge configurations.	
CO2	Calculate the energy and potential due to a system of charges & Explain the behavior of electric field across a boundary conditions.	
CO3	Explain the Poisson's, Laplace fields	equations and behavior of steady magnetic



RajaRajeswari College of Engineering (Approved by AICTE, New Delhi, Govt. of Karnataka, Affiliated to Visvesvaraya Technological University, Belagavi) Explain the behavior of magnetic fields and magnetic materials. **CO4** Asses time varying fields and propagation of waves in different media. CO5

Year / SEM : 2 nd year / 4 th sem		Year of Study : 2019-20
Cour	Course Name: OPERATIONAL AMPLIFIERS AND LINEAR ICs (18EE46)	
CO1	Describe the characteristics of i	deal and practical operational amplifier.
CO2	Design filters and signal genera	tors using linear ICs.
CO3	Demonstrate the application of	Linear ICs as comparators and rectifiers.
CO4	Analyze voltage regulators for g voltage regulators.	given specification using op-amp and IC
CO5	Summarize the basics of PLL a	nd Timer.

Year / SEM : 2 nd year / 4 th sem		Year of Study : 2019-20
Cou	Course Name: ELECTRICAL MACHINES LABORATORY - 2 (18EEL47)	
CO1	Test DC machines to determine of DC motor.	their characteristics and also to control the speed
CO2	Pre-determine the performance conducting suitable tests.	characteristics of DC machines by
CO3	Perform load test on single phases assess its performance.	se and three phase induction motor to
CO4	Conduct test on induction moto characteristics.	r to pre-determine the performance
CO5	Conduct test on synchronous m	otor to draw the performance curves.

Year / SEM : 2ndyear / 4 th sem Year of Study : 2019-20 Course Name: OP- AMP AND LINEAR ICS LABORATORY (18EEL48)



RajaRajeswari College of Engineering ((Approved by AICTE, New Delhi, Govt. of Karnataka, Affiliated to Visvesvaraya Technological University, Belagavi) To conduct experiment to determine the characteristic parameters of OP-Amp

CO1	
CO2	To design test the OP-Amp as Amplifier, adder, subtractor, differentiator and integrator.
CO3	To design test the OP-Amp as oscillators and filters.
CO4	Design and study of Linear IC's as multivibrator power supplies.

Year / SEM : 3 rd year / 5 th sem		Year of Study : 2019-20	
Course	Course Name: MANAGEMENT AND ENTREPRENEURSHIP (15EE51/17EE51)		
CO1	Explain the field of management, task of the manager, planning and steps in decision making		
CO2	Discuss the structure of organization, importance of staffing, leadership styles, modes of communication, techniques of coordination and importance of managerial control in business		
CO3	Explain the concepts of entrepr responsibilities towards differen	eneurship and a businessman's social nt groups	
CO4	Show an understanding of role state/central level institutions/ag	of SSI's in the development of country and gencies supporting business enterprises.	
CO5	Discuss the concepts of project feasibility studies, need for proj	management, capital budgeting, project ect report and new control techniques	

Year / SEM : 3 rd year / 5 th sem		Year of Study : 2019-20
Course Name: MICROCONTROLLER (15EE52/17EE52)		
CO1	Outline the 8051 architecture, readdressing modes.	egisters, internal memory organization,
CO2	Discuss 8051 addressing modes and I/O port programming.	s, instruction set of 8051, accessing data
CO3	Develop 8051C programs for ti manipulation, logic and arithme timer/counter programming.	me delay, I/O operations, I/O bit etic operations, data conversion and

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CO4	Summarize the basics of serial communication and interrupts, also
	develop 8051 programs for serial data communication and interrupt
	programming.
C05	Program 8051 to work with external devices for ADC, DAC, Stepper motor control, DC motor control, Elevator control

Year /	SEM : 3 rd year / 5 th sem	Year of Study : 2019-20
	Course Name: POWER ELF	CCTRONICS (15EE53/17EE53)
CO1	To give an overview of applicat semiconductor devices, their sw characteristics, types, their oper circuits	tions power electronics, different types of power vitching characteristics, power diode ration and the effects of power diodes on RL
CO2	To explain the techniques for de rectifier circuits	esign and analysis of single phase diode
CO3	To explain different power tran characteristics and limitations.	sistors, their steady state and switching
CO4	To explain different types of Th control requirements	hyristors, their gate characteristics and gate
C05	To explain the design, analysis characteristics of controlled rec Voltage controllers.	techniques, performance parameters and tifiers, DC- DC, DC -AC converters and

Year /	SEM : 3 rd year / 5 th sem	Year of Study : 2019-20
	Course Name: SIGNALS AN	D SYSTEMS (15EE54/17EE54)
CO1	Explain the generation of signals, be performed on signals and prope	behavior of system and the basic operations that can erties of systems.
CO2	Apply convolution in both continu systems given impulse response of	ous and discrete domain for the analysis of f a system.
CO3	Solve the continuous time and disc their representation by block diagr	crete time systems by various methods and am
CO4	Perform Fourier analysis for contin systems	nuous and discrete time, linear time invariant
CO5	Apply Z-transform and properties systems.	of Z transform for the analysis of discrete time

Year / SEM : 3rdyear / 5 th sem

Year of Study : 2019-20

Course Name: ELECTRICAL MACHINE DESIGN (15EE55/17EE55)



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CO1	Identify and list, limitations, modern machines and properties of materials	trends in design, manufacturing of electrical used in the electrical machines
CO2	Derive the output equation of DC ma and magnetic circuits of DC machine and design stator and rotor circuits of	chine, discuss selection of specific loadings s, design the field windings of DC machine, `a DC machine.
CO3	Derive the output equations of transfe estimate the number of cooling tubes, core type transformer.	ormer, discuss selection of specific loadings, , no load current and leakage reactance of
CO4	Develop the output equation of induc loadings and magnetic circuits of ind of a induction motor.	tion motor, discuss selection of specific uction motor, design stator and rotor circuits
CO5	Formulate the output equation of alte Synchronous machine, discuss short of of synchronous machines, design sali given specifications	rnator, design the field windings of circuit ratio and its effects on performance ent pole and non-salient pole alternators for
Year / S	SEM : 3rdyear / 5 th sem	Year of Study : 2019-20
C	Course Name: HIGH VOLTAGE E	NGINEERING (15EE56/17EE56)
CO1	Explain conduction and breakdow breakdown phenomenon in solid c	n phenomenon in gases, liquid dielectrics and lielectrics.
CO2	Summarize generation of high vol	tages and currents
CO3	Outline measurement techniques f	or high voltages and currents
CO4	Summarize overvoltage phenomer electric power systems.	non and insulation coordination in

Year / S	SEM : 3 rd year / 5 th sem	Year of Study : 2019-20
Course Name: MICROCONTROLLER LABORATORY (15EEL57/17EEL57)		
CO1	Write assembly language progra logical instructions and code co	ams for data transfer, arithmetic, Boolean and nversions.
CO2	Write ALP using subroutines for configuration of SFRs for serial	or generation of delays, counters, communication and timers
CO3	Perform interfacing of stepper r speed, elevator, LCD, external	notor and dc motor for controlling the ADC and temperature control.



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CO4	Generate different waveforms using DAC interface.	
CO5	Work with a small team to carryout experiments using microcontroller concepts and prepare reports that present lab work.	

Year /	SEM : 3 rd year / 5 th sem	Year of Study : 2019-20
Cours	Course Name: POWER ELECTRONICS LABORATORY (15EEL58/17EEL58)	
CO1	Obtain static characteristics of s performance.	semiconductor devices to discuss their
CO2	Trigger the SCR by different m	ethods
CO3	Verify the performance of singl AC voltage controller with R ar	e phase controlled full wave rectifier and nd RL loads.
CO4	Control the speed of a DC moto	or, universal motor and stepper motors.
C05	Verify the performance of singl resistive load.	e phase full bridge inverter connected to

Year /	SEM : 3 rd year / 6 th sem	Year of Study : 2019-20
	Course Name: CONTROL	SYSTEMS (15EE61/17EE61)
CO1	Analyze and model electrical an	nd mechanical system using analogous.
CO2	Formulate transfer functions us	ing block diagram and signal flow graphs.
CO3	Analyze the stability of control steady state time response.	system, ability to determine transient and
CO4	Illustrate the performance of a g domains, stability analysis usin	given system in time and frequency g Root locus and Bode plots.
CO5	Discuss stability analysis using compensator for a given specifi	Nyquist plots, Design controller and cation.



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Year / S	SEM : 3 rd year / 6 th sem	Year of Study : 2019-20
(Course Name: POWER SYSTEM	1 ANALYSIS – 1 (15EE62/17EE62)
CO1	Model the power system compo power system.	onents & construct per unit impedance diagram of
CO2	Analyze three phase symmetric	al faults on power system.
CO3	Compute unbalanced phasors ir versa, also develop sequence ne	terms of sequence components and vice tworks.
CO4	Analyze various unsymmetrical	faults on power system.
C05	Examine dynamics of synchron system stability.	ous machine and determine the power

Year / SEM : 3 rd year / 6 th sem		Year of Study : 2019-20
(Course Name: DIGITAL SIGNA	L PROCESSING (15EE63/17EE63)
CO1	Apply DFT and IDFT to perform determine the output.	inear filtering techniques on given sequences to
CO2	Apply fast and efficient algorithms given sequence	s for computing DFT and inverse DFT of a
CO3	Design and realize infinite impulse filters using impulse invariant and	e response Butterworth and Chebyshev digital bilinear transformation techniques.
CO4	Develop a digital IIR filter by dire direct, cascade and linear phase m	ct, cascade, parallel, ladder and FIR filter by ethods of realization
C05	Design and realize FIR filters by u method.	se of window function and frequency sampling

Year / S	SEM : 3 rd year / 6 th sem	Year of Study : 2019-20
Course Name: DIGITAL SIGNAL PROCESSING (15EE64/17EE64)		
CO1	Apply DFT and IDFT to perform l determine the output.	inear filtering techniques on given sequences to
CO2	Apply fast and efficient algorithms given sequence	s for computing DFT and inverse DFT of a



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CO3	Design and realize infinite impulse response Butterworth and Chebyshev digital
	filters using impulse invariant and bilinear transformation techniques.
CO4	Develop a digital IIR filter by direct, cascade, parallel, ladder and FIR filter by
	direct, cascade and linear phase methods of realization
CO5	Design and realize FIR filters by use of window function and frequency sampling
	method.

Year / SEM : 3 rd year / 6 th sem		Year of Study : 2019-20
Course	Name : COMPUTER AIDED ELE	ECTRICAL DRAWING (15EE651/17EE651)
CO1	Discuss the terminology and ty	pes of DC and AC armature windings.
CO2	Develop armature winding diag	ram for DC and AC machines
CO3	Develop a layout for substation equipment.	using the standard symbols for substation
CO4	Draw sectional views of core an data	nd shell types transformers using the design
CO5	Draw sectional views of assemble design data or the sketches	bled DC machine or its parts using the

Year / SEM : 3 rd year / 6 th sem		Year of Study : 2019-20
C	Course Name: SENSORS AND T	RANSDUCERS (15EE662/17EE662)
CO1	Discuss need of transducers, the	eir classification, advantages and disadvantages
CO2	Show an understanding of work	ing of various transducers and sensors
CO3	Discuss recent trends in sensor	technology and their selection
CO4	Discuss basics of signal conditi	oning and signal conditioning equipment.
CO5	Explain measurement of non-el speed, force, torque, power and	ectrical quantities -temperature, flow, viscosity



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Course Name: POWER SYSTEM ANALYSIS – 2– 15EE71		
	Formulate network matrices and	models for solving load flow problems.
CO1		
	Perform steady state power flow	analysis of power systems using numerical
CO2	iterative techniques.	
	Suggest a method to control volt	age profile.
CO3		
	Show knowledge of optimal ope	ration of generators on a bus bar, optimal unit
CO4	commitment,	
	Discuss optimal scheduling for h	ydro-thermal system, power system security and
CO5	reliability.	
	Analyze short circuit faults in po	wer system networks using bus impedance
CO6	matrix.	
CO7	Perform numerical solution of sw	ving equation for multi-machine stability
C07		

Year / SEM : 4 th year / 7 th sem		Year of Study : 2019-20	
	Course Name: POWER SYSTEM PROTECTION- 15EE72		
C01	Discuss performance of protectiv relay terminology overcurrent protection.	ve relays, components of protection scheme and	
CO2	Explain the working of distance swings, line length and source in	relays and the effects ofarc resistance, power pedance on performance of distance relays.	
CO3	Discuss pilot protection; wire pil	ot relaying and carrier pilot relaying.	
CO4	Discuss construction, operating p for differential protection.	principles and performance of differential relays	
C05	Discuss protection of generators,	motors, Transformer and Bus Zone Protection.	



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CO6	Explain the principle of circuit interruption in different types of circuit breakers.
CO7	Describe the construction and operating principle of different types of fuses and to give the definitions of different terminologies related to a fuse.
CO8	Discuss protection against Overvoltages and Gas Insulated Substation (GIS)

Year /	SEM: 4 th year / 7 th sem	Year of Study : 2019-20
	Course Name: HIGH VOLTA	GE ENGINEERING – 15EE73
	Explain conduction and breakdo	wn phenomenon in gases, liquid dielectrics.
CO1		
	Explain breakdown phenomenor	in solid dielectrics.
CO2		
CO3	To explain different geological s depleted gas reservoirs	torage methods including storage in coal seams,
CO4	Explain generation of high voltage	ges and currents
CO5	Discuss measurement techniques	for high voltages and currents.
CO6	Discuss overvoltage phenomeno systems.	n and insulation coordination in electric power
C07	Discuss non-destructive testing of voltage testing of electric appara	f materials and electric apparatus and high- tus

Year / S	SEM: 4 th year / 7 th sem	Year of Study : 2019-20
Course Name: ADVANCED CONTROL SYSTEMSS(Professional Elective) –		
CO1	Discuss state variable approach t continuous and discrete time sys	For linear time invariant systems in both the tems.
CO2	Develop of state models for linea	ar continuous – time and discrete – time systems.



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CO3	Apply vector and matrix algebra to find the solution of state equations for linear continuous – time and discrete – time systems.
CO4	Define controllability and observability of a system and test for controllability and observability of a given system.
CO5	Design pole assignment and state observer using state feedback.
CO6	Develop the describing function for the nonlinearity present to assess the stability of the system.
C07	Develop Lyapunov function for the stability analysis of nonlinear systems.

Year / SEM : 4 th year / 7 th sem		Year of Study : 2019-20
Course Name: UTILIZATION OF ELECTRICAL POWER(Professional Elective)		
	- 15	EE742
	Discuss electric heating, air-cond	litioning and electric welding.
CO1		
CO2	Explain laws of electrolysis, extr deposition.	action and refining of metals and electro
CO3	Explain the terminology of illum working of electric lamps.	ination, laws of illumination, construction and
CO4	Design interior and exterior light lighting- flood lighting-street light	ing systems- illumination levels for factory nting.
CO5	Discuss systems of electric tracti movement.	on, speed time curves and mechanics of train
CO6	Explain the motors used for elect	ric traction and their control.
C07	Discuss braking of electric moto traction systems.	rs, traction systems and power supply and other
CO8	Explain the working of electric a	nd hybrid electric vehicles.



RajaRajeswari College of Engineering (Approved by AICTE, New Delhi, Govt. of Karnataka, Affiliated to Visvesvaraya Technological University, Belagavi) Course Name: CARBON CAPTURE AND STORAGE(Professional Elective)-15EE743

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CO1	Discuss the impacts of climate change and the measures that can be taken to reduce emissions.
	Discuss carbon capture and carbon storage.
CO2	
CO3	Explain the fundamentals of power generation.
CO4	Explain methods of carbon capture from power generation and industrial processes.
CO5	Explain different carbon storage methods: storage in coal seams, depleted gas reservoirs and saline formations.
CO6	Explain Carbon dioxide compression and pipeline transport.

Year / SEM : 4 th year / 7 th sem		Year of Study : 2019-20
Course	Name: POWER SYSTEM PLA	NNING (Professional Elective)–15EE744
CO1	Discuss primary components of poptimum power system expansion, various types	power system planning, planning methodology for of generation, transmission and distribution.
CO2	Show knowledge of forecasting energy by deterministic and stati	of future load requirements of both demand and stical techniques using forecasting tools.
CO3	Discuss methods to mobilize response power sector	ources to meet the investment requirement for the
CO4	Understand economic appraisal t the investment decisions	to allocate the resources efficiently and appreciate
CO5	Discuss expansion of power gen country, evaluation of operating contingencies and the stability of	eration and planning for system energy in the states of transmission system, their associated f the system.
CO6	Discuss principles of distribution the system studies	n planning, supply rules, network development and
CO7	Discuss reliability criteria for generation and analysis, grid reliability, voltage	neration, transmission, distribution and reliability disturbances and their remedies



CO8	Discuss planning and implementation of electric –utility activities, market principles and the norms
	framed by CERC for online trading and exchange in the interstate power market.

Year / SEM : 4 th year / 7 th sem		Year of Study : 2019-20
Course Name: FACTS AND HVDC TRANSMISSION (Professional Elective)-15EE751		
C01	Discuss transmission interconnect the loading capability, dynamic s interconnection and controllable	ctions, flow of Power in an AC System, limits of stability considerations of a transmission parameters.
CO2	Explain the basic concepts, defin benefits from FACTS technology	itions of flexible ac transmission systems and /.
CO3	Describe shunt controllers, Static injecting reactive power in the tr and power transfer capability.	e Var Compensator and Static Compensator for ansmission system in enhancing the controllability
CO4	Describe series Controllers Thyr Static Synchronous Series Comp line current.	istor-Controlled Series Capacitor (TCSC) and the ensator (SSSC) for control of the transmission
CO5	Explain advantages of HVDC po HVDC system	wer transmission, overview and organization of
CO6	Describe the basic components o reactive power demanded by the converter.	f a converter, the methods for compensating the
C07	Explain converter control for HV functions	DC systems, commutation failure, control

Year / S	SEM: 4 th year / 7 th sem	Year of Study : 2019-20
Course Name: 7 APPARATUS(1	TESTING AND COMMISSIO Professional Elective) – 15EE75	NING OF POWER SYSTEM 2
CO1	Describe the process to plan, con equipment's.	trol and implement commissioning of electrical
CO2	Differentiate the performance sp	ecifications of transformer and induction motor.
CO3	Demonstrate the routine tests for transformer & switchgears.	synchronous machine, induction motor,



Describe corrective and preventive maintenance of electrical equipment's

CO4	Desende concentre and preventive maintenance of creetilear equipment s.
CO5	Explain the operation of an electrical equipment's such as isolators, circuit breakers, induction motorand synchronous machines.

Year / SEM : 4 th year / 7 th sem		Year of Study : 2019-20
Course Name: POWER SYSTEM SIMULATION LABORATORY-15EEL76		
C01	Develop a program in MATLAB transmission lines.	to assess the performance of medium and long
CO2	Develop a program in MATLAB salient and non-salient pole alter	to obtain the power angle characteristics of nator.
CO3	Develop a program in MATLAB fault at differen locations in a of radial power sys	to assess the transient stability under three phase stems.
CO4	Develop programs in MATLAB matrices of interconnected power systems.	to formulate bus admittance and bus impedance
C05	Use Mi-Power package to solve	power flow problem for simple power systems.
CO6	Use Mi-Power package to study radial power systems	unsymmetrical faults at different locations in
C07	Use of Mi-Power package to stud thermal power plants.	ly optimal generation scheduling problems for

Year /	SEM : 4 th year / 7 th sem	Year of Study : 2019-20	
Course	Course Name: POWER SYSTEM SIMULATION LABORATORY-15EEL76		
CO1	Develop a program in MATLAB transmission lines.	to assess the performance of medium and long	
CO2	Develop a program in MATLAB salient and non-salient pole alter	to obtain the power angle characteristics of nator.	
CO3	Develop a program in MATLAB fault at different locations in a of	to assess the transient stability under three phase fradial power systems.	



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CO4	Develop programs in MATLAB to formulate bus admittance and bus impedance matrices of interconnected power systems.
CO5	Use Mi-Power package to solve power flow problem for simple power systems.
CO6	Use Mi-Power package to study unsymmetrical faults at different locations in radial power systems
CO7	Use of Mi-Power package to study optimal generation scheduling problems for thermal power plants.

Year /	/ SEM : 4 th year / 7 th sem	Year of Study : 2019-20
Course Name: RELY AND HIGH VOLTAGE LABORATORY-15EEL77		
CO1	Experimentally verify the charac voltage and negative sequence relays both electromag	teristics of over current, over voltage, under netic and static type.
CO2	Experimentally verify the charac over voltage, under voltage relay	teristics of microprocessor based over current, s and distance relay.
СО3	Show knowledge of protecting g	enerator, motor and feeders.
CO4	Analyze the spark over character configurations using High AC no	istics for both uniform and non-uniform d DC voltages
C05	Measure high AC and DC voltag	es and breakdown strength of transformer oil.
CO6	Draw electric field and measure configuration models.	e the capacitance of different electrode
C07	Show knowledge of generating s efficiency, energy of impulse gen air insulation.	tandard lightning impulse voltage to determine erator and 50% probability flashover voltage for

Year / SEM : 4 th year / 7 th sem		Year of Study : 2019-20
Course Name: PROJECT PHASE – I AND SEMINAR–15EEP78		
	Demonstrate a sound technical k	nowledge of their selected project topic.
CO1		



CO2	
CO3	Design engineering solutions to complex problems utilising a systems approach.
CO4	Communicate with engineers and the community at large in written an oral forms.
CO5	Demonstrate the knowledge, skills and attitudes of a professional engineer.

Year /	SEM: 4 th year / 8 th sem	Year of Study : 2019-20	
Course N	Course Name: POWER SYSTEM OPERATION AND CONTROL(Core Course) – 15EE81		
CO1	Describe various levels of contro system,components, architecture and configuration of	Is in power systems, the vulnerability of the SCADA.	
CO2	Solve unit commitment problem	3	
CO3	Explain issues of hydrothermal s problems	cheduling and solutions to hydro thermal	
CO4	Explain basic generator control l speed governors	oops, functions of Automatic generation control,	
CO5	Develop and analyze mathematic	cal models of Automatic Load Frequency Control	
CO6	Explain automatic generation con interconnected power system.	ntrol, voltage and reactive power control in an	
CO7	Explain reliability, security, cont issues of power systems.■	ingency analysis, state estimation and related	

Year / SEM : 4 th year / 8 th sem		Year of Study : 2019-20
Course Name: INDUSTRIAL DRIVES AND APPLICATIONS(Core Course) -15EE82		
	Explain the advantages and choi	ce of electric drive.
CO1		



RajaRajeswari College of Engineering (Approved by AICTE, New Delhi, Govt. of Karnataka, Affiliated to Visvesvaraya Technological University, Belagavi) Explain dynamics and different modes of operation of electric drives.

CO2	
CO3	Suggest a motor for a drive and control of dc motor using controlled rectifiers.
CO4	Analyze the performance of induction motor drives under different conditions.
C05	Control induction motor, synchronous motor and stepper motor drives.
CO6	Suggest a suitable electrical drive for specific application in the industry.

Year / SEM : 4 th year / 8 th sem		Year of Study : 2019-20		
Course Name: OPERATION AND MAINTENANCE OF SOLAR ELECTRICSYSTEMS (Professional Elective)–15EE832				
CO1	Discuss basics of solar resource data, its acquisition and usage.			
CO2	Explain PV technology, buying the PV modules and connecting the modules to form arrays.			
CO3	Explain the use of inverters, other system components, cabling used to connect the components and mounting methods of the PV system.			
CO4	Assess the site for PV system installation.			
CO5	Design a grid connected system and compute its size.			
CO6	Explain installation, commission	ning, operation and maintenance of PV systems.		
C07	Explain the types of financial incentives available, calculation of payback time			

Year / SEM : 4 th year / 8 th sem	Year of Study : 2019-20		
Course Name: INTERNSHIP / PROFESSIONAL PRACTICE			
-15EE84			



RajaRajeswari College of Engineering (Approved by AICTE, New Delhi, Govt. of Karnataka, Affiliated to Visvesvaraya Technological University, Belagavi) Gain practical experience within industry in which the internship is done.



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CO1	
CO 2	Acquire knowledge of the industry in which the internship is done.
	Apply knowledge and skills learned to classroom work.
CO3	
CO4	Develop a greater understanding about career options while more clearly defining personal career goals
CO5	Experience the activities and functions of professionals.

Year / SEM : 4 th year / 8 th sem		Year of Study : 2019-20		
Course Name: PROJECT WORK PHASE -II-15EEP85				
	Present the project and be able to defend it.			
CO1				
	Make links across different areas evaluate ideas and	of knowledge and to generate, develop and		
CO2	information so as to apply these skills to the project task.			
CO3	Habituated to critical thinking an	d use problem solving skills		
CO4	Communicate effectively and to present ideas clearly and coherently in both the written and oral forms.			
CO5	Work in a team to achieve common goal.			
CO6	Learn on their own, reflect on the improve it.	eir learning and take appropriate actions to		

Year	/ SEM : 4 th year / 8 th sem	Year of Study : 2019-20		
Course Name: SEMINAR15EES86				
CO1	Attain, use and develop knowledge in the field of electrical and electronics engineering and other disciplines through independent learning and collaborative study.			


by AICTE, New Delhi, Govt. of Karnataka, Affiliated to Visvesvaraya Technological I Identify, understand and discuss current, real-time issues





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Department of MCA

2.6.1 Program outcomes, program specific outcomes and course outcomes ProgramOutcomes:



PO1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2: Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations

PO4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.



PO6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11: Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12: Life-long learning: Recognize the need for, and have the preparation and ability to

engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES (PSOs):

Master of computer Applications will be able to:

PSO-1:	Understand the principles of Computer Applications and enrich knowledge in recent advancements and developments in Software Industries.
PSO-2:	Competent in programming and computing skills, ability to apply software development methodologies and modeling to solve real world problems.

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ub: Advanced Java Programming Sub Code: 18MCA41	Sub:
1 Learn the concept of Servlet and its life cycle, understand JSP tags and its	CO1
services	
O2 Create packages and interfaces, Build Database connection	CO2
Develop java server pages applications using JSP tags and develop Enterprise	CO3
java bean applications.	

Sub: Advanced Web Programming Sub Code: 18MCA42

CO1	Acquire knowledge of building the web applications using PHP, Ruby,
	Bootstrap, AJAX, and XML.
CO2	Design the Asynchronous Web Application using AJAX, Understand the
	terminology of building web Application using MVC architecture.
CO3	Design responsive web applications using Bootstrap.

Sub: Object Oriented Modeling and Design Sub Code: 18MCA43

CO1	Acquire knowledge of Basic UML concepts and terminologies, Life Cycle of
	Object oriented Development, Modeling Concepts.
CO2	Identify the basic principles of software modeling and apply them in real world
	applications, Produce conceptual models for solving operational problems in
	software and IT environment using UML.
CO3	Analyze the development of object oriented software models in terms of static
	behavior, Evaluate and implement various design patterns.

Sub:	Cyber Security	Sub Code: 18MCA442
CO1	Define and illu	strate cyber security concepts and applications, Analyze the
		working of cyber security principles to system design.
CO2	Illus	trate appropriate techniques to solve cyber security threats.
CO3	Evaluate and im	plement cyber security through network security protocols.

Sub:	Big Data Analytics	Sub Code: 18MCA454
CO1	Understand the Map Re understand algorithms for	duce technique for solving Big data problems; r Big Data by deciding on the apt Features set.
CO2	Apply algorithms for handling	peta bytes of datasets, Analyze main memory consumption for Big Data analytics.
CO3	Understand and analyze the u	isage of map reduce techniques for solving big data problems.



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Sub: Professional Communication & Report Writing Sub Code: 18MCA46	
CO1	Understand the professional communication at work place, Acquire the
	knowledge technical writing and business reporting.
CO2	Develop the leadership qualities.
CO3	Understand and implement ethical behavior at work place.

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Sub: 18MCA51 Sub Name: Programming Using C# .NET **CO1** Understand C# & client server concepts using .Net Frame work components. **CO2** Apply delagates, events and exception handling to incorporate with ASP,winform,ADO.NET,Analyze the use of .NET components depending on the problem statement Implement & Develop a web based and console based application with database **CO3** connectivity.

Sub:	18MCA52	Sub Name: Mobile Applications
	CO1	Illustrate effective user interfaces that leverage evolving mobile device
		capabilities and develop applications using software development kits,
		frameworks and toolkits.
	CO2	Establish various methods to integrate database and server side technologies
		and develop open source software based mobile applications.
	CO3	Build and deploy competent mobile development applications

Sub:	18M0	CA53 Sub Name: Machine Learning
	CO1	Develop and appreciation for what is involved in learning models from data
	CO2	Differentiate supervised and unsupervised learning; understand neural
		network and classification techniques.
	CO3	Understand machine learning algorithms and statistical analysis

18MCA542 Sub Name: Internet Of Things Sub: Understand the challenges of IOT networks, Smart objects. **CO1 CO2** Appraise the role of IOT protocol and understand the need of data analysis and security in IOT network **CO3** Learn different sensor technologies for sensing real world entities



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Sub code: 18MCA553

Sub Name: Software Architecture

CO1	Acquire knowledge of applications of architectural patterns
CO2	Modeling quality attributes and understand the requirement gathering
	techniques
CO3	Understand different design patterns

Sub code: 17MCA61, 62, 63 Sub name: Intership, Project work, Seminar **CO1** Identify the suitable problem making use of the technical and engineering knowledge gained from previous courses with the awareness of impact of technology on the society and ethical responsibilities Ability to segregate work and execute/implement project using appropriate **CO2** tools Develop skills to disseminate technical and general information by means of **CO3** oral as well as return presentation and professional skills.