SINHGAD TECHNICAL EDUCATION SOCIETY'S®

SMT. KASHIBAI NAVALE COLLEGE OF ENGINEERING®

Sinhgad Institutes

Approved by AICTE Vide F. No. 740-89-004 (NDEGAPR/ET/2000) &
Affiliated to Savitribai Phule Pune University ID. No. PU/PN/ENGG/155/2001
Accrediated by NBA & NACC
Recognized by UGC under Section 2 (f) & 12 (B) of UGC Act 1956

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PROF. M. N. NAVALE
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FOUNDER - PRESIDENT

DR. (MRS.) SUNANDA M. NAVALE
B. A., M. P. M., Ph.D.
FOUNDER - SECRETARY

DR. A. V. DESHPANDE
B. E., M. E. (Computer Engg.), Ph. D.
PRINCIPAL

Date: 11/04/2022

To,
The Director
National Assessment and Accreditation Council (NAAC)
P.O. Box No. 1075, Nagarbhavi,
Bengaluru- 560 072

Subject: Proofs of Metric No. 2.6.1

Reference: Metric No. 2.6.1: Teachers and students are aware of the stated Programme and course outcomes of the Programmes offered by the institution.

Dear sir/Madam,

As per said subject kindly find below the index of File Descriptions/Documents for your valuable information.

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Smt. Kashibai Navale College of Engineering Vadgaon(Bk.) Pune - 41.

Principal
(Dr. A. V. Deshpande)

Principal
Smt. Kashibai Navale
College of Engineering
Vadgaon(Bk.), Pune - 41.

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Thanking You,

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(Dr. A. V. Deshpande)

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S. hgad Technical Education Society
Smt. Kashibai Navale College Of Engineering,Vadgoan(Bk),Pune-41
Department of Computer Engineering
Academic Year 2020-21

Program Outcomes

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
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,
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
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 Skills	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,
PO11	Project Management and Finance	Demonstrate knowledge and understanding of 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
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.

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Program Specific Outcomes (PSO)

A graduate of the Computer Engineering Program will demonstrate

PSO1	Professional Skills-The ability to understand, analyse and develop computer programs in the areas related to algorithms, system software, multimedia, web design, big data analytics, and networking for efficient design of computer-based systems of varying.
PSO2	Problem-Solving Skills- The ability to apply standard practices and strategies in software project development using open-ended programming environments to deliver a quality product for business success.
PSO3	Successful Career and Entrepreneurship- The ability to employ modern computer languages, Benvironments, and platforms in creating innovative career paths to be an entrepreneur, and a zest for higher studies.

Program Educational Objectives

PEO1	To prepare globally competent graduates having strong fundamentals and domain knowledge to provide effective solutions for engineering problems.
PEO2	To prepare the graduates to work as a committed professionals with strong professional ethics and values, sense of responsibilities, understanding of legal, safety, health, societal, cultural and environmental issues.
PEO3	To prepare committed and motivated graduates with research attitude, lifelong learning, investigative approach, and multidisciplinary thinking.
PEO4	To prepare the graduates with strong managerial and communication skills to work effectively as individual as well as in teams.

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Department of Computer Engineering

Course outcomes for all courses

A.Y. : 2020-2021 (2019 Pattern)

Course Outcome For SE Year Sem-I Course

Department : Computer Engg. Course Name : Discreate Mathematics (C19P201), ACA.Year: 2020-21	
CO No.	Statement
C19P201.1	Design and analyse real world engineering problems by applying set theory, propositional logic and mathematical induction
C19P201.2	Develop skill in expressing mathematical properties of relation and function
C19P201.3	Identify number of logical possibilities of events to design professional engineering Solutions
C19P201.4	Model and solve computing problem using tree and graph Analyze the properties of binary operations and evaluate the algebraic structure
C19P201.5	Apply abstract algebra in combinatorics, coding theory and questions regarding geometric constructions
C19P201.6	Analyze the properties of binary operations and evaluate the algebraic structure

Department : Computer Engg. Course Name : Fundamentals of Data Structures (C19P202), ACA.Year: 2020-21	
CO No.	Statement
C19P202.1	To demonstrate a detailed understanding of behaviour of data structures like array, linked list, stack, and queue by developing programs
C19P202.2	To use appropriate algorithmic strategy for better efficiency
C19P202.3	To summarize data searching and sorting techniques
C19P202.4	To discriminate the usage of various structures in approaching the problem solution
C19P202.5	To analyze and use effective and efficient data structures in solving various Computer Engineering domain problems
C19P202.6	To design the algorithms to solve the programming problems

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Department : Computer Engg. Course Name : Object Oriented Programming (C19P203), ACA.Year: 2020-21	
CO No.	Statement
C19P203.1	Analyze the strengths of object oriented programming
C19P203.2	Design and apply OOP principles for effective programming
C19P203.3	Develop the application using object oriented programming language(C++)
C19P203.4	Apply object-oriented concepts for advanced programming
C19P203.5	Design and apply the concepts of Files and Streams
C19P203.6	Design and apply the concepts of Standard Template Library (STL)

Department : Computer Engg. Course Name : Computer Graphics (C19P204), ACA.Year: 2020-21	
CO No.	Statement
C19P204.1	Define basic terminologies of Computer Graphics, interpret the mathematical foundation of the concepts of computer graphics and apply mathematics to develop Computer programs for elementary graphic operations.
C19P204.2	Define the concept of windowing and clipping and apply various algorithms to fill and clip polygons
C19P204.3	Explain the core concepts of computer graphics, including transformation in two and three dimensions, viewing and projection
C19P204.4	Explain the concepts of color models, lighting, shading models and hidden surface elimination
C19P204.5	Describe the fundamentals of curves, fractals, animation and gaming
C19P204.6	Analyse natural shapes to create effective programs to draw shapes like curves and fractal

Department : Computer Engg. Course Name : Digital Electronics & Logic Design (C19P205), ACA.Year: 2020-21	
CO No.	Statement
C19P205.1	Simplify Boolean Expressions using K Map
C19P205.2	Design and implement combinational circuits
C19P205.3	Design and implement sequential circuits
C19P205.4	Develop simple real-world application using ASM and PLD
C19P205.5	Choose appropriate logic families IC packages as per the given design specifications
C19P205.6	Explain organization and architecture of computer system

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Department : Computer Engg. Course Name : Humanity & Social Science (C19P206), ACA.Year: 2020-21	
CO No.	Statement
C19P206.1	Aware of the various issues concerning humans and society
C19P206.2	Aware about their responsibilities towards society
C19P206.3	Sensitized about broader issues regarding the social, cultural, economic and human aspects, involved in social changes
C19P206.4	Able to understand the nature of the individual and the relationship between self and the community
C19P206.5	Able to understand major ideas, values, beliefs, and experiences that have shaped human history and cultures

Department : Computer Engg. Course Name : Data Structures Laboratory (C19P207), ACA.Year: 2020-21	
CO No.	Statement
C19P207.1	Use algorithm on various linear data structure using sequential organization to solve real life problems
C19P207.2	Analyze problem to apply suitable searching and sorting algorithm to various application
C19P207.3	Analyze problem to use variant of linked list and solve various real life problems
C19P207.4	Design and implement data structure and algorithm for solving different kind of problem

Department : Computer Engg. Course Name : OOP and Computer Graphics Laboratory (C19P208), ACA.Year: 2020-21	
CO No.	Statement
C19P208.1	Understand and apply the concept like inheritance, polymorphism, exception handling and generic structures for implementing reusable programming codes
C19P208.2	Analyse the concept of file and apply it while storing and retrieving the data from secondary storages
C19P208.3	Analyse and apply computer Garapics Algorithms for line circle drawing , scan conversion and filling with the help of object oriented programming concept
C19P208.4	Understand the concept of windowing and clipping and apply various algorithms to fill and clip polygons
C19P208.5	Apply logic to impliment curves fractals, animations and gamming programs.

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Department : Computer Engg. Course Name : Digital Electronics Laboratory (C19P209), ACA.Year: 2020-21	
CO No.	Statement
C19P209.1	To understand the working of Digital Electronics circuits
C19P209.2	Apply the knowledge to appropriate IC as per the design specifications
C19P209.3	Design and implimment sequential and combinational digital circuit as per the specification

Department : Computer Engg. Course Name : Business Communication Skills Laboratory (C19P210), ACA.Year: 2020-21	
CO No.	Statement
C19P210.1	Express effectively through verbal/oral communication and improve listening skill
C19P210.2	Write precise briefs or reports technical documents
C19P210.3	Prepare for group discussion / meeting / interview and presentations
C19P210.4	Explore goal / target setting self-motivation and practicing creative thinking
C19P210.5	Operate effective in multidisciplinary and heterogeneous teams through the knowledge of team work , Inter-personal relationships, conflict management and leadership qualities.

Department : Computer Engg. Course Name : Audit Course 3(I) Green Construction & Design (C19P211), ACA.Year: 2020-21	
CO No.	Statement
C19P211.1	To understand the importance of environment friendly society.
C19P211.2	To apply primary measures to reduce carbon emissions from their surroundings.
C19P211.3	To learn role of IT solutions in design of green buildings.
C19P211.4	To understand the use of software systems to complete statutory compliancesinvolved in the design of a new home or office building through green construction.

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Course Outcome For SE Year Sem-II Course

Department : Computer Engg. Course Name : Mathematics III (C19P212), ACA.Year: 2020-21	
CO No.	Statement
C19P212.1	Solve Linear differential equations, essential in modelling and design of computer-based systems.
C19P212.2	Apply concept of Fourier transform and Z-transform and its applications to continuous and discrete systems and image processing.
C19P212.3	Apply Statistical methods like correlation and regression analysis and probability theory for data analysis and predictions in machine learning.
C19P212.4	Solve Algebraic and Transcendental equations and System of linear equations using numerical techniques
C19P212.5	Obtain Interpolating polynomials, numerical differentiation and integration, numerical solutions of ordinary differential equations used in modern scientific computing .

Department : Computer Engg. Course Name : Data Structures & Algorithms (C19P213), ACA.Year: 2020-21	
CO No.	Statement
C19P213.1	To identify & articulate the complexity goals and benefits of a good hashing scheme for real-world applications
C19P213.2	To apply non-linear data structures for solving problems of various domain
C19P213.3	To design and specify the operations of a nonlinear-based abstract data type and implement them in a high-level programming language
C19P213.4	To analyze the algorithmic solutions for resource requirements and optimization
C19P213.5	To use efficient indexing methods and multiway search techniques to store and maintain data
C19P213.6	To use appropriate modern tools to understand and analyze the functionalities confined to the secondary storage

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Department : Computer Engg. Course Name : Software Engineering (C19P214), ACA.Year: 2020-21	
CO No.	Statement
C19P214.1	Analyze software requirements and formulate design solution for a software
C19P214.2	Design applicable solutions in one or more application domains using software engineering approaches that integrate ethical, social, legal and economic concerns.
C19P214.3	Apply new software model, techniques and technologies to bring out innovation and novelistic solution for the growth of the society in all aspects and evolving into their continuous professional development
C19P214.4	Model and design user interface and component level
C19P214.5	Identify and handle risk management anf software configuration management
C19P214.6	Utilize knowledge of software testing approaches , approaches to varification and validation.

Department : Computer Engg. Course Name : Microprocessor (C19P215), ACA.Year: 2020-21	
CO No.	Statement
C19P215.1	To apply the assembly language programming to develop small real life embedded application
C19P215.2	To understand the architecture of the advanced processor thoroughly to use the resources for programming
C19P215.3	To understand the higher processor architectures descended from 80386 architecture
C19P215.4	To learn the architecture and programmer's model of advanced processor
C19P215.5	To understand the system level features and processes of advanced processor
C19P215.6	To understand debugging and testing techniques confined to 80386 DX

Department : Computer Engg. Course Name : Principles of Programming Languages (C19P216), ACA.Year: 2020-21	
CO No.	Statement
C19P216.1	Make use of basic principles of programming languages
C19P216.2	Able to develop a program with Data representation and Computations
C19P216.3	Able to develop programs using Object Oriented Programming language : Java
C19P216.4	Develop application using inheritance, encapsulation, and polymorphism
C19P216.5	Able to demonstrate Applet and Multithreading for robust application development
C19P216.6	Able to develop a simple program using basic concepts of Functional and Logical programming paradigm

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Department : Computer Engg. Course Name : Data Structures & Algorithms Laboratory (C19P217), ACA.Year: 2020-21	
CO No.	Statement
C19P217.1	Understand ADT/libraries, hash table and dictionary to design algorithms for a specific problem
C19P217.2	Choose most appropriate data structure and apply algorithms for graphical solution of the problems.
C19P217.3	Apply and analyze nonlinear data structures to solve real world complex problems
C19P217.4	Apply and analyze algorithm design techniques for indexing ,sorting,multi-way searching file organization and compression
C19P217.5	Analyze the efficiency of most appropriate data structure for creating efficient solution for engineering design situations

Department : Computer Engg. Course Name : Microprocessor Laboratory (C19P218), ACA.Year: 2020-21	
CO No.	Statement
C19P218.1	Understand and apply various addressing models and instruction set to implement assembly language programs
C19P218.2	Apply logic to implement code conversion
C19P218.3	Analyze and apply logic to demonstrate processor mode of operation

Department : Computer Engg. Course Name : Code of Conduct (C19P219), ACA.Year: 2020-21	
CO No.	Statement
C19P219.1	Understand the basic perception of profession, professional ethics, various moral & social issues, industrial standards, code of ethics and role of professional ethics in engineering field.
C19P219.2	Aware of professional rights and responsibilities of an engineer, responsibilities of an engineer for safety and risk benefit analysis.
C19P219.3	Understand the impact of the professional Engineering solutions in societal and Environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
C19P219.4	Acquire knowledge about various roles of engineers in variety of global issues and able to apply ethical principles to resolve situations that arise in their professional lives

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Department : Computer Engg. Course Name : Project Based Learning (C19P220), ACA.Year: 2020-21	
CO No.	Statement
C19P220.1	Ability to solve real life problems by applying knowledge.
C19P220.2	Ability to analyze alternative approaches, apply and use most appropriate one for feasible solution.
C19P220.3	Ability to understand basics of IT Project management
C19P220.4	Students should be able to accept and meet challenges in the real world, mirroring what professionals do every day.
C19P220.5	Able to Classify software applications and identify unique features of various domains
C19P220.6	Learning by doing approach in PBL will promote long-term retention of material and replicable skill, as well as improve teachers' and students' attitudes towards learning.

Department : Computer Engg. Course Name : Audit Course 4 (II) Intellectual Property Rights and Patents(C19P221), ACA.Year: 2020-21	
CO No.	Statement
C19P221.1	Understand the fundamental legal principles related to confidential information, copyright, patents, designs, trademarks and unfair competition
C19P221.2	Identify, apply and assess principles of law relating to each of these areas of intellectual property
C19P221.3	Apply the appropriate ownership rules to intellectual property you have been involved in creating

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2015 Pattern

Course Outcome For TE Year Sem-I Course

Department : Computer Engg. Course Name : Theory of Computation (C15P301), ACA.Year: 2020-21	
CO No.	Statement
C15P301.1	Understand formal language, translation logic, essentials of translation, alphabets, language representation and apply it to design Finite Automata and its variants.
C15P301.2	Understand basic building blocks of regular expression and apply them to construct regular expression. Understand the pumping Lemma and its use in theoretical computer science.
C15P301.3	Define and identify the properties of context free grammars. Illustrate different forms of grammar and its use in parsing. Learn to simplify the grammar.
C15P301.4	Demonstrate the push down automaton model for the context free language by designing and studying its different applications
C15P301.5	Understand the representation and Language Acceptability by Turing Machine. Design Turing machine for the different requirements outlined by theoretical computer science
C15P301.6	Acquire awareness about different classes of Problems, classify them and analyse them and study concepts of NP completeness.

Department : Computer Engg. Course Name : Database Management Systems (C15P302), ACA.Year: 2020-21	
CO No.	Statement
C15P302.1	Understand the fundamental concepts of database management as well as Analyse and Design Database model using E-R Diagram.
C15P302.2	Study and implement SQL and Pl/SQL CURD operations on large volume of structured database
C15P302.3	Design a good relational database using techniques like Normalization, CODDs Rules to eliminate or reduce redundancy
C15P302.4	Identify the issues of transaction processing and concurrency control in relational database System.
C15P302.5	Study of different Database Architectures and its real time applications.
C15P302.6	Learn powerful, flexible, scalable and modern database programming techniques such as NOSQL to handle big data.

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Department : Computer Engg. Course Name : Software Engineering & Project Management (C15P303), ACA.Year: 2020-21	
CO No.	Statement
C15P303.1	Understand the fundamentals of software engineering and decide on process models and tools.
C15P303.2	Apply methods of capturing, specifying, visualizing and analyzing software requirements
C15P303.3	Analyze ways of design concept at architectural, component &interface level.
C15P303.4	Discuss various estimation and scheduling techniques and apply them.
C15P303.5	Know project risk management, software configuration management, maintenance and reengineering.
C15P303.6	Analyse testing types and tools and create test cases.

Department : Computer Engg. Course Name : Information System & Engineering Economics (C15P304), ACA.Year: 2020-21	
CO No.	Statement
C15P304.1	Understand the importance of various forms of an Information Systems and its application to an organization
C15P304.2	Learn the role of vendor management and understand ethical, social and privacy issues in IT governance.
C15P304.3	Study Information System Development and Project Management.
C15P304.4	Understand engineering economic analysis in decision making for earning and evaluating.
C15P304.5	Analyse the effects of inflation , economic equivalence of the project and calculate the present worth of a project
C15P304.6	Adapt perfect decisions for investment in business projects to reduce the tax.

Department : Computer Engg. Course Name : Computer Networks (C15P305), ACA.Year: 2020-21	
CO No.	Statement
C15P305.1	Explain the basic concepts used in networking and layered architecture of computer network and intersect the components of network to flow.
C15P305.2	Illustrate different link layer terminologies like error detection-correction and flow control used in network.
C15P305.3	Analyse and select appropriate channel allocation methodologies and different Multiple access protocol used in network
C15P305.4	Demonstrate the subnet formation with IP allocation mechanism and apply various routing algorithms to find shortest paths for network-layer packet delivery.
C15P305.5	Describe and Implement the services provided by TCP and UDP protocols used for reliable data transfer maintaining flow control and congestion control.
C15P305.6	Comprehend basic protocols of application layer with selection and usage for various sectors of user community.

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Department : Computer Engg. Course Name : Skill Development Lab (C15P306), ACA.Year: 2020-21	
CO No.	Statement
C15P306.1	To adapt the usage of modern tools and recent software.
C15P306.2	To evaluate problems and analyze data using current technologies
C15P306.3	To learn the process of creation of data-driven web applications using current technologies
C15P306.4	To understand how to incorporate best practices for building enterprise applications
C15P306.5	To learn how to employ Integrated Development Environment(IDE) for implementing and testing of software solution
C15P306.6	To construct software solutions by evaluating alternate architectural patterns.

Department : Computer Engg. Course Name : Database Management System Lab (C15P307), ACA.Year: 2020-21	
CO No.	Statement
C15P307.1	To develop basic, intermediate and advanced Database programming skills
C15P307.2	To develop basic Database administration skills
C15P307.3	To percept transaction processing
C15P307.4	To Develop the ability to handle databases of varying complexities
C15P307.5	Implement advanced database Programming concepts

Department : Computer Engg. Course Name : Computer Networks Lab (C15P308), ACA.Year: 2020-21	
CO No.	Statement
C15P308.1	To establish communication among the computing nodes in P2P and Client-Server architecture
C15P308.2	Configure the computing nodes with understanding of protocols and technologies
C15P308.3	Use different communicating modes and standards for communication
C15P308.4	Use modern tools for network traffic analysis
C15P308.5	To learn network programming.

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Department : Computer Engg. Course Name : Audit Course 3 I Cyber Security (C15P309), ACA.Year: 2020-21	
CO No.	Statement
C15P309.1	Compare the interrelationships among security roles and responsibilities in a modern information-driven enterprise—to include interrelationships across security do mains (IT, physical, classification, personnel, and so on)
C15P309.2	Assess the role of strategy and policy in determining the success of information security
C15P309.3	Estimate the possible consequences of misaligning enterprise strategy, security policy, and security plans

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Course Outcome For TE Year Sem-II Course

Department : Computer Engg. Course Name : Design and Analysis of Algorithms (C15P310), ACA.Year: 2020-21	
CO No.	Statement
C15P310.1	Understand the performance parameter for recursive and non-recursive algorithms and use it in the design of algorithms for engineering problems
C15P310.2	Develop the skill to find the suitable algorithmic model for problems from functional and imperative models.
C15P310.3	Discuss different algorithmic strategies and apply them to solve various problems and analyse them
C15P310.4	Explain complexity theory along with different classes of problems and formulate solutions to problems.
C15P310.5	Summarize amortised analysis and apply on various types of algorithms. Synthesise algorithms to common engineering situations
C15P310.6	Analyse the properties of multithreaded, distributed algorithms and the string matching algorithm.

Department : Computer Engg. Course Name : Systems Programming and Operating System(C15P311), ACA.Year: 2020-21	
CO No.	Statement
C15P311.1	Understand the basic concepts of System Software. Analyse and implement Pass and Phase concepts for assembler design
C15P311.2	Analyse and synthesize macro processor design using efficient data structures.
C15P311.3	Study of language translator and tools viz. LEX &YACC to implement lexical analysis and syntax analysis.
C15P311.4	Study and Implement operating system functions to improve performance of operating system.
C15P311.5	Summarize the programming model for memory management and simulate the algorithms for performance analysis.
C15P311.6	Study and implement the I/O management and file management.

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Department : Computer Engg. Course Name : Embedded Systems and Internet of Things(C15P312), ACA.Year: 2020-21	
CO No.	Statement
C15P312.1	Describe fundamentals of embedded systems with ARM and IoT including essence and basic design strategy of IoT
C15P312.2	Describe IoT based application according to IoT platform design methodology
C15P312.3	Develop real world IoT application &deploy it on physical devices by understanding pillars of embedded IoT
C15P312.4	Understand Protocol Standardization and Security for IoT.
C15P312.5	To understand the importance of web and cloud in IoT.
C15P312.6	Understand the architecture of cloud of things &Build web applications by using python web application framework

Department : Computer Engg. Course Name : Software Modelling & Design (C15P313), ACA.Year: 2020-21	
CO No.	Statement
C15P313.1	Analyse the problem statement (SRS) and choose proper design technique for designing web based/ desktop application
C15P313.2	Design and analyze an application using UML modeling as fundamental tool
C15P313.3	Apply design patterns to understand reusability in OO design
C15P313.4	Decide and apply appropriate modern tool for designing and modelling
C15P313.5	Decide and apply appropriate modern testing tool for testing web-based/desktop application

Department : Computer Engg. Course Name : Web Technology (C15P314), ACA.Year: 2020-21	
CO No.	Statement
C15P314.1	Perceive the basics of web and Design static web based application using HTML,CSS,XML
C15P314.2	Understand and employ Javascript, Jquery to design and develop Static and dynamic web based applications.
C15P314.3	To understand and apply the concepts of Servlet and JSP using different JSP elements
C15P314.4	To acquaint and employ PHP, AJAX programming functionalities including MYSQL integration. To design and evaluate dynamic web applications with PHP, AJAX and MYSQL.
C15P314.5	To design, understand, implement MVC architecture with AngularJS and NodeJS functionalities.
C15P314.6	To understand web services and content management.

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Department : Computer Engg. Course Name : Seminar and Technical Communication (C15P315), ACA.Year: 2020-21	
CO No.	Statement
C15P315.1	To explore the basic principles of communication (verbal and non-verbal) and active, empathetic listening, speaking and writing techniques.
C15P315.2	To expose the student to new technologies, researches, products, algorithms, services
C15P315.3	To explore to be familiar with basic technical writing concepts and terms, such as audience analysis, jargon, format, visuals, and presentation.
C15P315.4	To improve skills to read, understand, and interpret material on technology
C15P315.5	To improve communication and writing skills

Department : Computer Engg. Course Name : Web Technology Lab (C15P316), ACA.Year: 2020-21	
CO No.	Statement
C15P316.1	To use current client side and server side web technologies
C15P316.2	To implement communication among the computing nodes using current client side and server side technologies
C15P316.3	To design and implement web services with content management

Department : Computer Engg. Course Name : System Programming &Operating System Lab (C15P317), ACA.Year: 2020-21	
CO No.	Statement
C15P317.1	To implement basic language translator by using various needed data structures
C15P317.2	To implement basic Macroprocessor
C15P317.3	To design and implement Dynamic Link Libraries
C15P317.4	To implement scheduling schemes

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Department : Computer Engg. Course Name : Embedded Systems & Internet of Things Lab(C15P318), ACA.Year: 2020-21	
CO No.	Statement
C15P318.1	To understand functionalities of various single board embedded platforms fundamentals
C15P318.2	To develop comprehensive approach towards building small low cost embedded IoT system.
C15P318.3	To implement the assignments based on sensory inputs

Department : Computer Engg. Course Name : Audit Course 4 I Digital and Social Media Marketing(C15P319), ACA.Year: 2020-21	
CO No.	Statement
C15P319.1	To Identify best practices for Social Media Marketing, including platform level best practices
C15P319.2	To Connect business objectives to appropriate Social Media tactics.
C15P319.3	To Create strong content that engages their target audience with their marketing message.

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Course Outcome For BE Year Sem-I Course

Department : Computer Engg. Course Name : High Performance Computing (C15P401), ACA.Year: 2020-21	
CO No.	Statement
C15P401.1	Transform algorithms in the computational area to efficient programming code for modern computer architectures
C15P401.2	Write, organize and handle programs for scientific computations
C15P401.3	Exploring tools for performance optimization and debugging of parallel algorithms.
C15P401.4	Present analysis of code with respect to performance and implement performance improvements
C15P401.5	To present test cases to solve problems using multi-core and distributed environments
C15P401.6	Analysis and design of novel techniques to parallelize the programming task

Department : Computer Engg. Course Name : Artificial Intelligence and Robotics (C15P402), ACA.Year: 2020-21	
CO No.	Statement
C15P402.1	Identify and apply suitable searching techniques for Artificial Intelligent Systems
C15P402.2	Decomposition of problem for development of suitable algorithms for constraint satisfaction and planning
C15P402.3	Apply logic and infer new facts using previous knowledge
C15P402.4	Construct Machine language translation by applying Natural Language Processing and simulation using Artificial Neural Networks.
C15P402.5	Develop mobile robotic system with deployment of various environment sensors and development of strategies for path finding.
C15P402.6	Design and Develop robots for various real time applications.

Department : Computer Engg. Course Name : Data Analytics (C15P403), ACA.Year: 2020-21	
CO No.	Statement
C15P403.1	Write case studies in Business Analytic and Intelligence using mathematical models
C15P403.2	Present a survey on applications for Business Analytic and Intelligence
C15P403.3	Provide problem solutions for multi-core or distributed, concurrent/Parallel environments

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Department : Computer Engg. Course Name : Data Mining & Warehousing (C15P404(D)), ACA.Year: 2020-21	
CO No.	Statement
C15P404(D).1	Acquire various techniques to mine the data.
C15P404(D).2	Describe data warehouse with dimensional modelling and OLAP operations
C15P404(D).3	Recognize similarity and dissimilarity of the data and analyse its proximity to discover the patterns in data.
C15P404(D).4	Employ market basket analysis to generate association rules using mining algorithms
C15P404(D).5	Apply the various data mining techniques to classify the data
C15P404(D).6	Evaluate performance of classifier by applying machine learning techniques

Department : Computer Engg. Course Name : Software Testing & Quality Assurance (C15P405(B)), ACA.Year: 2020-21	
CO No.	Statement
C15P405(B).1	Describe fundamental concepts in software testing such as manual testing, automation testing and software quality assurance.
C15P405(B).2	Design and develop project test plan, design test cases, test data, and conduct test operations
C15P405(B).3	Apply recent automation tool for various software testing for testing software
C15P405(B).4	Understand in details working of selenium automation testing tool
C15P405(B).5	Apply different approaches of quality management, assurance, and quality standard to software system
C15P405(B).6	Apply and analyse effectiveness Software Quality Tools

Department : Computer Engg. Course Name : Laboratory Practice I (C15P406), ACA.Year: 2020-21	
CO No.	Statement
C15P406.1	To be conversant with performance analysis and modeling of parallel programs
C15P406.2	To understand the options available to parallelize the programs
C15P406.3	To learn various peculiar search strategies for AI
C15P406.4	To develop a mind to solve real world problems unconventionally with optimality
C15P406.5	To apply algorithmic strategies while solving problems
C15P406.6	To study algorithmic examples in distributed, concurrent and parallel environments

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Department : Computer Engg. Course Name : Laboratory Practice II (C15P407), ACA.Year: 2020-21	
CO No.	Statement
C15P407.1	To be conversant with performance analysis and modeling of parallel programs
C15P407.2	To understand the options available to parallelize the programs
C15P407.3	To learn various peculiar search strategies for AI
C15P407.4	To develop a mind to solve real world problems unconventionally with optimality
C15P407.5	To apply algorithmic strategies while solving problems
C15P407.6	To study algorithmic examples in distributed, concurrent and parallel environments

Department : Computer Engg. Course Name : Project Work Stage I (C15P408), ACA.Year: 2020-21	
CO No.	Statement
C15P408.1	To develop problem solving ability
C15P408.2	To Organize, sustain and report on a substantial piece of team work over a period of several months
C15P408.3	To Evaluate alternative approaches, and justify the use of selected tools and methods
C15P408.4	To find information for yourself from appropriate sources such as manuals, books, research journals and from other sources, and in turn increase analytical skills

Department : Computer Engg. Course Name : Audit Course 5 II Botnet of Things (C15P409), ACA.Year: 2020-21	
CO No.	Statement
C15P409.1	Implement security as a culture and show mistakes that make applications vulnerable to attacks.
C15P409.2	Understand various attacks like DoS, buffer overflow, web specific, database specific, web -spoofing attacks.
C15P409.3	Demonstrate skills needed to deal with common programming errors that lead to most security problems and to learn how to develop secure application

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Course Outcome For BE Year Sem-II Course

Department : Computer Engg. Course Name : Machine Learning (C15P410), ACA.Year: 2020-21	
CO No.	Statement
C15P410.1	Apply Machine learning concepts to distinguish different learning based applications.
C15P410.2	Synthesis with feature selection methodologies, design learning models and evaluate.
C15P410.3	Design and implement regression models and evaluate performance
C15P410.4	Design and Implement supervised learning algorithms with different learning models.
C15P410.5	Design and implement decision trees and Ensemble Learning
C15P410.6	Design and implement different state of the art clustering techniques.

Department : Computer Engg. Course Name : Information and Cyber Security (C15P411), ACA.Year: 2020-21	
CO No.	Statement
C15P411.1	Understand the security basics and elements of information security.
C15P411.2	Understand symmetric and asymmetric algorithms for encryption and decryption to secure data across networks.
C15P411.3	Apply the standard algorithms while communicating in cyberspace to provide data integrity, confidentiality and authentication.
C15P411.4	Analyze various protocols to ensure security over networks.
C15P411.5	Design intrusion detection system and security solutions against cyber-attacks by applying policies of firewall
C15P411.6	Acquire the knowledge of Personally Identifiable Information (PII) and Indian Information Protection Law.

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Department : Computer Engg. Course Name : Elective III (Soft Computing and Optimization Algorithms) (C15P412 D), ACA.Year: 2020-21	
CO No.	Statement
C15P412D.1	Understand and apply soft computing methodologies, including artificial neural networks, fuzzy logic, and genetic algorithms. Identify its real time applications.
C15P412D.2	Develop an efficient parallel algorithm to solve a given problem.
C15P412D.3	Apply the fuzzy logic &rules for reasoning to formulate the conclusions for the problem statements.
C15P412D.4	Design and development of certain scientific and commercial application using evolutionary processes
C15P412D.5	To design and develop commercial applications using Genetic Algorithms.
C15P412D.6	Learn a swarm intelligence, PSO &ACO, its formulation, topology, and different parameters.

Department : Computer Engg. Course Name : Elective IV(Human Computer Interface) (C15P413), ACA.Year: 2020-21	
CO No.	Statement
C15P413.1	Understand the foundation of Human Computer Interaction and methods for evaluation of user interface.
C15P413.2	Understand HCI key design principles, rules and standards.
C15P413.3	Develop the design concepts with implementation tools, technology and identify errors.
C15P413.4	Evaluate the model to make products and services more usable, easy to learn and intuitive for the user
C15P413.5	Understand various users model like Predictive Models, Cognitive Models and apply it for evaluating the quality of a user interface
C15P413.6	Apply appropriate task models and dialogs to design systems that are usable by people

Department : Computer Engg. Course Name : Laboratory Practice III (C15P414), ACA.Year: 2020-21	
CO No.	Statement
C15P414.1	Apply Machine learning concepts to distinguish different learning based applications.
C15P414.2	Synthesis with feature selection methodologies, design learning models and evaluate.
C15P414.3	Design and implement regression models and evaluate performance
C15P414.4	Understand the security basics and elements of information security.
C15P414.5	Understand symmetric and asymmetric algorithms for encryption and decryption to secure data across networks.
C15P414.6	Apply the standard algorithms while communicating in cyberspace to provide data integrity, confidentiality and authentication.

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Department : Computer Engg. Course Name : Laboratory Practice IV (C15P415), ACA.Year: 2020-21	
CO No.	Statement
C15P415.1	Understand and apply soft computing methodologies, including artificial neural networks, fuzzy logic, and genetic algorithms. Identify its real time applications.
C15P415.2	Develop an efficient parallel algorithm to solve a given problem.
C15P415.3	Apply the fuzzy logic &rules for reasoning to formulate the conclusions for the problem statements.
C15P415.4	Understand the foundation of Human Computer Interaction and methods for evaluation of user interface.
C15P415.5	Understand HCI key design principles, rules and standards.
C15P415.6	Develop the design concepts with implementation tools, technology and identify errors.

Department : Computer Engg. Course Name : Project Work Stage II (C15P416), ACA.Year: 2020-21	
CO No.	Statement
C15P416.1	Show evidence of independent investigation
C15P416.2	Critically analyze the results and their interpretation.
C15P416.3	Report and present the original results in an orderly way and placing the open questions in the right perspective.
C15P416.4	Link techniques and results from literature as well as actual research and future research lines with the research.
C15P416.5	Appreciate practical implications and constraints of the specialist subject

Department : Computer Engg. Course Name : Audit Course 6 I Business Intelligence (C15P417), ACA.Year: 2020-21	
CO No.	Statement
C15P417.1	Apply the concepts of Business Intelligence in real world applications
C15P417.2	Explore and use the data warehousing wherever necessary
C15P417.3	Design and manage practical BI system

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Post Graduate Programme on Computer Engineering (M.E. computer Engineering)

Program Outcomes

PO1	Scholarship of Knowledge	Acquire in-depth knowledge of Computer Science and Engineering, including wider and global perspective, with an ability to discriminate, evaluate, analyze and synthesize existing and new knowledge, and integration of the same for enhancement of knowledge.
PO2	Critical Thinking	Analyze complex engineering problems critically; apply independent judgment for synthesizing information to make intellectual and/or creative advances for conducting research in a wider theoretical, practical and policy context.
PO3	Problem Solving	Think laterally and originally, conceptualize and solve engineering problems, evaluate a wide range of potential solutions for those problems and arrive at feasible, optimal solutions after considering public health and safety, cultural, societal and environmental factors in the core areas of expertise.
PO4	Research Skills	Extract information pertinent to unfamiliar problems through literature survey and experiments, apply appropriate research methodologies, techniques and tools, design, conduct experiments, analyze and interpret data, demonstrate higher order skill and view things in a broader perspective, contribute individually/in group(s) to the development of scientific/technological knowledge in one or more domains of engineering.
PO5	Usage of Modern Tools	Create, select, learn 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	Collaborative and Multidisciplinary work:	Possess knowledge and understanding of group dynamics, recognize opportunities and contribute positively to collaborative-multidisciplinary scientific research, demonstrate a capacity for self-management and teamwork, decision-making based on open-mindedness,objectivity and rational analysis in order to achieve common goals and further the learning of themselves as well as others.
PO7	Project Management and Finance:	Demonstrate knowledge and understanding of Computer Science & Engineering and management principles and apply the same to one's own work, as a member and leader in a team, manage projects efficiently in respective disciplines and multidisciplinary environments after consideration of economical and financial factors.
PO8	Communication	Communicate with the engineering community, and with society at large, regarding complex engineering activities confidently and effectively, such as, being able to comprehend and write effective reports and design documentation by adhering to appropriate standards, make effective presentations, and give and receive clear instructions.
PO9	Life-long learning	Recognize the need for, and have the preparation and ability to engage in life-long learning independently, with a high level of enthusiasm and commitment to improve knowledge and competence continuously.
PO10	Ethical Practices and Social Responsibility:	Acquire professional and intellectual integrity, professional code of conduct, ethics of research and scholarship, consideration of the impact of research outcomes on professional practices and an understanding of responsibility to contribute to the community for sustainable development of society
PO11	Independent and Reflective Learning:	Observe and examine critically the outcomes of one's actions and make corrective measures subsequently, and learn from mistakes without depending on external feedback

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Program Specific Outcomes (PSO)

A graduate of the Computer Engineering Program will demonstrate

PSO1	Professional Skills: The ability to understand, analyze and develop software in the areas related to system software, multimedia, web design, big data analytics, networking, and algorithms for efficient design of computer-based systems of varying complexities.
PSO2	Successful Career and Entrepreneurship- The ability to employ modern computer languages, Benvironments, and platforms in creating innovative career paths to be an entrepreneur, and a zest for higher studies.

Program Educational Objectives

PEO1	To prepare globally competent post graduates with enhanced domain knowledge and skills attaining professional excellence and updated with modern technology to provide effective solutions for engineering and research problems
PEO2	To prepare the post graduates to work as a committed professionals with strong professional ethics and values, sense of responsibilities, understanding of legal, safety, health, societal, cultural and environmental issues.
PEO3	To prepare committed and motivated post graduates with research attitude, lifelong learning, investigative approach, and multidisciplinary thinking to succeed in the career in industry/academia/research.
PEO4	To prepare the post graduates with strong managerial and communication skills to work effectively as individual as well as in teams.

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Course outcomes for all courses

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Course Outcome For M.E. Computer Engineering First Year Sem-I

Department : Computer Engg. Course Name : Research Methodology (510101), ACA.Year: 2020-21	
CO No.	Statement
510101.1	Discuss some basic concepts of research and its code of ethics.
510101.2	Identify appropriate research topics through literature search and review.
510101.3	Discuss various statistical analysis tools to measure errors in research.
510101.4	Discuss various optimization techniques in engineering research.
510101.5	Apply ethics and practices in survey based research methods.
510101.6	Write and present a research report.

Department : Computer Engg. Course Name : Bio-Inspired Optimization Algorithm (510102), ACA.Year: 2020-21	
CO No.	Statement
510102.1	Understand and design algorithms for particular classes of problems
510102.2	Apply various evolutionary computation methods and algorithms for particular classes of problems.
510102.3	Discuss the basics of AI and different optimizations techniques.
510102.4	Select the optimal solution based on bio-inspired algorithms
510102.5	Apply nature-inspired algorithms to optimization
510102.6	Discuss the natural phenomena that motivate the algorithms

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Department : Computer Engg. Course Name : Software Development and Version Control (510103), ACA.Year: 2020-21	
CO No.	Statement
510103.1	Discuss and apply the design patterns for software development.
510103.2	Understand different software architectural designs.
510103.3	Discuss the basics oIdentify and assess the quality attributes of a system at the architectural level.f AI and different optimizations techniques.
510103.4	Discuss basic principles and purposes of Software Configuration Management (SCM)
510103.5	Discuss the need of software version control.
510103.6	Apply and Use of open source version control tool.

Department : Computer Engg. Course Name : Embedded and Real Time Operating System (510104), ACA.Year: 2020-21	
CO No.	Statement
510104.1	Recognize and classify embedded and real-time systems
510104.2	Apply various real time algorithms for building embedded systems.
510104.3	Discuss various I/O communication mechanism in embedded system.
510104.4	Design real time embedded systems using the concepts of RTOS.
510104.5	Discuss the communication bus protocols used for real-time systems.
510104.6	Categorize and represent scheduling algorithms.

Department : Computer Engg. Course Name : Data Mining(510105), ACA.Year: 2020-21	
CO No.	Statement
510105.1	Discuss various data mining phases and various ways of data mining.
510105.2	Recognize similarity and dissimilarity of the data and analyse its proximity to discover the patterns in data.
510105.3	Optimize the mining process by choosing best data mining technique
510105.4	Apply the various data mining techniques to classify the data
510105.5	Apply data mining techniques to discover patterns in data
510105.6	Apply data mining for any project

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Department : Computer Engg. Course Name : Laboratory Proficiency I (510106), ACA.Year: 2020-21	
CO No.	Statement
510106.1	Perform research based literature survey of any research paper
510106.2	Apply numerical and statistical modeling on a dataset
510106.3	Design any nature inspired algorithm
510106.4	Study of open source system/application software like Version Control in Linux Kernel
510106.5	Simulation/ Design, planning and modeling of a Real-Time / Embedded System
510106.6	Design and develop any data mining algorithm

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Course Outcome For M.E. Computer Engineering First Year Sem-II

Department : Computer Engg. Course Name : Operations Research (510108), ACA.Year: 2020-21	
CO No.	Statement
510108.1	Model and solve linear programming problems using appropriate techniques.
510108.2	Identify and develop operational research models from the verbal description of the real system.
510108.3	Understand mathematical models used in Operations Research.
510108.4	Construct various dynamic and adaptive models
510108.5	Build up mathematical skills to analyse and solve integer programming problems from a wide range of applications
510108.6	Develop critical thinking and objective analysis of decision problems

Department : Computer Engg. Course Name : System Simulation and Modeling (510109), ACA.Year: 2020-21	
CO No.	Statement
510109.1	Apply modelling to understand system behaviour
510109.2	Design the simulation scheme for particular system
510109.3	Analyse the modelled and simulated systems
510109.4	Develop skills to apply simulation software to construct and execute goal-driven system models.
510109.5	Understand the definition of a stochastic process and its behaviour.
510109.6	Compare the results of simulations confined to real world applications.

Department : Computer Engg. Course Name : Machine Learning (510110), ACA.Year: 2020-21	
CO No.	Statement
510110.1	Apply Machine learning concepts to distinguish different learning based applications.
510110.2	Design and evaluate learning models and synthesize it with feature selection methodologies.
510110.3	Design and implement regression models and evaluate its performance.
510110.4	Design and implement supervised learning algorithms with different learning models.
510110.5	Formulate a given problem within the Bayesian learning framework with focus on building lifelong learning ability
510110.6	Apply the algorithms to a real problem, optimize the models learned and report on the expected accuracy that can be achieved by applying the models

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Department : Computer Engg. Course Name : Pervasive and Ubiquitous Computing (510111), ACA.Year: 2020-21	
CO No.	Statement
510111.1	Describe the characteristics of pervasive computing applications including the basic computing application problems, performance objectives and architectures of the systems.
510111.2	Analyze and estimate the impact of pervasive computing on future computing applications and society
510111.3	Describe the characteristics of personal digital assistant and its applications including the basic computing application problems, performance objectives and architectures of the systems.
510111.4	Recognize the different ways that humans will interact with systems in a ubiquitous environment and account for these accordingly
510111.5	Solve various interface issues in pervasive computing.
510111.6	Explore the trends and problems of current pervasive computing systems using examples.

Department : Computer Engg. Course Name : Seminar - I (510112), ACA.Year: 2020-21	
CO No.	Statement
510112.1	To use multiple thinking strategies to examine real-world issues and explore creative avenues of expression,.
510112.2	To acquire, articulate, create and convey intended meaning using verbal and non-verbal method of communication
510112.3	To learn and integrate, through independent learning in sciences and technologies, with disciplinary specialization and the ability to integrate information across
510112.4	Apply communication skills to effectively communicate in seminar presentation
510112.5	Apply writing skills to effectively document the findings
510112.6	Explore the trends and problems related to research area explored in Seminar - I

Department : Computer Engg. Course Name : Laboratory Proficiency - II (510113), ACA.Year: 2020-21	
CO No.	Statement
510113.1	Explore and compare various operations research algorithms
510113.2	Design and develop an algorithmic solutoin for transportation and related problems
510113.3	Design simulation solution for any automobile manufacturing or any other industry
510113.4	Explore and compare various machine learning algorithms and its applications
510113.5	Design and develop machine learning solutions for problems
510113.6	Design network security solutions

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Course Outcome For M.E. Computer Engineering Second Year Sem-I

Department : Computer Engg. Course Name : Fault Tolerant Systems (610101), ACA.Year: 2020-21	
CO No.	Statement
610101.1	Discuss the need and necessity to consider fault tolerant design in digital systems
610101.2	Discuss various techniques for fault modelling and tests generation
610101.3	Discuss fault tolerance routing and its algorithms.
610101.4	Evaluate reliability of systems in Hierarchical Interconnection Networks
610101.5	Evaluate fault tolerance and reliability of systems in networks.
610101.6	Apply important methods in distributed systems to support scalability and fault tolerance.

Department : Computer Engg. Course Name : Information Retrieval (610102), ACA.Year: 2020-21	
CO No.	Statement
610102.1	Discuss basic concepts and techniques in Information Retrieval
610102.2	Evaluate and analyse retrieved information
610102.3	Generate quality information out of retrieved information
610102.4	Apply clustering and classification algorithms to analyze the information
610102.5	Identify and discuss language models for information retrieval.
610102.6	Design information retrieval system.

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Department : Computer Engg. Course Name : Cloud Security (610103A), ACA.Year: 2020-21	
CO No.	Statement
610103A.1	Articulate the differences between deployment models (public, private, hybrid, and community) versus service models (infrastructure-, platform-, and software-as-a-service) of cloud computing
610103A.2	Discuss computing security fundamentals confined to cloud environment
610103A.3	Identify the threats, risks, vulnerabilities, side-channel attacks, and privacy issues associated with cloud-based services.
610103A.4	Describe cloud computing security architectures
610103A.5	Choose the appropriate technologies, algorithms, and approaches for the cloud security issues.
610103A.6	Apply security architectures that assure secure isolation of physical and logical infrastructures.

Department : Computer Engg. Course Name : Seminar - II (610104), ACA.Year: 2020-21	
CO No.	Statement
610104.1	To use multiple thinking strategies to examine real-world issues and explore creative avenues of expression,.
610104.2	To acquire, articulate, create and convey intended meaning using verbal and non-verbal method of communication
610104.3	To learn and integrate, through independent learning in sciences and technologies, with disciplinary specialization and the ability to integrate information across
610104.4	Apply communication skills to effectively communicate in seminar presentation
610104.5	Apply writing skills to effectively document the findings
610104.6	Explore the trends and problems related to research area explored in Seminar - II

Department : Computer Engg. Course Name : Dissertation Stage - I (610105), ACA.Year: 2020-21	
CO No.	Statement
610105.1	Conduct thorough literature survey confined to the domain of choice
610105.2	Perform critical analysis on the literature survey and find the research gap
610105.3	Design preliminary solution to the research gap
610105.4	Analyze the findings and work of various authors confined to the chosen domain
610105.5	Develop presentation skills to deliver the technical contents
610105.6	Furnish the report of the technical research domain

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Course Outcome For M.E. Computer Engineering Second Year Sem - II

Department : Computer Engg. Course Name : Seminar - III (610107), ACA.Year: 2020-21	
CO No.	Statement
610107.1	To use multiple thinking strategies to examine real-world issues and explore creative avenues of expression,.
610107.2	To acquire, articulate, create and convey intended meaning using verbal and non-verbal method of communication
610107.3	To learn and integrate, through independent learning in sciences and technologies, with disciplinary specialization and the ability to integrate information across
610107.4	Apply communication skills to effectively communicate in seminar presentation
610107.5	Apply writing skills to effectively document the findings
610107.6	Explore the trends and problems related to research area explored in Seminar - II

Department : Computer Engg. Course Name : Dissertation Stage - II (610108), ACA.Year: 2020-21	
CO No.	Statement
610108.1	Show evidence of independent investigation
610108.2	Critically analyze the results and their interpretation ; infer findings
610108.3	Report and present the original results in an orderly way and placing the open questions in the right perspective
610108.4	Link techniques and results from literature as well as actual research and future research lines with the research
610108.5	Appreciate practical implications and constraints of the specialist subject
610108.6	Write and present the well documented findings in the report of Dissertation Stage - II

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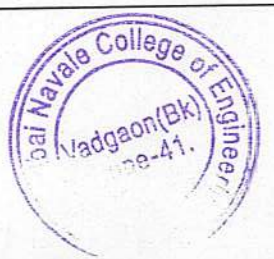
Department of Information Technology

AY 2020-21

Program Outcomes:

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, 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 Teamwork Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10	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.



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

Program Specific Outcomes (PSO):

PSO 1
The skills to apply software engineering and management principles, to provide integrated solutions for complex computational problems by applying the knowledge of Information Technology fundamentals.

PSO 2
The ability to adapt rapid developments in technologies through life-long learning with an understanding of social and ecological problems related to Information Technology practices

Program Educational Objctives (PEOs):

PEO 1: Development of fundamental concepts To develop strong fundamental concepts for solving technical problems in mathematics, science, engineering and Technology.

PEO 2: Core Excellence
To identify, conceive, analyze, design, execute & test complex computing problems by applying expertise along with skills in the field of Information technology

PEO 3: Versatility
To develop approach, skills for entrepreneurship and higher education in the field of Information Technology.

PEO 4: Ethical and Social Development
To be committed to ethical standards, community services through active engagement with professional bodies, voluntary groups or other community activitie

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2019 Pattern

Course Outcome For Second Year Sem-I Course

CO No	Statement
Department of Information Technoloy, Course Name: Discrete Mathematics, A.Y 2020-21	
I19P201.1	Formulate and apply formal proof techniques and solve the problems with logical reasoning.
I19P201.2	Analyze and evaluate the combinatorial problems by using probability theory.
I19P201.3	Understand and Apply the concepts of graph theory to devise mathematical models.
I19P201.4	Analyze types of relations and functions to provide solution to computational problems.
I19P201.5	Identify techniques of number theory and its application.
I19P201.6	Identify fundamental algebraic structures.
Department of Information Technoloy, Course Name: Logic Design and Computer Organization, A.Y 2020-21	
I19P202.1	Perform basic binary arithmetic & simplify logic expressions.
I19P202.2	Grasp the operations of logic ICs and Implement combinational logic functions using ICs.
I19P202.3	Comprehend the operations of basic memory cell types and Implement sequential logic functions using ICs.
I19P202.4	Elucidate the functions & organization of various blocks of CPU.
I19P202.5	Understand CPU instruction characteristics, enhancement features of CPU.
I19P202.6	Describe an assortment of memory types (with their characteristics) used in computer systems and basic principle of interfacing input, output devices.
Department of Information Technoloy, Course Name: Data Structures and Algorithms, A.Y 2020-21	
I19P203.1	Analyze algorithms and to determine algorithm correctness and time efficiency class
I19P203.2	Understand different advanced abstract data type (ADT)and data structure and their implementation
I19P203.3	Understand different algorithm design techniques (brute-force,d vide and conquer,greedy etc) and their implementation
I19P203.4	Apply implement learned algorithm design techniques and data structures to solve problems
I19P203.5	Perform basic analysis of algorithm with respect to time and space complexity
I19P203.6	Use algorithmic foundations for solving problems and programming

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Department of Information Technoloy, Course Name:Object Oriented Programming, A.Y 2020-21	
I19P204.1	Differentiate various programming paradigms
I19P204.2	Identify classes, objects, methods, and handle object creation, initialization, and Destruction to model real-world problems
I19P204.3	Identify relationship among objects using inheritance and polymorphism principles
I19P204.4	Handle different types of exceptions and perform generic programming
I19P204.5	Use of files for persistent data storage for real world application
I19P204.6	Apply appropriate design patterns to provide object-oriented solutions
Department of Information Technoloy,Course Name: Basics of Computer Network, A.Y 2020-21	
I19P205.1	Understand and explain the concepts of communication theory and compare functions of OSI and TCP/IP model.
I19P205.2	Analyze data link layer services, error detection and correction, linear block codes, cyclic Codes, framing and flow control protocols.
I19P205.3	Compare and understand different Random access techniques, channelization and IEEE standards.
I19P205.4	Apply the skills of subnetting, supernetting and routing mechanisms.
I19P205.5	Understand protocols such as RIP, IGRP, BGP and OSPF.
I19P205.6	Illustrate services and protocols used at transport layer.

Course Outcome For SE Year Sem-II Course 2019 Pattern

Department of Information Technoloy,Course Name: Engineering Mathematics- III, A.Y 2020-21	
CO No	Statement
I19P206.1	Solve higher order linear differential equations and apply to Control systems, Computer vision, and Robotics
I19P206.2	Solve problems related to Fourier transform, Z-transform and applications to Image processing
I19P206.3	Apply statistical methods like correlation, regression analysis in to analyze data and to make predictions applicable to machine intelligence.
I19P206.4	Perform Vector differentiation and analyze the vector fields
I19P206.5	Perform Vector integration and APPLY to fluid flow problems
I19P206.6	Analyze Complex functions, conformal mappings and contour integration applicable to Image processing, Digital filters and Computer graphics.

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Department of Information Technoloy,Course Name:Processor Architecture, A.Y 2020-21	
I19P207.1	Apprehend architecture and memory organization of PIC 18 microcontroller.
I19P207.2	Implement embedded C programming for PIC 18
I19P207.3	Use concepts of timers and interrupts of PIC 18.
I19P207.4	Demonstrate real life applications using PIC 18.
I19P207.5	Analyze architectural details of ARM processors.
I19P207.6	Perform interfacing of real-world input and output devices to PIC18 microcontroller.
Department of Information Technoloy,Course Name: Database Management System, A.Y 2020-21	
I19P208.1	Understand the fundamental concepts and basic functions of DBMS and RDBMS
I19P208.2	Design ER-models to represent simple database application scenarios.
I19P208.3	Design SQL queries for relational databases
I19P208.4	Apply normalization techniques for database design improvement and understand query processing
I19P208.5	Apply ACID properties for transaction management and concurrency control.
I19P208.6	Analyze various database architectures and technologies
Department of Information Technoloy, Course Name: Computer Graphics, A.Y 2020-21	
I19P209.1	Apply mathematical and logical aspects for developing elementary graphics operations like scan conversion of points, lines, circle, and apply it for problem solving.
I19P209.2	Employ techniques of geometrical transforms to produce, position and manipulate
I19P209.3	Describe mapping from a world coordinates to device coordinates, clipping, and graphics tools in design, development and testing of 2D, 3D modeling applications.
I19P209.4	Apply concepts of rendering, shading, animation, curves and fractals using computer graphics tools in design, development and testing of 2D, 3D moceling applications.
I19P209.5	Perceive the concepts of virtual reality.
I19P209.6	Understand Computer Gaming Concepts
Department of Information Technoloy,Course Name: Software Engineering, A.Y 2020-21	
I19P210.1	Learn the principles of Software Engineering.
I19P210.2	Learn and understand methods of capturing, specifying, visualizing and analyzing software requirements
I19P210.3	Know design principles for software project development.

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I19P210.4	Learn basics of IT project management.
I19P210.5	Understand software quality attributes and testing principles.
I19P210.6	Introduce formal methods and recent trends in Software Engineering.

Course Outcomes for Third Year Sem-I Course 2015 Pattern	
Department of Information Technoloy, Course Name: Theory of Computation, A.Y 2020-21	
CO Number	Statement
I15P301.1	Solve higher order linear differential equations and apply to Control systems, Computer vision, and Robotics
I15P301.2	Solve problems related to Fourier transform, Z-transform and applications to Image processing
I15P301.3	Apply statistical methods like correlation, regression analysis in to analyze data and to make predictions applicable to machine intelligence.
I15P301.4	Perform Vector differentiation and analyze the vector fields
I15P301.5	Perform Vector integration and APPLY to fluic flow problems
I15P301.6	Analyze Complex functions, conformal mappings and contour integration applicable to Image processing, Digital filters and Computer graphics.
Department of Information Technoloy,Course Name: Database Management Systems, A.Y 2020-21	
I15P302.1	Understand the fundamental concepts and basic functions of DBMS and RDBMS
I15P302.2	Apply normalization techniques for database design improvement and understand SQL
I15P302.3	Explain basic concept of query processing and transaction management
I15P302.4	Explain the concurrency control, recovery algorithms and database architectures
I15P302.5	Design and implement a database schema for a given problem-domain
I15P302.6	Identify the key processes of data mining, data warehousing and knowledge discovery process and Analyze various database architectures and technologies.
Department of Information Technoloy,Course Name: Software Engineering & Project Management, A.Y 2020-21	
I15P303.1	Recognize unique features of various software application domains and classify software applications.
I15P303.2	Choose and apply an appropriate lifecycle model of software development.

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I15P303.3	Describe principles of agile development, discuss the SCRUM process and distinguish agile process models from other process models.
I15P303.4	Analyze software requirements by applying various modeling techniques.
I15P303.5	List and classify CASE tools and discuss recent trends and research in software engineering.
I15P303.6	Understand IT project management through the life cycle of the project and future trends in IT Project Management.
Department of Information Technoloy, Course Name: Operating Systemt, A.Y 2020-21	
I15P304.1	Understand the fundamentals and Roles of Operating System
I15P304.2	understand the concept of a process, thread and solve problems based on process scheduling algorithms
I15P304.3	Understand the concept of process synchronization, mutual exclusion and deadlock and solve Deadlock avoidance
I15P304.4	Illustrate and Differentiate various memory management techniques
I15P304.5	Clarify the concept of I/O management and File system and analyse the seek time using disk scheduling algorithm
I15P304.6	Understand the linux operating system with it's components
Department of Information Technoloy, Course Name: Human-Computer Interaction, A.Y 2020-21	
I15P305.1	To explain importance of HCI study and principles of user-centred design (UCD) approach.
I15P305.2	To develop understanding of human factors in HCI design.
I15P305.3	To develop understanding of models, paradigms and context of interactions.
I15P305.4	To design effective user-interfaces following a structured and organized UCD process.
I15P305.5	To evaluate usability of a user-interface design.
I15P305.6	To apply cognitive models for predicting human-computer-interactions.

Course Outcomes for Second Year Sem-Ⅱ Course

Department of Information Technoloy, Course Name: Computer Network Technology, A.Y 2020-21	
CO Number	Statement
I15P306.1	Understand and recall responsibilities, services offered and protocol used at each layer of OSI and TCP/IP model .

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I15P306.2	Understand different addressing techniques, design network and analyze network traffic.
I15P306.3	Implement client server paradigm and test different application layer protocols
I15P306.4	Illustrate the different wireless technologies and IEEE standards.
I15P306.5	Identify and understand issues, design goals and ptotocols in Ad Hoc wireless network
I15P306.6	Understand and explore recent trends in communication network
Department of Information Technoloy,Course Name: Systems Programming, A.Y 2020-21	
I15P307.1	Learn independently modern software development tools and creates novel solutions for language processing applications
I15P307.2	Understand and implement assemblers and macro processors
I15P307.3	Apply LEX tool for generation of Lexical Analyzer.
I15P307.4	Apply YACC tool for generation of syntax analyzer
I15P307.5	Construct output for all the phases of compiler
I15P307.6	Apply code optimization in the compilation process
Department of Information Technoloy, Course Name: Design and Analysis of Algorithms A.Y 2020-21	
I15P308.1	To calculate computational complexity using asymptotic notations for various algorithms.
I15P308.2	To apply Divide & Conquer as well as Greedy approach to design algorithms.
I15P308.3	To practice principle of optimality.
I15P308.4	To illustrate different problems using Backtracking.
I15P308.5	To compare different methods of Branch and Bound strategy.
I15P308.6	To explore the concept of P, NP, NP-complete, NP-Hard and parallel algorithms.
Department of Information Technoloy, Course Name: Cloud Computing, A.Y 2020-21	
I15P309.1	Understand the Fundamentals of Cloud Computing
I15P309.2	Understand Virtualization in cloud computing and to analyze Common Standards in Cloud Computing
I15P309.3	Analyze environments and to Understand Applications of cloud computing
I15P309.4	Explain security related terms in cloud along with security issues
I15P309.5	State trends in ubiquitous computing, to analyze cloud enabling technologies for IoT and to understand innovative applications of IoT
I15P309.6	Interpret change in OS along with intelligent applications and future of intelligent devices
Department of Information Technoloy, Course Name: Data Science & Big Data Analytics, A.Y 2020-21	

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I15P310.1	Understand Data Science and Big Data primitives.
I15P310.2	Apply different mathematical models for Big Data.
I15P310.3	Determine Big Data learning skills by developing industry or research applications.
I15P310.4	Analyze each learning model and perform on different datasets.
I15P310.5	Understand needs, challenges and techniques for big data visualization
I15P310.6	Identify different applications of Big Data technologies.

Course Outcomes for Fourth Year Sem-I Course 2015 Pattern

CO Number	Statement
Department of Information Technoloy, Course Name: Information and Cyber Security, A.Y 2020-21	
I15P401.1	Use basic cryptographic techniques in application development.
I15P401.2	Apply methods for authentication, access control, intrusion detection and prevention.
I15P401.3	To apply the scientific method to digital forensics and perform forensic investigations
I15P401.4	To develop computer forensics awareness
I15P401.5	To study network defence tools
I15P401.6	To study network defence tools
Department of Information Technoloy,Course Name: Machine Learning and Applications, A.Y 2020-21	
I15P402.1	Understand the fundamentals and types of Machine Learning
I15P402.2	Discriminate and solve different classification machine learning problems and asses the performance of them.
I15P402.3	Clarify different types of linear regression models and their performance matrices
I15P402.4	Illustrate probability concepts and probabilistic models and solve Bayes theorem based problems
I15P402.5	Identify different techniques to combine multiple machine learning models for ensemble learning
I15P402.6	Understand the concepts of reinforcement and deep learning concepts
Department of Information Technoloy,Course Name: Software Design and Modeling, A.Y 2020-21	
I15P403.1	Understand object oriented methodologies, basics of Unified Modeling Language (UML).

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I15P403.2	Understand analysis process, use case modeling, domain/class modeling
I15P403.3	Discriminate interaction and behavior modeling
I15P403.4	Analyze Understand design process and business, access and view layer class design
I15P403.5	Illustrate GRASP principles and GoF design patterns.
I15P403.6	Understand architectural design principles and guidelines in the various type of application development.
Department of Information Technoloy, Course Name: Business Analytics and Intelligence, A.Y 2020-21	
I15P404.1	Comprehend the Information Systems and development approaches of Intelligent
I15P404.2	Evaluate and Apply business processes using information systems.
I15P404.3	Propose the Framework for business intelligence.
I15P404.4	Get acquainted with the Theories, techniques, and considerations for capturing organizational intelligence.
I15P404.5	Formulate business intelligence with business strategy.
I15P404.6	Apply the techniques for implementing business intelligence systems.
Department of Information Technoloy, Course Name: Software Testing and Quality Assurance,A.Y 2020-21	
I15P405.1	Explain the basics of software testing and various types of defect classes.
I15P405.2	Explain different types of testing and study different levels of testing (-Unit Testing, Integration Testing) in detail.
I15P405.3	Explain,Scope of automation , design for automation and how to use metrics and models.
I15P405.4	Explain components of the Software Quality Assurance System, and planning for software quality.
I15P405.5	Design models for quality assurance , and how it is utilised for better productivity.
I15P405.6	Describe software process methodology, internal Auditing and Assessments process.

Course Outcomes for Fourth Year Sem-II Course	
CO Number	Statement
Department of Information Technoloy,Course Name: Distributed Computing System,A.Y 2020-21	
I15P406.1	Understand the principles and desired properties of distributed systems on which the internet and other distributed systems are based.

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I15P406.2	Understand and apply the basic theoretical concepts and algorithms of distributed systems in problem solving.
I15P406.3	Recognize the inherent difficulties that arise due to distributed-ness of computing resources.
I15P406.4	Identify the challenges in developing distributed applications.
I15P406.5	Identify storage techniques applicable for distributed systems
I15P406.6	Categorize different security measures in distributed systems
Department of Information Technoloy,Course Name: Ubiquitous Computing A.Y 2020-21	
I15P407.1	Demonstrate the knowledge of design of Ubicomp and its applications.
I15P407.2	Explain smart devices and services used Ubicomp.
I15P407.3	Describe the significance of actuators and controllers in real time application design.
I15P407.4	Use the concept of HCI to understand the design of automation applications.
I15P407.5	Classify Ubicomp privacy and explain the challenges associated with Ubicomp privacy.
I15P407.6	Get the knowledge of ubiquitous and service oriented networks along with Ubicomp management.
Department of Information Technoloy,Course Name: Internet of Things (IoT),A.Y 2020-21	
I15P408.1	Understand what is internet of things.
I15P408.2	Understand architecture and design of IoT.
I15P408.3	Describe the objects connected in IoT.
I15P408.4	Understand the underlying Technologies.
I15P408.5	Understand the platforms in IoT.
I15P408.6	Understand cloud interface to IoT.
Department of Information Technoloy, Course Name: Social Media Analytics, A.Y 2020-21	
I15P409.1	Understand the basics of Social Media Analytics
I15P409.2	Explain the significance of Data mining in Social media.
I15P409.3	Demonstrate the algorithms used for text mining.
I15P409.4	Apply network measures for social media data.
I15P409.5	Explain Behavior Analytics techniques used for social media data
I15P409.6	Apply social media analytics for Face book and Twitter kind of applications.

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DEPARTMENT OF E & TC ENGINEERING
Criterion No.: 2.6.1
Academic Year 2020-21

Program Outcomes:

Engineering Graduates will be able to:

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

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

3. **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.

4. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the

5. **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

6. **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

7. **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

8. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of

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

10. **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.

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

12. **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.

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DEPARTMENT OF E & TC ENGINEERING
Criterion No.: 2.6.1
Academic Year 2020-21

Program Educational Outcomes:

Graduates will be able to

1. Apply concepts of mathematics, science and engineering for design - development of creative interdisciplinary frameworks for advancement of the society.

2. Demonstrate quantifiable advancement in the careers they decide to seek after.

3. Adopt life-long learning with high morals to outshine in the volatile economic and technological environment.

Jagtap

Dr. S.K. Jagtap
HOD (E &TC)

Head
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DEPARTMENT OF E & TC ENGINEERING
Criterion No.: 2.6.1
Academic Year 2020-21

Program Specific Outcomes:

PSOs are the statement that describe what a graduate of specific program should be able to do -

PSO1 To design and Implement Modern Electronic Systems utilizing knowledge of Embedded Systems, VLSI and Signal Processing

PSO2 Identify and apply appropriate Modern tools for the design and implementation of communication using IoT, AI and Robotics

Jagtap

Dr. S.K. Jagtap
HOD (E &TC)

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DEPARTMENT OF E & TC ENGINEERING
Criterion No.: 2.6.1
LIST OF COURSE OUTCOMES IN ACADEMIC YEAR 2020-21

Course Outcomes for Second Year First Semester Course (2019 Pattern)	
Department: E &TC Engineering. Course Name:Engineering Mathematics III (207005)	
CO No.	**Statement**
CO1	Solve higher order linear differential equation using appropriate techniques for modelling, analyzing of electrical circuits and control systems.
CO2	Solve problems related to Fourier transform, Z-transform and applications to communication systems and Signal processing.
CO3	Evaluate Interpolating polynomials, numerically differentiate and integrate functions, numerical solutions of differential equations using single step and multi-step iterative methods used in modern scientific
CO4	Represent vector differentiation , analyze the vector fields and apply to Electro-Magnetic fields
CO5	Solve problem related to vector integration by Greens theorem, Stokes theorem and Gauss Divergence theorem. Which gives relations between line, surface and Volume Integrais and apply it to Electro-Magnetic fields.
CO6	Analyze conformal mappings, transformations and perform contour integration of complex functions in the study of electrostatics and signal processing
Department: E &TC Engineering. Course Name:Electronic Circuits (204181)	
CO No.	**Statement**
CO1	Assimilate the physics, characteristics and parameters of MOSFET towards its application as amplifier.
CO2	Design MOSFET amplifiers, with and without feedback, & MOSFET oscillators, for given specifications
CO3	Analyze and assess the performance of linear and switching regulators, with their variants, towards applications in regulated power supplies.
CO4	Explain internal schematic of Op-Amp and define its performance parameters.
CO5	Design, Build and test Op-amp based analog signal processing and conditioning circuits towards various real time applications.
CO6	Understand and compare the principles of various data conversion techniques and PLL with their applications.
Department: E &TC Engineering. Course Name:Digital Circuits (204182)	
CO No.	**Statement**
CO1	Identify and prevent various hazards and timing problems in a digital design.
CO2	Select the basic logic gates for various reduction techniques of digital logic circuit.
CO3	Analyze, design and implement combinational logic circuits.
CO4	Analyze, design and implement sequential circuits.
CO5	Compare and design Mealy and Moore machines.
CO6	Identify and Construct digital system using PLD.

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Head
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Department: E &TC Engineering. Course Name:Electric Circuits (204183)	
CO No.	**Statement**
CO1	Analyze the simple DC and AC circuits with circuit simplification techniques and network theorems.
CO2	Analyze driven and source free RL and RC circuits.
CO3	Determine network parameters of given network and analyze the given network using Laplace Transform.
CO4	Understand speed control characteristics of DC motors.
CO5	Perform load test on Phase AC Motors.
CO6	Explain operation of special purpose motors & understand necessity, components and specifications of electrical vehicles.
Department: E &TC Engineering. Course Name:Data Structures (204184)	
CO No.	**Statement**
CO1	Solve mathematical problems using C programming language.
CO2	Implement sorting and searching algorithms and calculate their complexity.
CO3	Develop applications of stack and queue using array
CO4	Demonstrate applicability of Linked List.
CO5	Demonstrate applicability of nonlinear data structures - Binary Tree with respect to its time complexity.
CO6	Apply the knowledge of graph for solving the problems of spanning tree and shortest path algorithm.
Department: E &TC Engineering. Course Name:Electronic Circuits Lab (204185)	
CO No.	**Statement**
CO1	Design and build MOSFET amplifier, with and without feedback to verify and calculate parameters.
CO2	Measure and compare op-amp parameter with datasheet.
CO3	Design, Build and test Op-amp based analog signal processing and conditioning circuits and various data conversion techniques.
CO4	Design and simulate MOSFET amplifier and op-amp circuit.
Department: E &TC Engineering. Course Name:Digital Circuits Lab (204186)	
CO No.	**Statement**
CO1	Classify the basic digital circuits and its applications.
CO2	Understand the use of logic gates.
CO3	Design basic combinational circuits and verify their functionalities.
CO4	Describe the various digital IC's & their operations.
CO5	Analyze and design various counter circuits.
CO6	Construct several types of shift registers.

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Department: E &TC Engineering. Course Name:Electrical Circuits Lab (204187)	
CO No.	**Statement**
CO1	Analyze the simple DC and AC circuits with circuit simplification techniques and network theorems.
CO2	Analyze driven and source free RL and RC circuits.
CO3	Determine network parameters of given network and analyze the given network using Laplace Transform.
CO4	Understand speed control characteristics of DC motors.
CO5	Perform load test on Phase AC Motors.
CO6	Explain operation of special purpose motors & understand necessity, components and specifications of electrical vehicles.
Department: E &TC Engineering. Course Name:Data Structures Lab (204188)	
CO No.	**Statement**
CO1	Compare various kinds of searching and sorting techniques.
CO2	Construct Linear and nonlinear data structures using arrays and linked list.
CO3	Develop Programs employing dynamic memory management.
CO4	Choose appropriate data structure to solve various computing problems.
CO5	Demonstrate the use of nonlinear data structures, such as the Binary Tree, in terms of time complexity.
CO6	Apply the knowledge of graph data structure for solving the problems of spanning tree and shortest path algorithm.
Department: E &TC Engineering. Course Name:Electronic Skill Development (204189)	
CO No.	**Statement**
CO1	Understand application of electronics principles in practice.
CO2	Design hardware.
CO3	Find faults in hardware also test and repair the hardware.
CO4	Calculate power budget for an electronic circuit.
CO5	Understand use of measuring equipment's for measurement of signals.
CO6	Understand concepts of various types of batteries and various solar power generation systems.

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Course Outcomes for Second Year Second Semester Course (2019 Pattern)	
Department: E &TC Engineering. Course Name:Signal and Systems (204191)	
CO No.	**Statement**
CO1	Analyze, categorize basic signals and execute operations on signals.
CO2	Analyze, categorize the systems based on their properties in terms of input output relation and in terms of impulse response and will be able to determine the convolution between to signals.
CO3	Analyze and evaluate the signals in frequency domain using Fourier series and Fourier Transform.
CO4	Determine the signals in complex frequency domain using Laplace Transform, and will be able to apply and analyze the LTI systems using Laplace Transforms.
CO5	Define and describe the probability, random variables and random signals.
CO6	Evaluate the mean, mean square, variance and standard deviation for given random variables using PDF.
Department: E &TC Engineering. Course Name:Control Systems (204192)	
CO No.	**Statement**
CO1	Determine mathematical model of physical system and find transfer function with BDR and SFG techniques.
CO2	Evaluate time domain response of first and second order system for standard test signals.
CO3	Determine stability of the system using Routh Criteria and Root Locus method.
CO4	Analyze system by frequency response analysis using Bode plot and Nyquist plot
CO5	Express and solve system equations using state space variables.
CO6	Understand the roll of controller in Industrial automation.
Department: E &TC Engineering. Course Name:Principles of Communication Systems (204193)	
CO No.	**Statement**
CO1	To compute & compare the bandwidth and transmission power requirements by analysing time and frequency domain spectra of signal required for modulation schemes under study.
CO2	Describe and analyse the techniques of generation, transmission and reception of Amplitude Modulation Systems.
CO3	Explain generation and detection of FM systems and compare with AM systems.
CO4	Exhibit the importance of Sampling Theorem and correlate with Pulse Modulation technique (PAM, PWM, and PPM).
CO5	Characterize the quantization process and elaborate digital representation techniques (PCM, DPCM, DM and ADM).
CO6	Illustrate waveform coding, multiplexing and synchronization techniques and articulate their importance in baseband digital transmission.

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Department: E &TC Engineering. Course Name:Object Oriented Programming (204194)	
CO No.	**Statement**
CO1	Understand the principles of object-oriented programming.
CO2	Implement the concepts of data encapsulation, constructor, and destructors in C++.
CO3	Understand and apply the concepts of Operator overloading and friend functions in C++.
CO4	Describe and Apply the concepts of classes, methods inheritance and polymorphism in C++.
CO5	Implement the concepts of Templates, Namespaces and Exception Handling in C++.
CO6	Describe and apply File handling concepts in C++.
Department: E &TC Engineering. Course Name:Signals & Control System Lab (204195)	
CO No.	**Statement**
CO1	Create, sketch basic signals, its amplitude and phase spectrum and also for an exponential signal for various cases and verify the results.
CO2	Create a program to record the speech and music signals and sketch it in time domain, its amplitude and phase spectrum.
CO3	Evaluate the convolution integral of Unit step and exponential signals and create a program to sketch the response of the system.
CO4	Determine Time response of First and second order systems from their Transfer Functions by software simulation and Determine stability of systems using Routh criteria and Root locus, by software simulation.
CO5	Evaluate gain margin, phase margin and comment on stability by analysing Bode plot and Nyquist plot.
CO6	Evaluate state model from Transfer Function and evaluate State transition matrix. To understand role of controllers in control system applications.
Department: E &TC Engineering. Course Name:Principles of Communication Systems Lab (204196)	
CO No.	**Statement**
CO1	Demonstrate generation and detection of analog modulation techniques. AM FM
CO2	Explain and verify sampling, PCM, delta modulation, adaptive delta modulation.
CO3	Compare various line coding schemes used for digital data transmission.
CO4	Simulate sampling as well as different modulation techniques using MATLAB.
Department: E &TC Engineering. Course Name:Object Oriented Programming Lab (204197)	
CO No.	**Statement**
CO1	Apply the concepts of classes, objects to develop C++ program
CO2	Implement C++ programs using constructor, destructor.
CO3	Implement function overloading and Operator overloading concepts in C++.
CO4	Implement C++ program using the concept of string class
CO5	Apply the concepts of templates, names apace and exceptional handling to develop object oriented program.
CO6	Develop a program using file handling concept.

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Department: E &TC Engineering. Course Name:Data Analytics Lab (204198)	
CO No.	**Statement**
CO1	Describe the fundamentals of data science.
CO2	Explain the various Python packages related to data science.
CO3	Develop Python programs related to data sequences using NumPy and Pandas.
CO4	Design Python programs related to data frames using NumPy and Pandas.

Department: E &TC Engineering. Course Name:Employability Skill Development (204199)	
CO No.	**Statement**
CO1	Define personal and career goals using introspective skills and SWOC assessment. Evaluate short-term and long-term goals.
CO2	Develop effective communication skills self - management attributes, problem solving abilities and team working & building capabilities.
CO3	Summarize inter-personal relationships, conflict management and leadership skills to take part in a multi-cultural professional environment.
CO4	Develop practically deployable skill set involving critical thinking, effective presentations and leadership qualities.
CO5	Explain the importance of professional ethics, etiquettes & morals.
CO6	Solve problems on quantitative ability and logical reasoning.

Department: E &TC Engineering. Course Name:Project Based Learning (204200)	
CO No.	**Statement**
CO1	Highlight project based learning activities that are continuing, multidisciplinary and student-centric.
CO2	Impart self-sufficient and group learning by solving real world problem with the help of existing resources.
CO3	Develop a systems based on the basics of electronics and communication engineering by possibly the addition of previously gained knowledge.
CO4	Acquire practical knowledge of life cycle of development of the complete electronics system.
CO5	Choose and apply suitable hardware and software tools to design and develop prototype system.
CO6	Develop team skills and learn professionalism while implementing the project.

Course Outcomes for Third Year First Semester Course (2015 Pattern)

Department: E &TC Engineering. Course Name: Digital Communication (304181)	
CO No.	**Statement**
CO1	Describe various building blocks of digital communication systems and the signal flow with different waveform coding techniques.
CO2	Analyze the performance of baseband digital transmission and draw various data formats.
CO3	Describe various random processes and mean, autocorrelation, cross correlation, probability density functions related to it.
CO4	Explain time and frequency domain analysis of the signals in a digital communication system
CO5	Analyze the performance of pass band digital communication system in terms of error rate and spectral efficiency and sketch their waveforms.
CO6	Understand working of spread spectrum communication system and its performance

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Department: E &TC Engineering. Course Name: Digital Signal Processing (304182)	
CO No.	**Statement**
CO1	Define, classify and discuss various types of signals, analyse signals and apply mathematical concept for signal processing.
CO2	Analyze the discrete time signals and system using different transform domain techniques.
CO3	Design & implement various filters for filtering different real world signals.
CO4	Apply DSP in different real world signal processing applications.

Department: E &TC Engineering. Course Name: Electromagnetics (304183)	
CO No.	**Statement**
CO1	Apply basic mathematical concepts related to electromagnetic vector fields.
CO2	Apply the principles of electrostatics to the solutions of problems relating to electric field and electric potential, boundary conditions and electric energy density.
CO3	Apply the principles of magneto statics to the solutions of problems relating to magnetic field and magnetic potential, boundary conditions and magnetic energy density.
CO4	Analyze time varying fields using the concepts related to Faraday's law, induced emf and Maxwell's equations.
CO5	Analyze transmission line problems using Smith Chart.
CO6	Apply Maxwell's equations to solve problems related to uniform plane wave propagation.

Department: E &TC Engineering. Course Name: Microcontrollers (304184)	
CO No.	**Statement**
CO1	Describe 8-bit Microcontroller Architecture of 8051.
CO2	Explain programming in assembly language for 8051 and to study various software and hardware tools for developing applications.
CO3	Explain interfacing of real world peripheral devices.
CO4	Describe PIC18FXX Microcontroller Architecture.
CO5	Explain interfacing of real world peripheral devices using Embedded C.
CO6	Explain interfacing of real world peripheral devices using different communication protocol.

Department: E &TC Engineering. Course Name: Mechatronics (304185)	
CO No.	**Statement**
CO1	Describe key elements of the mechatronics system and its representation in terms of block diagram.
CO2	Identify basic principles of Sensors and Transducers.
CO3	Classify various types of mechatronics system components and its applications.
CO4	Describe case study of the mechatronics system.
CO5	Identify Electrical Actuators, Electron-mechanical actuators
CO6	Describe case study of the mechatronics system.

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Department: E &TC Engineering. Course Name: Signal Processing and Communication Lab (304191)	
CO No.	**Statement**
CO1	Visualize and practically implement various baseband and passband modulation techniques.
CO2	Analyze various aspects related to Spread Spectrum Techniques
CO3	Simulate performance parameters of baseband and passband modulation techniques using MATLAB.
CO4	Understand the digital signal processing, sampling and aliasing.
CO5	Analyze various properties of DFT.
CO6	Apply different window methods to realize IIR filter design.
Department: E &TC Engineering. Course Name: Microcontrollers and Mechatronics Lab (304192)	
CO No.	**Statement**
CO1	Explain programming in assembly language for 8051 and Explain interfacing of real world peripheral device.
CO2	Explain interfacing of real world peripheral devices using Embedded C for PIC18FXX Microcontroller
CO3	Explain interfacing of real world peripheral devices using different communication protocol.
CO4	Understand the key elements of Mechatronics design process and the basic concepts of engineering system with dynamic response of the system.
CO5	Realize the concepts of real time interfacing and data acquisition and discuss the operating principles of hydraulic and Pneumatic systems.
CO6	Understanding the concepts of design of Mechatronics system through case studies.
Department: E &TC Engineering. Course Name: Electronics System Design (304193)	
CO No.	**Statement**
CO1	Assess the fundamental steps and working principles of electronics devices to build electronics systems.
CO2	Understand datasheets and select suitable components and devices.
CO3	Implement prototype of Data Acquisition system by selecting proper transducer and signal conditioning circuit.
CO4	Develop an electronic system/sub-system and verify its performance by simulating the same.
CO5	Customized an EDA tool for circuit schematic and simulation.
CO6	Construct, accomplish the database and query handling using suitable tools.

Course Outcomes for Third Year Second Semester Course (2015 Pattern)

Department: E &TC Engineering. Course Name: Power Electronics (304186)	
CO No.	**Statement**
CO1	Design and implement a triggering / gate drive circuit for a power device.
CO2	Understand and analyze different phase controlled converters
CO3	Construct the design and control of rectifier and inverter circuits.
CO4	Experiment the working of DC-DC converters and AC voltage controllers.
CO5	Explain the working of resonant circuits and design protection circuits used in power electronic applications.
CO6	Examine different special motor drives for various industrial applications.

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Department: E &TC Engineering. Course Name: Information Theory Coding and Communication Networks (304187)	
CO No.	**Statement**
CO1	Perform information analysis and design of different source coding technique for data compression.
CO2	Explain different channel coding theorems for communication system and Analyze the performance of error control codes.
CO3	Design a channel coding scheme in communication system.
CO4	Design of encoding and decoding circuits for channel performance improvement against burst error.
CO5	Apply and define fundamental principles of data communication and its components.
CO6	Understand flow and error control techniques in communication networks.
Department: E &TC Engineering. Course Name: Business Management (304188)	
CO No.	**Statement**
CO1	Grasp the fundamentals of management as a function and put it into use.
CO2	Understand the importance of quality in a business and the various philosophies & tools on quality
CO3	Demonstrate knowledge of the financial position of an organization and its use along the project management life cycle.
CO4	Illustrate the importance of human resource and the various stages a employee has to be managed through case studies
CO5	Explain the concept of entrepreneurship, demonstrate the various activities to be carried out for entrepreneurship and the support available to encourage entrepreneurship.
CO6	Outline the role of marketing and examining the various traditional and modern marketing techniques.
Department: E &TC Engineering. Course Name: Advanced Processors (304189)	
CO No.	**Statement**
CO1	Describe the features, advantages of ARM 7, ARM 9 & ARM11.
CO2	Describe the ARM 7 microprocessor architectures and its features.
CO3	Design and Interface the advanced peripherals to ARM based microcontroller.
CO4	Design embedded system with available resources.
CO5	Describe the C67X processors architecture and its features.
CO6	Apply DSP Processors and resources for signal processing applications.
Department: E &TC Engineering. Course Name: System Programming and Operating Systems (304190)	
CO No.	**Statement**
CO1	Establish the awareness of different components of Systems Programming.
CO2	Analyze and investigate the different implementation techniques of system programming operating system abstractions.
CO3	Demonstrate and interpret different OS functions, process management policies and scheduling of processes by CPU.
CO4	Discover the requirement for process synchronization and deadlock.
CO5	Understand the Memory management systems and its allocation policies, Virtual Memory and Paging systems.
CO6	Develop knowledge of file management techniques, various I/O devices and scheduling algorithms.

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Department: E &TC Engineering. Course Name: Power and ITCT Lab (304194)	
CO No.	**Statement**
CO1	Understand the characteristics of different power electronic devices.
CO2	Discuss, analyse different controlled converters.
CO3	Implementation of various power electronics applications.
CO4	Discuss, distinguish and interpret entropies and mutual information for Noise free, Error free, Binary Symmetric and Noisy Channel
CO5	Discuss, analyse and interpret Shannon-Fano, Huffman, Linear Block, Cyclic, Convolutional, BCH-RS Coding and decoding
CO6	Discuss networking components and LAN and simulate ARQ techniques.
Department: E &TC Engineering. Course Name: Advanced Processors and System Programming Lab (304195)	
CO No.	**Statement**
CO1	Understand and interpret basics of LPC2148 also interfacing of LPC2148 with display, GSM.
CO2	Analyze the concepts of finding current location latitude and longitude values with the help of GPS also demonstrate the concept of ADC.
CO3	Examine interfacing of SD card to LPC 2148 using SPI also interfacing of EEPROM to PLC2148 using I2C protocol.
CO4	Understand and interpret the basics of the Linux operating system using various functions.
CO5	Describe and design various components of system software.
CO6	Demonstrate and implement various process and memory management algorithms.
Department: E &TC Engineering. Course Name: Employability Skills and Mini Project (304196)	
CO No	**Statement**
CO1	Understand, plan and execute a Mini Project with team.
CO2	Implement electronic hardware by learning PCB artwork design, soldering techniques, testing and troubleshooting etc.
CO3	Prepare a technical report based on the Mini project.
CO4	Deliver technical seminar based on the Mini Project work carried out.

Course Outcomes for Fourth Year First Semester Course (2015 Pattern)

Department: E &TC Engineering. Course Name: VLSI Design and Technology (404181)	
CO No.	**Statement**
CO1	Write effective HDL coding for digital design.
CO2	Apply knowledge of real time issues in digital design.
CO3	Model digital circuit with HDL, simulate, synthesize and prototype in PLDs.
CO4	Design CMOS circuits for basic digital circuits and specified applications.
CO5	Analyze various issues and constraints in design of an ASIC.
CO6	Apply knowledge of testability in design and build self-test circuit.

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Department: E &TC Engineering. Course Name: Computer Networks and Security (404182)	
CO No.	**Statement**
CO1	Compare different types of network; network Topology, different network devices.
CO2	Understand TCP/IP protocol suite.
CO3	Compare and Understand IPv4 and IPv6 IP addressing.
CO4	Apply basic knowledge of installing and configuring networking applications.
CO5	Apply a basic knowledge of network security.
Department: E &TC Engineering. Course Name: Radiation and Microwave Techniques (404183)	
CO No.	**Statement**
CO1	Distinguish various performance parameters of radiating elements.
CO2	Define, analyse, and classify radiating elements and arrays.
CO3	Discuss, apply waveguide fundamentals in design of transmission lines.
CO4	Design and set up a system consisting of various passive microwave components.
CO5	Apply and analyse tube based and solid state active devices along with their application.
CO6	Define and measure performance parameters of microwave components.
Department: E &TC Engineering. Course Name: Digital Image and Video Processing (404184)-Elective I	
CO No.	**Statement**
CO1	Develop and implement basic mathematical operations on digital images (2-D) and using fundamental concepts of Digital Image Processing with basic relationship of pixels.
CO2	Investigate image enhancement techniques and restoration problems.
CO3	Apply and classify various 2-D data compression techniques for 2-D digital images
CO4	Categorize and design image processing techniques for segmentation and Morphological operators.
CO5	Interpret objects and regions of the image with appropriate representation techniques.
CO6	Explore video signal representation and different algorithms for video processing.
Department: E &TC Engineering. Course Name:Internet of Things (404184)- Elective I	
CO No.	**Statement**
CO1	Understand the various concepts, terminologies and architecture of IoT systems.
CO2	Study and understand various sensors and actuators for design of IoT.
CO3	Illustrate different protocols for IoT system design.
CO4	Understand various techniques of data storage and analytics in IoT.
CO5	Understand and apply various IoT concepts for building IoT applications.

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Department: E &TC Engineering. Course Name: Embedded Systems and RTOS (404184)-Elective I	
CO No.	**Statement**
CO1	Identify design metrics of embedded systems to design real time applications.
CO2	Explain the concept of Real Time Operating Systems in embedded applications.
CO3	Summarize concepts of µC/OS RTOS.
CO4	Select and make use of modern architecture for embedded system design.
CO5	Select Linux for embedded system development.
CO6	Develop an embedded product using an open source platform.
Department: E &TC Engineering. Course Name: Artificial Intelligence (404185A)- Elective-II	
CO No.	**Statement**
CO1	Describe the modern view of AI as the study of agents that receive precepts from the Environment and perform actions.
CO2	Demonstrate awareness of informed search and exploration methods.
CO3	Explain about AI techniques for knowledge representation, planning and uncertainty Management.
CO4	Develop knowledge of decision making and learning methods.
CO5	Design and develop different pattern recognition and expert system algorithms for various applications.
CO6	Outline the fundamentals of Natural Language Processing.
Department: E &TC Engineering. Course Name: Electronic Product Design (404185B)- Elective-II	
CO No.	**Statement**
CO1	Familiar with various stages of Electronic Product Design.
CO2	Understand different considerations of analog, digital and mixed circuit design.
CO3	Familiar with different considerations of software design and testing methods.
CO4	Get acquainted with methods of PCB design and different tools.
CO5	Understand the importance of product test and test specification.
CO6	Get acquainted with the process and importance of documentation.
Department: E &TC Engineering. Course Name: Lab Practice – I (CNS + RMT) (404186)	
CO No.	**Statement**
CO1	Select a suitable LAN topology for the given network.
CO2	Identify a given class of IP address.
CO3	Understand simulation of different application layer protocols in Cisco Packet Tracer.
CO4	Differentiate various antenna and antenna array by calculating performance parameters
CO5	Design and set up a system consisting of various passive, active microwave components.
CO6	Measure performance parameter of microwave components.

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Department: E &TC Engineering. Course Name: Lab Practice – II (VLSI + Elec – I (DIVP) (404187)	
CO No.	**Statement**
CO1	Model various combinational and sequential circuits using HDL and simulate using EDA tool.
CO2	Design and implement a Digital system on an FPGA board.
CO3	Design and implementation of CMOS Digital Circuit Layout using EDA tool.
CO4	Understand fundamentals operation of Digital Image and its process
CO5	Asses the different types of image enhancement techniques for the perfection of pictographic information for human perceptions
CO6	Understand the concepts of image segmentation, compression and recognition techniques to remove redundancy pixel transmit the image/Video using less bandwidth and object detection.
Department: E &TC Engineering. Course Name: Lab Practice – II (VLSI + Elec – I (IOT) (404187)	
CO No.	**Statement**
CO1	Model various combinational and sequential circuits using HDL and simulate using EDA tool.
CO2	Design and implement a Digital system on an FPGA board.
CO3	Design and implementation of CMOS Digital Circuit Layout using EDA tool.
CO4	Understand the various concepts, terminologies and architecture of IoT systems.
CO5	Illustrate different protocols for IoT system design.
CO6	Understand and apply various IoT concepts for building IOT applications.
Department: E &TC Engineering. Course Name: Lab Practice – II (VLSI + Elec – I (ES & RTOS) (404187)	
CO No.	**Statement**
CO1	Model various combinational and sequential circuits using HDL and simulate using EDA tool.
CO2	Design and implement a Digital system on an FPGA board.
CO3	Design and implementation of CMOS Digital Circuit Layout using EDA tool.
CO4	Explain task controlling procedures
CO5	Perform Interfacing with peripheral devices
CO6	Implement controller programming platforms
Department: E &TC Engineering. Course Name: Project Stage - I (404188)	
CO No.	**Statement**
CO1	Apply their acquired skills to define problem statements and objectives.
CO2	Paraphrase abstract and synopsis for selected problems.
CO3	Analyze related research work and summarize in the form of literature survey.
CO4	Demonstrate their knowledge of technological tools and techniques for planning and execution of project.

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Course Outcomes for Fourth Year Second Semester Course (2015 Pattern)	
Department: E &TC Engineering. Course Name: Mobile Communication (404189)	
CO No.	**Statement**
CO1	Describe how wireless networks are penetrating our lives for data, multimedia and voice transmission.
CO2	Analyze different traffic model to predict and measure the propagation loss.
CO3	Understand basic concepts of cellular system, wireless propagation and the techniques used to maximize the capacity of cellular network.
CO4	Understand the detailed Architecture of GSM with the call establishment process.
CO5	Evaluate the performance of CDMA and GSM system.
CO6	Get the overview of LTE architecture, and opportunities and requirements in 5G networks.
Department: E &TC Engineering. Course Name: Broadband Communication Systems (404190)	
CO No.	**Statement**
CO1	Select various components such as optical source, detector and fiber of Optical Communication system.
CO2	Demonstrate Link power budget and Rise Time Budget by proper selection of components and check its viability.
CO3	Identify state of the art active and passive WDM components.
CO4	Analyze Orbital parameters of Satellite Orbits.
CO5	Determine various subsystems in Satellite Communication.
CO6	Design Uplink and Downlink Satellite System.
Department: E &TC Engineering. Course Name: Machine Learning (404191)- Elective-III	
CO No.	**Statement**
CO1	Differentiate between various learning approaches and illustrate the steps involved in designing a different machine learning algorithm.
CO2	Demonstrate the application of supervised learning algorithms like regression and classification for solving real world problems.
CO3	Develop unsupervised learning algorithms to solve complex problems with an understanding of the trade-offs involved.
CO4	Analyze basic concepts of neural networks and different learning mechanisms for societal applications.
CO5	Investigate various neural network algorithms to solve real world problems.
CO6	Formulate deep learning algorithms such as Convolutional Neural Networks (CNN's) for image recognition applications.
Department: E &TC Engineering. Course Name: Audio Video Processing (404191)- Elective-III	
CO No.	**Statement**
CO1	Analyze different parameters of color television system.
CO2	Study and understand various HDTV standards and Digital TV broadcasting systems.
CO3	Illustrate different video, audio and image compressing techniques.
CO4	Understand Audio systems and PA systems.
CO5	Understand various acoustic systems.

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Department: E &TC Engineering. Course Name: Robotics (404192)- Elective -IV	
CO No.	**Statement**
CO1	Familiar with the history, concept development and key components of robotics technologies.
CO2	Understand mathematical manipulations of spatial coordinate representation and transformation.
CO3	Solve basic robot forward and inverse kinematic problems.
CO4	Understand and able to solve basic robotic dynamics, path planning and control problems.
CO5	Get acquainted with advanced robotic techniques.
CO6	Acquire basic knowledge of developing and building a robot.

Department: E &TC Engineering. Course Name: Wireless Sensor Networks (404192)- Elective -IV	
CO No.	**Statement**
CO1	Describe, distinguish & interpret various concepts and terminologies used in WSN.
CO2	Classify and summarize use of various radio communication and link management in WSN.
CO3	Define and compare various wireless standards and protocols associated with WSN.
CO4	Recognize and illustrate importance of localization and routing techniques used in WSN.
CO5	Understand and discuss techniques of data aggregation and importance of security in WSN.
CO6	Analyze, compare and examine the issues involved in design and deployment of WSN.

Department: E &TC Engineering. Course Name: Biomedical Electronics (404192)- Elective -IV	
CO No.	**Statement**
CO1	Model the physiology of the biomedical system.
CO2	Understand functioning of heart; principle and working of Biomedical Instruments for cardiovascular system with various sources of bio- signal distortions and its remedial techniques.
CO3	Describe the structure of the nervous system and analyse EEG signals for disease detection like Epilepsy and Sleep apnea.
CO4	Select appropriate filters like Active, Wiener and Adaptive Filters for artifact removal in ECG signal.
CO5	Analyze ECG signals and apply knowledge of electronics engineering for noise removal and highlight the features.
CO6	Discuss the application of Electronics in diagnostics and therapeutic areas.

Department: E &TC Engineering. Course Name: Lab Practice –III (MCS + BCS) (404193)	
CO No.	**Statement**
CO1	Understand and perform practical based on telephone switching.
CO2	Analyze and perform experiment on telecommunication traffic.
CO3	Understand and simulate wireless channel model.
CO4	Identify various components such as optical source, detector and Fiber of Optical Communication system
CO5	Determine Power budget and Time budget analysis of optical fiber system.
CO6	Design an AUDIO-VIDEO satellite link between Transmitter and Receiver and transmit three separate signals. (Audio, Video, and Tone) simultaneously through satellite Link.

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Department: E &TC Engineering. Course Name: Lab Practice –IV Machine Learning) (404194)	
CO No.	**Statement**
CO1	Understand the fundamental theory and concepts of neural networks.
CO2	Apply different neural network architectures and algorithms to solve real time problems such as classification and regression.
CO3	Develop and characterize various machine learning algorithms such as supervised, unsupervised to solve real-life problems such as classification and regression.
CO4	Understand the fundamental concept of deep learning architecture and algorithm such as convolutional neural networks.
Department: E &TC Engineering. Course Name: Lab Practice –IV(Audio Video Engineering) (404194)	
CO No.	**Statement**
CO1	Understand the various concepts, terminologies and working of television systems.
CO2	Study and understand various audio and video formats, compression techniques.
CO3	Illustrate different audio systems and PA systems.
Department: E &TC Engineering. Course Name: Project Stage –II (404195)	
CO No.	**Statement**
CO1	Design solution for the problem defined.
CO2	Execute the project to find a solution which is ethical and professional.
CO3	Prepare a detailed report of work carried in the process of execution of the project.
CO4	Demonstrate oral, written and technical skills acquired during the process of completion of the project.

Jagtap

Dr. S.K. Jagtap

HOD (E &TC)

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Department of Mechanical Engineering
Academic Year-2020-21

Program Outcomes:	
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, 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
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
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 Teamwork 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 (LLL) in the broadest context of technological change.
Program Specific Outcomes (PSO):	
PSO1	Core Competence in Mechanical Engineering : Student will be able to comprehend, synthesize and analyse the problems in the field of Thermal engineering, Design engineering, Manufacturing engineering and Mechatronics.
PSO2	Competence in Computational Tools : Student will be able to apply the knowledge of mechanical engineering software tools for solving engineering problems for developing products & Processes related to mechanical & alligned engineering feilds.
Program Educational Objctives (PEOs):	
PEO 1	Core Competence in Mechanical Engineering: Employable in core mechanical industries, multidisciplinary sectors like government organizations, software industries, practice entrepreneurship and pursue higher education.
PEO 2	Innovation and Research: Able to solve complex mechanical engineering problems through innovation and research.
PEO 3	Professionalism and Ethics: Able to practice professionalism as a team or an individual considering ethics, social and environmental responsibility

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Course Outcome For SE Year Sem-I Course 2019 Pattern	
CO No	Statement
Department of Mechanical Engineering, Course Name: SOLID MECHANICS (M19P215), A.Y 2020-21	
M19P215.1	ANALYSE various types of stresses and strain developed on determinate and indeterminate members.
M19P215.2	CONSTRUCT Shear force and bending moment diagram for various types of transverse loading and support.
M19P215.3	EVALUATE the slope & deflection, bending stresses and shear stresses on a beam
M19P215.4	CALCULATE torsional shear stress in shaft and buckling on the column
M19P215.5	APPLY the concept of principal stresses and theories of failure to determine stresses
M19P215.6	UTILIZE the concepts of SFD & BMD, torsion and principal stresses to solve combined loading application-based problems.
Department of Mechanical Engineering, Course Name: SOLID MODELING & DRAFTING (M19P215), A.Y 2020-21	
M19P216.1	UNDERSTAND basic concepts of CAD system, need and scope in Product Lifecycle Management
M19P216.2	UTILIZE knowledge of curves and surfacing features and methods to create complex solid geometry
M19P216.3	CONSTRUCT solid models, assemblies using various modeling techniques & PERFORM mass property analysis, including creating and using a coordinate system
M19P216.4	APPLY geometric transformations to simple 2D geometries
M19P216.5	USE CAD model data for various CAD based engineering applications viz. production drawings, 3D printing, FEA, CFD, MBD, CAE, CAM, etc.
M19P216.6	USE PMI & MBD approach for communication
Department of Mechanical Engineering, Course Name: Engineering Thermodynamics (M19P217), A.Y 2020-21	
M19P217.1	Understand and apply first laws of thermodynamics to various processes and thermodynamic systems
M19P217.2	Apply the concept of second law of thermodynamics to determine thermodynamic properties for various ideal gas processes.
M19P217.3	Apply the Concept of entropy, Available and non-available energy for an open and closed system.
M19P217.4	Estimate the quality of steam and performance of vapour cycle.
M19P217.5	Analyze the fuel combustion process and product of combustion.
M19P217.6	Evaluate the performance of steam generators.
Department of Mechanical Engineering, Course Name: Engineering Materials & Metallurgy (M19P218), A.Y 2020-21	
M19P218.1	COMPARE crystal structures and ASSESS different lattice parameters.

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M19P218.2	CORRELATE crystal structures and imperf[illegible]ns in crystals with mechanical behaviour of materials.
M19P218.3	DIFFERENTIATE and DETERMINE mechanical properties using destructive and non-destructive testing of materials.
M19P218.4	IDENTIFY and ESTIMATE different parameters of the system viz., phases, variables, component, grains, grain boundary, degree of freedom, etc.
M19P218.5	ANALYSE effect of alloying element and heat treatment on properties of ferrous and nonferrous alloy.
M19P218.6	SELECT appropriate materials for various applications.
Department of Mechanical Engineering, Course Name: Electrical & Electronics Engineering (M19P219), A.Y 2020-21	
M19P219.1	Apply Programming concepts to Understand role of microprocessor and microcontroller in Embedded systems
M19P219.2	Develop interfacing of different types of sensors and other hardware devices with Atmega328 base Arduino board.
M19P219.3	Explain the operation of DC motor ,its speed control methods and braking
M19P219.4	Compare between types of three phase induction motor and its characteristic features.
M19P219.5	Explain about emerging technology of electric vehicle (EV) and modular subsystem
M19P219.6	Choose energy storage devices and electrical drives for EVs.
Department of Mechanical Engineering, Course Name: Geometrical Dimensioning & Tolerancing Lab (M19P220), A.Y 2020-21	
M19P220.1	Understand GD&T terminology, Maximum and Minimum material condition, features, rules for GD&T, Datum control and various tolerances related to it
M19P220.2	Examine the Industrial Practices on Surface finish, Welding symbols and understand various Industrial Drawings
M19P220.3	Analyze Tolerances based on Type of Fits in Assembly & Stacks-Up with suitable examples
M19P220.4	Apply the designing skills through specific mechanical software on application like Design for Manufacturing (DFM), Assembly and Dis-assembly & Safety with suitable examples.
M19P220.5	Prepare a report on Industrial visit / Case study
Department of Mechanical Engineering, Course Name: Audit Course -III (M19P221), A.Y 2020-21	
M19P221.1	Understand and appreciate the concept of Entrepreneurship
M19P221.2	Identify Entrepreneurship opportunity.
M19P221.3	Develop winning business plans.
Course Outcome For SE Year Sem-II Course 2019 Pattern	
CO No	Statement

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Department of Mecha[illegible] Engineering, Course Name: Engineering Mathematics -III (M1[illegible]22), A.Y 2020-21	
M19P222.1	Solve higher order linear differential equations and apply to modeling and analyzingm a[illegible]s spring systems.
M19P222.2	Apply Laplace transform and Fourier transform techniques to solve differential equationsi nvolved in Vibration theory, Heat transfer and related engineering applications
M19P222.3	Apply statistical methods like correlation, regression analysis in analyzing, interpretinge [illegible]perimental data .
M19P222.4	Apply probability theory in testing and quality control.
M19P222.5	Perform Vector differentiation & integration, analyze the vector fields and APPLY to fluicf low problems
M19P222.6	Solve various partial differential equations such as wave equation, one and two dimensional heat flow equations.
Department of Mechanical Engineering, Course Name: Kinematics of Machinery (M19P223), A.Y 2020-21	
M19P223.1	APPLY kinematic analysis to simple mechanisms
M19P223.2	ANALYZE velocity and acceleration in mechanisms by vector and graphical method
M19P223.3	SYNTHESIZE a four bar mechanism with analytical and graphical methods
M19P223.4	APPLY fundamentals of gear theory as a prerequisite for gear design
M19P223.5	CONSTRUCT cam profile for given follower motion
Department of Mechanical Engineering, Course Name: Applied Thermodynamics (M19P224), A.Y 2020-21	
M19P224.1	Classify various types of Engines, Compare Air standard, Fuel Air and Actual cycles and identify various losses in real cycles.
M19P224.2	Understand fundametales of petrol engine including Theory of Carburetion, Stages of Combustion in S. I. Engines and Theory of Detonation, and factors affecting detonation
M19P224.3	Understand fundametales of petrol engine including Fuel Supply system, Types of Injectors and Injection Pumps,Comparison of SI and CI Combustion and Knocking and Factors affecting, Criteria for good combustion chamber and types
M19P224.4	Investigate performance parameters of I. C. Engines
M19P224.5	Describe construction and working of various I. C. Engine systems also various harmful gases emitted from exhaust and different devices to control pollution and emission norms for pollution control

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Department of Mechanical Engineering, Course Name: Fluid Mechanics (M19P225), A.Y 2020-21	
M19P225.1	DETERMINE various properties of fluid
M19P225.2	APPLY the laws of fluid statics and concepts of buoyancy
M19P225.3	IDENTIFY types of fluid flow and terms associated in fluid kinematics
M19P225.4	UNDERSTAND and APPLY principles of fluid dynamics to laminar flow
M19P225.5	ESTIMATE friction and minor losses in internal flows and UNDERSTAND the concept of boundary layer formation over an external surface
M19P225.6	CONSTRUCT mathematical correlation considering dimensionless parameters, also ABLE to predict the performance of prototype using model laws
Department of Mechanical Engineering, Course Name: Manufacturing Processes (M19P226), A.Y 2020-21	
M19P226.1	Select appropriate moulding, core making and melting practice and estimate pouring time, solidification rate and Design riser size and location for sand casting process.
M19P226.2	Understand mechanism of metal forming techniques and calculate load required for flat rolling.
M19P226.3	Demonstrate press working operation and apply the basic principle to design dies and tools for forming and shearing operations.
M19P226.4	Classify and explain different welding processes and evluate welding characteristics
M19P226.5	Differentiate thermoplastics and thermosetting and explain polymer processing techniques.
M19P226.6	Understand the principle of manufacturing fibre reinforce composites and metal matrics composites.
Department of Mechanical Engineering, Course Name: Machine Shop (M19P227), A.Y 2020-21	
M19P227.1	Perform welding using TIG/ Resistance welding technique
M19P227.2	Demonstrate the fabrication of Fibre-reinforced composites by hand lay-up process
M19P227.3	Perform surface grinding operation and calculate its machining time
M19P227.4	Determine number of indexing movements required and acquire skills to produce a spur gear on a horizontal milling machine
M19P227.5	Prepare industry visit report
M19P227.6	Understand procedure of plastic processing

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Department of Mechanical Engineering, Course Name: Project Based Learning -II (M19P228), 2020-21	
M19P228.1	IDENTIFY the real-world problem (possibly of interdisciplinary nature) through a rigorous literature survey and formulate / set relevant aims and objectives.
M19P228.2	ANALYZE the results and arrive at valid conclusions.
M19P228.3	PROPOSE a suitable solution based on the fundamentals of mechanical engineering by possibly integration of previously acquired knowledge.
M19P228.4	CONTRIBUTE to society through proposed solutions by strictly following professional ethics and safety measures.
M19P228.5	USE of technology in proposed work and demonstrate learning in oral and written form.
M19P228.6	DEVELOP ability to work as an individual and as a team member.
Department of Mechanical Engineering, Course Name: Audit Course -IV (M19P229), A.Y 2020-21	
M19P229.1	Understand the stages of writing process and apply them to technical and workplace writing task.
M19P229.2	Produce set of documents related to technology.
M19P229.3	Know basic technical writing concept and terms.
Course Outcome For TE Year Sem-I Course 2015 Pattern	
Department of Mechanical Engineering, Course Name: Design of Machine Elements -I (M15P301), A.Y 2020-21	
M15P301.1	Design the cotter joints, knuckle joints, levers and component subjected to eccentric loading
M15P301.2	Design shafts,keys and couplings under static load conditions
M15P301.3	Analyze different stresses in power screws and apply those in the procedure to design screw jack
M15P301.4	Evaluate dimensions of machine components under fluctuating load condition
M15P301.5	Evaluate and interpret the stress developed in welded and threaded joints
M15P301.6	Apply the design and development procedure for different types of springs
Department of Mechanical Engineering, Course Name: Heat Transfer (M15P302), A.Y 2020-21	
M15P302.1	Analyze the various modes of heat transfer and implement the basic heat conduction equations for steady one dimensional thermal system.
M15P302.2	Apply general heat conduction equation to thermal systems with internal heat generation & evaluate heat transfer through extended surfaces
M15P302.3	Validate lumped system analysis for transient heat conduction and identify insulating materials
M15P302.4	Analyze the heat transfer rate in natural and forced convection and evaluate through experimental investigation
M15P302.5	Estimating heat transfer by radiation between objects with different geometries

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M15P302.6	Analyze the heat transfer equipments and est e their performance
Department of Mechanical Engineering, Course Name: Theory of Machines -II (M15P303), A.Y 2020-21	
M15P303.1	Understand fundamental of gear which will be the prerequisite for gear design.
M15P303.2	Perform force analysis of Spur, Helical , Bevel , worm & Worm Gear
M15P303.3	Analyze speed & torque in epi-cyclic gear train which will help in gear design
M15P303.4	Design cam profile with particular follower motion & understand cam jump phenomenon , advance cam curves
M15P303.5	Synthesize a four bar mechanism with analytical & graphical methods
M15P303.6	Analyze the gyroscopic couple or its effect for stabilization of ship, aeroplane , Four wheeler vehicle & they will also choose appropriate drive for given application.
Department of Mechanical Engineering, Course Name: Turbo Machines (M15P304), A.Y 2020-21	
M15P304.1	Know the basic principles, governing equations and applications of turbo Machines
M15P304.2	Understand construction and working principle of Turbo Machines.
M15P304.3	Design and evaluate different parameters for Turbo Machines.
M15P304.4	Analyse different Turbo Machines.
M15P304.5	Predict performance of different Turbo Machines applying model analysis.
M15P304.6	Evaluate the performance characteristics of Turbo Machines.
Department of Mechanical Engineering, Course Name: Turbo Machines (M15P304), A.Y 2020-21	
M15P304.1	Know the basic principles, governing equations and applications of turbo Machines
M15P304.2	Understand construction and working principle of Turbo Machines.
M15P304.3	Design and evaluate different parameters for Turbo Machines.
M15P304.4	Analyse different Turbo Machines.
M15P304.5	Predict performance of different Turbo Machines applying model analysis.
M15P304.6	Evaluate the performance characteristics of Turbo Machines.
Department of Mechanical Engineering, Course Name: Metrology & Quality Controls (M15P305), A.Y 2020-21	
M15P305.1	Select the appropriate measuring instruments (standards), design guages and calibrate measuring instruments.
M15P305.2	Understand the conventional methods of measurements and estimate the different parameters of gear and threads.

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M15P305.3	Understand the advanced methods of measurements such as CMM, Machine Vision System, Interferometer and Laser Metrology.
M15P305.4	Associate quality control tools (Techniques) for industrial applications.
M15P305.5	Apply the appropriate statistical tools to investigate and predect the quality of product/process.
M15P305.6	Describe the different techniques in total quality management systems.
Department of Mechanical Engineering, Course Name: Skill Development (M15P306), A.Y 2020-21	
M15P306.1	Assemble the different components such as tail stock, IC engine which are required for shop floor working
M15P306.2	Acquire the knowledge of tool and tackles used in machine assembly shop
M15P306.3	use the Therotical knowledge in practical work
Department of Mechanical Engineering, Course Name: NMAO (M15P307), A.Y 2020-21	
M15P307.1	Implement appropriate numerical methods and solver to evaluate roots of equation. Measure the numerical errors.
M15P307.2	Apply direct and approximate methods to solve linear algebric equations and formulation of algorithms and programs.
M15P307.3	Build solutions for real life problem using optimization techniques.
M15P307.4	Choose and validate appropriate methods to solve initial and boundary value problems in Ordinary Differential Equations and Partial Differential Equatons.
M15P307.5	Apply and validate various techniques for regression analysis and curve fitting.
M15P307.6	Analyze different numerical integration methods.
Course Outcome For TE Year Sem-II Course 2015 Pattern	
CO No	Statement
Department of Mechanical Engineering, Course Name: Design of Machine Elements -II (M15P308), A.Y 2020-21	
M15P308.1	Design Spur, Helical, Bevel and Worm gears and apply it for industrial applications
M15P308.2	Analyze Rolling contact bearing and its selection from manufacturer's Catalogue
M15P308.3	Select belt, rope and chain drive from manufacturer's Catalogue
M15P308.4	Analyze and select sliding contact bearing for industrial applications
Department of Mechanical Engineering, Course Name: Refrigeration & Air Conditioning (M15P309), A.Y 2020-21	
M15P309.1	Know the applications of refrigeration and air conditioning systems and present the properties, applications and environmental issues of different refrigerants.
M15P309.2	Obtain cooling capacity and coefficient of performance by conducting test on vapour compression refrigeration and vapour absorption refrigeration systems.

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M15P309.3	Analyze the refrigeration cycles and methods mproving performance of refrigeration systems.
M15P309.4	Understand basic air conditioning processes on psychrometric chart and calculate cooling oad for various comfort and industrial air conditioning applications.
M15P309.5	Choose different components of refrigeration and air conditioning systems as per their operating principles and the requirement.
M15P309.6	Select air distribution and air handling systems as per requirement.
Department of Mechanical Engineering, Course Name: Mechatronics (M15P310), A.Y 2020-21	
M15P310.1	Understand principle of sensors, its characteristics and applications in mechatronics system
M15P310.2	Identify key elements of mechatronics system and represention in terms of block diagram
M15P310.3	Sensors and Actuators interfacing with DAQ using appropriate microcontroller
M15P310.4	Develop PLC ladder programming for various control system application.
M15P310.5	System modelling & stability analysis in frequency domain for control system application
M15P310.6	Implementation of PID control on real time systems
Department of Mechanical Engineering, Course Name: Manufacturing Process -II (M15P311), A.Y 2020-21	
M15P311.1	Apply the knowledge of various manufacturing Processes
M15P311.2	Identify various process parameter and their effect on processes
M15P311.3	Figure out application of Modern Machining
M15P311.4	Aapply the knowledge of different advanced machining processes
M15P311.5	Get familiarize with control systems, Manual part programming (plain milling and turning), Subroutine, Canned cycle
M15P311.6	Get the knowledge of Jigs and Fixtures for variety of operations.
Department of Mechanical Engineering, Course Name: Machine Shop- II (M15P312), A.Y 2020-21	
M15P312.1	Understand and implement process planning sheet of job
M15P312.2	Draft jog and fixture drawing maually
M15P312.3	Excute various opertions on lathe machine to develop proposed mechanical component

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Department Mechanical Engineering, Course Name: Seminar (M15P313), A.Y 2020-21	
M15P313.1	Establish motivation for any topic of interest and develop a thought process for technical presentation
M15P313.2	Organize a detailed literature survey and build a document with respect to technical publications.
M15P313.3	Analysis and comprehension of proof-of-concept and related data.
M15P313.4	Effective presentation and improve soft skills.
M15P313.5	Make use of new and recent technology (e.g. Latex) for creating technical reports
Department of Mechanical Engineering, Course Name: Audit Course -II (M15P314), A.Y 2020-21	
M15P314.1	Appreciate the concept of Entrepreneurship
M15P314.2	Identify Entrepreneurship opportunity .
M15P314.3	Develop winning business plans.
Course Outcome For BE Year Sem-I Course 2015 Pattern	
Department of Mechanical Engineering, Course Name: Hydraulics & Pneumatics (M15P401), A.Y 2020-21	
CO No	Statement
M15P401.1	Understand working principle of components used in hydraulic & pneumatic systems
M15P401.2	Identify various applications of hydraulic & pneumatic systems
M15P401.3	Selection of appropriate components required for hydraulic and pneumatic systems
M15P401.4	Analyse hydraulic and pneumatic systems for industrial/mobile applications
M15P401.5	Design a system according to the requirements
M15P401.6	Develop and apply knowledge to various applications

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Department of Mec[illegible]cal Engineering, Course Name: CAD / CAM Automation (M15P[illegible]), A.Y 2020-21	
M15P402.1	Associate and apply homogeneous transformation matrices for geometrical transformations mapping of 2D CAD entities.
M15P402.2	Estimate analytical and synthetic curve profiles and associate various types of surfaces and solid modeling approaches for part modeling.
M15P402.3	Simulate the structural analysis of simple mechanical elements like bars, beams, trusses, etc. using Finite Element Analysis software like ANSYS and comment on their safety.
M15P402.4	Program CNC code for Turning / Milling operations and simulate tool path using CAM software.
M15P402.5	Differentiate various additive rapid manufacturing techniques for engineering applications.
M15P402.6	Differentiate roles and components of various industrial automation strategies.
Department of Mechanical Engineering, Course Name: Dynamics of Machinery (M15P403), A.Y 2020-21	
M15P403.1	Understand different methods to determine natural frequency for single DOF undamped & damped free vibratory systems.
M15P403.2	Analyze response of forced vibrations due to harmonic excitation, base excitation and excitation due to unbalanced forces.
M15P403.3	Evaluate natural frequencies, mode shapes for 2 DOF undamped free longitudinal and torsional vibratory systems.
M15P403.4	Apply balancing technique for static and dynamic balancing of multi cylinder inline and radial engines.
M15P403.5	Understand uses of vibration measuring instruments for industrial / real life applications along with suitable method for vibration control.
M15P403.6	Analyze noise measurement & noise reduction techniques for industry and day today life problems.
Department of Mechanical Engineering, Course Name: Elective -I Finite Element (M15P 404A), A.Y 2020-21	
M15P404A.1	Understand basic fundamentals of finite element model using different approaches.
M15P404A.2	Apply FEA technique to solve problems on bar, beams and truss for calculating displacement, stresses and reaction.
M15P404A.3	Evaluate stresses and displacements of 2D problems by using FEA.
M15P404A.4	Implement the concept of isoparametric Elements, Co-ordinate Mapping & Numerical Integration in FEA.
M15P404A.5	Formulate the Finite Element model and Implement it to solve one dimensional heat transfer problem.
M15P404A.6	Apply lumped and mass system methods and investigate dynamic behavior for bar, truss and beam element.

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Department of Mechanical E eering, Course Name: Elective -I Computational Fluid Dynamic 15P 404B), A.Y 2020-21	
M15P404B.1	Students should be able to model fluid / heat transfer problems and apply fundamental conservation principles
M15P404B.2	Students should be able to do discretize the governing equations by Finite Difference Method and Finite volume Method.
M15P404B.3	Students should be able to develop programming skills by in-house code development for conduction, convection and fluid dynamics problems.
M15P404B.4	Students should be able to solve basic convection and diffusion equations and understands the role in fluid flow and heat transfer.
M15P404B.5	To prepare the students for research leading to higher studies.
M15P404B.6	To prepare the students for career in CAE industry using software tools.
Department of Mechanical Engineering, Course Name: Elective -I Heating Ventilation & Air Conditioning (M15P 404C), A.Y 2020-21	
M15P404C.1	Evaluate the performance parameters of trans-critical & ejector refrigeration systems
M15P404C.2	Estimate thermal performance of compressor, evaporator, condenser and cooling tower.
M15P404C.3	Analyze refrigerant piping design, capacity & safety controls and balancing of vapour compressor system.
M15P404C.4	Estimate heat transmission through building walls using CLTD and decrement factor &time lag methods with energy-efficient and cost-effective measures for building envelope.
M15P404C.5	Recognise working of types of desiccant, evaporative, thermal storage, radiant cooling, clean room and heat pump air-conditioning systems.
M15P404C.6	Evaluate working of types of desiccant, evaporative, thermal storage, radiant cooling, clean room and heat pump air-conditioning systems.
Department of Mechanical Engineering, Course Name: Elective -II Automobile Engineering (M15P 405A), A.Y 2020-21	
M15P405A.1	Understanding the automobile vehicle and it's layout. Demonstrate Automobile Transmission system like clutch, gear box, etc
M15P405A.2	Demonstrate Automobile control system like Axle, steering, suspension, wheels and tyres with it's construction and working.
M15P405A.3	Demonstrate system like Suspension and Brakes with its Contruction and working principle
M15P405A.4	Demonstrate of vehicle performance and safety of vehicle based on various road conditions
M15P405A.5	Demonstrate electrical system like lighting, starting charging with its Contruction and working principle. also demonstrate Automobile maintenance
M15P405A.6	Demonstrate the Automobile system like Electrical and hybrid vehicles with their construction and working. Environment importance to use this vehicles and future scope.

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Department of Mechanical Engineering, Course Name: Elective -II Operational Research (M15P 405B), A.Y 2020-21	
M15P405B.1	Apply the knowledge of LPP and decision theory to solve the problems related to top level management.
M15P405B.2	Optimize the available resources with the help of transportation and assignment models
M15P405B.3	Select the optimal strategies in conflicting situations and solve simple problems of replacement.
M15P405B.4	Solve, analyze and optimize the simple problems of CPM and PERT by using project management techniques.
M15P405B.5	Improve the decision making and also critical thinking related to sequencing as well as queuing models.
M15P405B.6	Optimize multi stage decision making environments.
Department of Mechanical Engineering, Course Name: Elective -II Energy Audit & Management (M15P 405A), A.Y 2020-21	
M15P405C.1	Identify the demand supply gap of energy in Indian scenario
M15P405C.2	Carry out energy audit of an industry/Organization.
M15P405C.3	Draw the energy flow diagram of an industry and identify the energy wasted or a waste stream.
M15P405C.4	Select appropriate energy conservation method to reduce the wastage of energy.
M15P405C.5	Evaluate the techno economic feasibility of the energy conservation technique adopted.
M15P405C.6	Select appropriate cogeneration technique suitable for organization
Department of Mechanical Engineering, Course Name: Project -I (M15P 406), A.Y 2020-21	
M15P406.1	Students will be able to find out the gap between existing mechanical systems and develop new creative new mechanical system.
M15P406.2	Students will be able to learn about the literature review.
M15P406.3	Students will be able to get the experience to handle various tools, tackles and machines.
Course Outcome For BE Year Sem-II Course 2015 Pattern	
Department of Mechanical Engineering, Course Name: Energy Engineering /Power Plant Engineering (M15P 407), A.Y 2020-21	
M15P407.1	Describe present Energy generation scenario and Analyze the improved Rankine cycle with reheat and regenration, Cogeneration cycle .
M15P407.2	Analyze the steam condensers, recognize the an environmental impacts of thermal power plant and method to control the same
M15P407.3	Interpret the hydrograph and Analyze the flow duration curve
M15P407.4	Analyze Diesel Engine power plant & Gas turbine power cycle.
M15P407.5	Explain the fundamentals of non-conventional power plants

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M15P407.6	Select power generation Equipment & deter[illegible] depreciation cost.
Department of Mechanical Engineering, Course Name: Mechanical System Design (M15P 408), A.Y 2020-21	
M15P408.1	Design and model machine tool gear boxes for stated specifications
M15P408.2	Apply the statistical considerations in design to analyze the defects and failure modes in industrial products.
M15P408.3	Design Belt Conveyor System for Material Handling applications
M15P408.4	Design and model cylinders and pressure vessels for engineering applications
M15P408.5	Design I.C. engine components for stated specifications
M15P408.6	Apply appropriate optimum design principles to mechanical components.
Department of Mechanical Engineering, Course Name: Elective -III Tribology (M15P 409A), A.Y 2020-21	
M15P409A.1	Know the significance of role of tribology in Industry.
M15P409A.2	know the the basic concepts of friction and wear mechanism and their measurement along with lubrication methods.
M15P409A.3	Analyze the performance Hydrodynamic Bearings analytically.
M15P409A.4	Analyze the performance Hydrostatic Bearings analytically.
M15P409A.5	Know the mechanism of Elastohydrodynamic bearing and get the knowledge of advanced lubrication methods.
M15P409A.6	Apply the principles surface engineering in different applications of tribology.
Department of Mechanical Engineering, Course Name: Elective -III Industrial Engineering (M15P 409B), A.Y 2020-21	
M15P409B.1	Apply the Industrial Engineering concept in the industrial environment.
M15P409B.2	Manage and implement different concepts involved in methods study and understanding of work content in different situations
M15P409B.3	Undertake small case study based project works regarding work measurement and time study.
M15P409B.4	Planning and controlling of production system and use of modern forecasting and mangement techniques for different types of industries Apply inventory models and techniques to create and recommend appropriate stocking solutions in various business settings.
M15P409B.5	Develop capability in integrating knowledge of design along with other aspects of value addition in the conceptualization and manufacturing stage of various products.
M15P409B.6	Identify various cost accounting and financial management practices widely applied in industries.
Department of Mechanical Engineering, Course Name: Elective -III Robotics (M15P 409C), A.Y 2020-21	
M15P409C.1	Identify different type of robot configuration and design gripper
M15P409C.2	select necessary Sensors, Drives and Control systems for Robot

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M15P409C.3	Calculate forward and inverse kinematics and velocity in robotic systems by representing DH parameters
M15P409C.4	Plan trajectory for desired motion using trajectory planning tools for robot
M15P409C.5	Understand machine vision and select appropriate robot programming for given application
M15P409C.6	Understand Artificial intelligence, IoT, machine learning, and select simulation for robot configuration
Department of Mechanical Engineering, Course Name: Elective -IV Advance Manufacturing Processes (M15P 410A), A.Y 2020-21	
M15P410A.1	Classify and analyze special forming processes
M15P410A.2	Analyze and identify applicability of advanced joining processes
M15P410A.3	Understand and analyze the basic mechanisms of hybrid non-conventional machining techniques
M15P410A.4	Select appropriate micro and nano fabrication techniques for engineering applications.
M15P410A.5	apply various additive manufacturing technology for product development in industrial applications
M15P410A.6	Compare various material characterization techniques used to analyze effects of chemical composition, crystal structure, topography etc. of specimens.
Department of Mechanical Engineering, Course Name: Elective -IV Product Design & Development (M15P 410A), A.Y 2020-21	
M15P410B.1	On completion of the course, Students will be able to understand essential factors for product design.
M15P410B.2	On completion of the course, Students will be able to design product as per customer needs and satisfaction
M15P410B.3	On completion of the course, Students will be able to understand Processes and concepts during product development On completion of the course,
M15P410B.4	On completion of the course, Students will be able to understand methods and processes of Forward and Reverse engineering
M15P410B.5	On completion of the course, students will be able to carry various design processes as DFA, DFMEA, design for safety
M15P410B.6	On completion of the course, students will be able to understand the product life cycle and product data management
Department of Mechanical Engineering, Course Name: Project -II (M15P 411), A.Y 2020-21	
M15P411.1	Design and develope manufacturing set up /simulate various mechanical systems using various manufacturing processes / softwares
M15P411.2	Evaluate the solution to a problem defined on the basis of research gap
M15P411.3	Formulate a dissertation report

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Department of Engineering Sciences

Criteria 2.6.1

List of CO of All Course for A.Y.: 2020-21

SUBJECT	ENGINEERING MATHEMATICS I
SUBJECT CODE	107001
CODE	Co with Statements
107001.1	Mean value theorems and its generalizations leading to taylors and maclaurians series useful in the analysis of engineering problems.
107001.2	The fourier series representation and harmonic analysis for design and analysis of periodic continuous and discrete systems.
107001.3	To deal with derivative of functions of several variables that are essential in various branches of engineering.
107001.4	To apply the concept of jacobian to find partial derivative of implicit function and functional dependence. use of partial derivatives in estimating errors and approximations and finding extreme values of function.
107001.5	The essential tool of matrices and ;linear algebra ina a comprehensive manner for analysis of system of linear equations.
107001.6	Finding linear and orthogonal transformations eigen values and eigen vectors applicable to engineering problems.
SUBJECT	ENGINEERING PHYSICS
SUBJECT CODE	107002
CODE	Co with Statements
107002.1	Develop understanding of interference, diffraction and polarization; connect it to few engineering applications.
107002.2	Learn basics of lasers and optical fibers and their use in some applications.
107002.3	Understand concepts and principles in quantum mechanics. Relate them to some applications.
107002.4	Understand theory of semiconductors and their applications in some semiconductor devices.
107002.5	Summarize basics of magnetism and superconductivity. Explore few of their technological applications.
107002.6	Comprehend use of concepts of physics for Non Destructive Testing. Learn some properties of nanomaterials and their application.

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SUBJECT	SYSTEMS OF MECHANICAL ENGINEERING
SUBJECT CODE	102003
CODE	Co with Statements
102003.1	Describe and compare the conversion of energy from renewable and non-renewable energy sources
102003.2	Explain basic laws of thermodynamics, heat transfer and their applications.
102003.3	List down the types of road vehicles and their specifications
102003.4	Illustrate various basic parts and transmission system of a road vehicle
102003.5	Discuss several manufacturing processes and identify the suitable process
102003.6	Explain various types of mechanism and its application
SUBJECT	BASICS ELECTRICAL ENGINEERING
SUBJECT CODE	103004
CODE	Co with Statements
103004.1	Differentiate between electrical and magnetic circuits and derive mathematical relation for self and mutual inductance along with coupling effect.
103004.2	Calculate series, parallel and composite capacitor as well as characteristics parameters of alternating quantity and phasor arithmetic
103004.3	Derive expression for impedance, current, power in series and parallel RLC circuit with AC supply along with phasor diagram.
103004.4	Relate phase and line electrical quantities in polyphase networks, demonstrate the operation of single phase transformer and calculate efficiency and regulation at different loading conditions
103004.5	Apply and analyze the resistive circuits using star-delta conversion KVL, KCL and different network theorems under DC supply.
103004.6	Evaluate work, power, and energy relations and suggest various batteries for different applications, concept of charging and discharging and depth of charge.

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SUBJECT	PROGRAMMING AND PROBLEM SOLVING
SUBJECT CODE	110005
CODE	Co with Statements
110005.1	Inculcate and apply various skills in problem solving and learn program design tools
110005.2	Choose most appropriate programming constructs and features to solve the problems in diversified domains using python
110005.3	Exhibit the Modular programming skills for the problems which require the logical constructs of python language.
110005.4	Know library functions and develop programs dealing with Strings
110005.5	Learn Object oriented Programming concepts and implement the same developing python programs
110005.6	Study data storage and demonstrate the same using File handling using python programs
SUBJECT	WORKSHOP
SUBJECT CODE	111006
CODE	Co with Statements
111006.1	Familiar with safety norms to prevent any mishap in workshop.
111006.2	Able to handle appropriate hand tool, cutting tool and machine tools to manufacture a job.
111006.3	Able to understand the construction, working and functions of machine tools and their parts.
111006.4	Able to know simple operations (Turning and Facing) on a centre lathe.
SUBJECT	ENVIRONMENTAL SCIENCE I (AUDIT COURCE I)
SUBJECT CODE	101007
CODE	Co with Statements
101007.1	To explain the concepts and strategies related to sustainable development and various components of environment.
101007.2	To examine biotic and abiotic factors within an ecosystem, to identify food chains, webs, as well as energy flow and relationships.
101007.3	To identify and analyze various conservation methods and their effectiveness in relation to renewable and nonrenewable natural resources.
101007.4	To gain an understanding of the value of biodiversity and current efforts to conserve biodiversity on national and local scale.

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SUBJECT	ENGINEERING MATHEMATICS II
SUBJECT CODE	107008
CODE	Co with Statements
107008.1	The effective mathematical tools for solutions of first order differential equations that model physical processes such as Newton's law of cooling, electrical circuit, rectilinear motion, mass spring systems, heat transfer etc.
107008.2	The effective mathematical tools for solutions of first order differential equations that model physical processes such as Newton's law of cooling, electrical circuit, rectilinear motion, mass spring systems, heat transfer etc.
107008.3	Advanced integration techniques such as Reduction formulae, Beta functions, Gamma functions, Differentiation under integral sign and Error functions needed in evaluating multiple integrals and their applications.
107008.4	Trace the curve for a given equation and measure arc length of various curves.
107008.5	The concepts of solid geometry using equations of sphere, cone and cylinder in a comprehensive manner.
107008.6	Evaluation of multiple integrals and its application to find area bounded by curves, volume bounded by surfaces, Centre of gravity and Moment of inertia.
SUBJECT	ENGINEERING CHEMISTRY
SUBJECT CODE	107009
CODE	Co with Statements
107009.1	Apply the different methodologies for analysis of water and techniques involved in softening of water as commodity.
107009.2	Select appropriate electro-technique and method of material analysis.
107009.3	Demonstrate the knowledge of advanced engineering materials for various engineering applications
107009.4	Analyze fuel and suggest use of alternative fuels.
107009.5	Identify chemical compounds based on their structure.
107009.6	Explain causes of corrosion and methods for minimizing corrosion.

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SUBJECT	BASIC ELECTRONICS ENGINEERING
SUBJECT CODE	104010
CODE	Co with Statements
104010.1	Differentiate between electrical and magnetic circuits and derive mathematical relation for self and mutual inductance along with coupling effect.
104010.2	Calculate series, parallel and composite capacitor as well as characteristics parameters of alternating quantity and phasor arithmetic
104010.3	Derive expression for impedance, current, power in series and parallel RLC circuit with AC supply along with phasor diagram.
104010.4	Relate phase and line electrical quantities in polyphase networks, demonstrate the operation of single phase transformer and calculate efficiency and regulation at different loading conditions
104010.5	Apply and analyze the resistive circuits using star-delta conversion KVL, KCL and different network theorems under DC supply.
104010.6	Evaluate work, power, and energy relations and suggest various batteries for different applications, concept of charging and discharging and depth of charge.
SUBJECT	ENGINEERING MECHANICS
SUBJECT CODE	101011
CODE	Co with Statements
101011.1	Determine resultant of various force systems.
101011.2	Determine centroid, moment of inertia and solve problems related to friction.
101011.3	Determine reactions of beams, calculate forces in cables using principles of equilibrium.
101011.4	Solve trusses, frames for finding member forces and apply principles of equilibrium to forces in space.
101011.5	Calculate position, velocity and acceleration of particle using principles of kinematics.
101011.6	Calculate position, velocity and acceleration of particle using principles of kinetics and Work, Power, Energy.

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SUBJECT	ENGINEERING GRAPHICS
SUBJECT CODE	102012
CODE	Co with Statements
102012.1	Draw the fundamental engineering objects using basic rules and able to construct the simple geometries.
102012.2	Construct the various engineering curves using the drawing instrument
102012.3	Apply the concept of orthographic projection of an object to draw several 2D views and its sectional views for visualizing the physical state of the object.
102012.4	Apply the visualization skill to draw a simple isometric projection from given orthographic views precisely using drawing equipment.
102012.5	Draw the development of lateral surfaces for cut section of geometrical solids.
102012.6	Draw fully-dimensioned 2D,3D drawings using computer aided drafting tools.
SUBJECT	PROJECT BASED LEARNING
SUBJECT CODE	110013
CODE	Co with Statements
110013.1	Project based learning will increase their capacity and learning through shared cognition
110013.2	Students able to draw on lessons from several disciplines and apply them in practical way
110013.3	Learning by doing approach in PBL will promote long-term retention of material and replicable skill, as well as improve teachers' and students' attitudes towards
SUBJECT	ENVIRONMENTAL SCIENCE II (AUDIT COURCE 2)
SUBJECT CODE	101014
CODE	Co with Statements
101014.1	To provide a comprehensive overview of environmental pollution and the science and technology associated with the monitoring and control
101014.2	To understand the evolution of environmental policies and laws.
101014.3	To explain the concepts behind the interrelations between environment and the development.
101014.4	To examine a range of environmental issues in the field, and relate these to scientific theory.
SUBJECT	PHYSICAL EDUCATION
SUBJECT CODE	107015
CODE	Co with Statements
107015.1	Concept of Physical Education, its Definition and Scope
107015.2	Fitness Assessment
SUBJECT	CIVICS
SUBJECT CODE	Co with Statements
	Meaning of democracy and the role of the governance
	Understand the study of democracy and governance

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Department of Computer Engineering

Academic Year 2019-20

Program Outcomes

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
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,
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
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 Skills	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,
PO11	Project Management and Finance	Demonstrate knowledge and understanding of 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
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.

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Program Specific Outcomes (PSO)

A graduate of the Computer Engineering Program will demonstrate

PSO1	Professional Skills-The ability to understand, analyse and develop computer programs in the areas related to algorithms, system software, multimedia, web design, big data analytics, and networking for efficient design of computer-based systems of varying.
PSO2	Problem-Solving Skills- The ability to apply standard practices and strategies in software project development using open-ended programming environments to deliver a quality product for business success.
PSO3	Successful Career and Entrepreneurship- The ability to employ modern computer languages, Benvironments, and platforms in creating innovative career paths to be an entrepreneur, and a zest for higher studies.

Program Educational Objectives

PEO1	To prepare globally competent graduates having strong fundamentals and domain knowledge to provide effective solutions for engineering problems.
PEO2	To prepare the graduates to work as a committed professionals with strong professional ethics and values, sense of responsibilities, understanding of legal, safety, health, societal, cultural and environmental issues.
PEO3	To prepare committed and motivated graduates with research attitude, lifelong learning, investigative approach, and multidisciplinary thinking.
PEO4	To prepare the graduates with strong managerial and communication skills to work effectively as individual as well as in teams.

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Department of Computer Engineering

Course outcomes for all courses

2015 Pattern

Course Outcome For SE Year Sem-I Course

Department : Computer Engg. Course Name : Discreate Mathematics (C15P201)(210241), ACA.Year: 2019-20	
CO No.	Statement
C15P201.1	Design and analyze real world engineering problems by applying set theory, propositional logic and mathematical induction
C15P201.2	Develop skill in expressing mathematical properties of relation and function
C15P201.3	Identify number of logical possibilities of events to design professional engineering Solutions
C15P201.4	Model and solve computing problem using graph theory
C15P201.5	Evaluate tree structure to find out optimal solution to complex real world problems
C15P201.6	Analyze the properties of binary operations and evaluate the algebraic structure

Department : Computer Engg. Course Name : Digital Electronics and Logic Design (C15P202)(210242), ACA.Year: 2019-20	
CO No.	Statement
C15P202.1	Design and implement Combinational digital circuits using Algebraic simplifications methods.
C15P202.2	Design and Implement Sequential digital circuits as per the specifications.
C15P202.3	Construct ASM Chart and demonstrate the digital systems using VHDL
C15P202.4	Describe different types of Programmable logic devices(PLD's).
C15P202.5	Understand the working of logic families & Apply the knowledge to select the logic families IC packages as per the design specifications.
C15P202.6	Differentiate between Microprocessor and Microcontroller 8051 to develop a minimum embedded system for simple real world application.

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Department : Computer Engg. Course Name : Data Structures and Algorithms (C15P203)(210243), ACA.Year: 2019-20	
CO No.	Statement
C15P203.1	Describe and study data structure classification, programming constructs and algorithmic analysis.
C15P203.2	Demonstrate the use of array as a linear data structure, it's operations and applications.
C15P203.3	Discuss dynamic memory allocation using Linked List and performing operations along with its applications.
C15P203.4	Understand ,Implement and Apply operations performed on stack using array and linked representation.
C15P203.5	Analyze problems to use variants of queue and solve various queuing problems.
C15P203.6	Recognize the differences between various searching and sorting algorithms and discover efficient algorithms by analyzing computational efficiency of given searching/sorting algorithms.

Department : Computer Engg. Course Name : Computer Organization and Architecture (C15P204)(210244), ACA.Year: 2019-20	
CO No.	Statement
C15P204.1	Understand the structure, function and characteristics of Computer Systems.
C15P204.2	Acknowledge the design of various functional units and components of digital computers.
C15P204.3	Analyze the principles and functions of core architecture , Memory Access techniques and I/O system.
C15P204.4	Ascertain the foundation of instruction sets and illuminate their impact on processor design.
C15P204.5	Identify and compare the various I/O interfacing techniques.
C15P204.6	Understand basic concepts and perform arithmetic and logical operations.

Department : Computer Engg. Course Name : Object Oriented Programming (C15P205)(210245), ACA.Year: 2019-20	
CO No.	Statement
C15P205.1	Analyse the strengths of classes and objects using object oriented programming
C15P205.2	Design and apply the concepts of inheritance and polymorphism OOP principles for effective programming
C15P205.3	Develop programming application using object oriented programming language C++ by virtual functions

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C15P205.4	Analyse the Templates and Exception Handling used in OOP principles
C15P205.5	Design and apply the concepts of Files and Streams
C15P205.6	Design and apply the concepts of Standard Template Library (STL)

Department : Computer Engg. Course Name : Digital Electronics Lab (C15P206)(210246), ACA.Year: 2019-20	
CO No.	Statement
C15P206.1	Simplify Boolean Expressions using K Map.
C15P206.2	Design and implement combinational circuits.
C15P206.3	Design and implement sequential circuits.
C15P206.4	Develop simple real-world application using ASM and PLD.
C15P206.5	Choose appropriate logic families IC packages as per the given design specifications.
C15P206.6	Explain organization and architecture of computer system

Department : Computer Engg. Course Name : Data Structures Lab (C15P207) (210247), ACA.Year: 2019-20	
CO No.	Statement
C15P207.1	To demonstrate a detailed understanding of behaviour of data structures like array, linked list, stack, and queue by developing programs.
C15P207.2	To use appropriate algorithmic strategy for better efficiency
C15P207.3	To summarize data searching and sorting techniques.
C15P207.4	To discriminate the usage of various structures in approaching the problem solution.
C15P207.5	To analyze and use effective and efficient data structures in solving various Computer Engineering domain problems.
C15P207.6	To design the algorithms to solve the programming problems.

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Department : Computer Engg. Course Name : Object Oriented Programming Lab (C15P208) (210248), ACA.Year: 2019-20	
CO No.	Statement
C15P208.1	Analyze the strengths of object oriented programming.
C15P208.2	Design and apply OOP principles for effective programming.
C15P208.3	Develop programming application using object oriented programming language C++.
C15P208.4	Percept the utility and applicability of OOP.
C15P208.5	To use the object-oriented paradigm in program design.
C15P208.6	To understand object-oriented concepts such as data abstraction, encapsulation, inheritance, dynamic binding, and polymorphism.

Department : Computer Engg. Course Name : Soft Skills (C15P209) (210249), ACA.Year: 2019-20	
CO No.	Statement
C19P209.1	Express effectively through verbal/oral communication and improve listening skill
C19P209.2	Write precise briefs or reports technical documents
C19P209.3	Prepare for group discussion / meeting / interview and presentations
C19P209.4	Explore goal / target setting self-motivation and practicing creative thinking
C19P209.5	Operate effective in multidisciplinary and heterogeneous teams through the knowledge of team work , Inter-personal relationships, conflict management and leadership qualities.

Department : Computer Engg. Course Name : Audit Course 1 Smart Cities IV (C15P210) (210250), ACA.Year: 2019-20	
CO No.	Statement
C15P210.1	Better understanding of the dynamic behavior of the urban system by going beyond the physical appearance and by focusing on representations, properties and impact factors
C15P210.2	Exploration of the city as the most complex human-made organism with a metabolism that can be modeled in terms of stocks and flows
C15P210.3	Knowledge about data-informed approaches for the development of the future city, based on crowd sourcing and sensing
C15P210.4	Knowledge about the latest research results in for the development and management of future cities
C15P210.5	Understanding how citizens can benefit from data-informed design to develop smart and responsive cities.

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Course Outcome For SE Year Sem-II Course

Department : Computer Engg. Course Name : Engineering Mathematics III (C15P211) (207003), ACA.Year: 2019-20	
CO No.	Statement
C15P211.1	Linear differential equations of higher order applicable to Control systems, Computer vision and Robotics.
C15P211.2	Transform techniques such as Fourier transform, Z-transform and applications to Image processing.
C15P211.3	Statistical methods such as correlation, regression analysis and probability theory to analyze data and to make predictions applicable to machine intelligence
C15P211.4	Vector calculus necessary to analyse and design complex electrical and electronic devices as appropriate to Computer engineering
C15P211.5	Complex functions, conformal mappings and contour integration applicable to Image processing, Digital filters and Computer graphics.

Department : Computer Engg. Course Name : Computer Graphics (C15P212) (210251), ACA.Year: 2019-20	
CO No.	Statement
C15P212.1	Apply mathematics and logic to develop Computer programs for elementary graphic operations
C15P212.2	Develop scientific and strategic approach to solve complex problems in the domain of Computer Graphics
C15P212.3	Develop the competency to understand the concepts related to Computer Vision and Virtual reality
C15P212.4	Apply the logic to develop animation and gaming programs

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Department : Computer Engg. Course Name : Advanced Data Structures (C15P213) (210252), ACA.Year: 2019-20	
CO No.	Statement
C15P213.1	Identify the complexity goals of a good hashing technique and evaluation of the hashing technique with respect to a real world problem.
C15P213.2	Design and specify nonlinear data structure and implementation of binary tree along with its operations.
C15P213.3	Discuss graph ADT. Explore,analyse and apply various graph algcrithms.
C15P213.4	Describe the algorithmic solutions for resource requirements and optimization using search trees.
C15P213.5	State and explain indexing methods and multiway search techniques.
C15P213.6	Describe the importance of secondary storage and indicate the real world usage. Demonstrate file organization techniques and illustrate the time and space complexities.

Department : Computer Engg. Course Name : Microprocessor (C15P214) (210253), ACA.Year: 2019-20	
CO No.	Statement
C15P214.1	Comprehend/ acquire the knowledge of the programmer's model of advanced processors and its memory organization
C15P214.2	Understand the functionality and concept of memory management and apply instruction set to develop assembly language programs
C15P214.3	Relate the system level features to implement multitasking and protection in 386 processor
C15P214.4	Identity and handle Exceptions and Interrupts for better resource utilization
C15P214.5	Apply and Identify debugging and testing techniques confined to 80386 DX.
C15P214.6	Construct different mathematical operations such as trigonometric,floating point and statistical using Co-processor.

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Department : Computer Engg. Course Name : Principles of Programming Languages (C15P215) (210254), ACA.Year: 2019-20	
CO No.	Statement
C15P215.1	Analyze the strengths and weaknesses of programming languages for effective and efficient program development.
C15P215.2	Inculcate the principles underlying the programming languages enabling to learn new programming languages
C15P215.3	Understand different programming paradigms
C15P215.4	Know the programming paradigms effectively in application development
C15P215.5	Utilize the concept of inheritance, packages and interface in java
C15P215.6	Apply the exception handling in script programming for web development

Department : Computer Engg. Course Name :Computer Graphics Lab (C15P216) (210255), ACA.Year: 2019-20	
CO No.	Statement
C15P216.1	Define basic terminologies of Computer Graphics, interpret the mathematical foundation of the concepts of computer graphics and apply mathematics to develop Computer programs for elementary graphic operations.
C15P216.2	Define the concept of windowing and clipping and apply various algorithms to fill and clip polygons.
C15P216.3	Implement the core concepts of computer graphics, including transformation in two and three dimensions, viewing and projection.
C15P216.4	Explain the concepts of color models, lighting, shading models and hidden surface elimination.
C15P216.5	Describe the fundamentals of curves, fractals, animation and gaming.
C15P216.6	To design the algorithms to solve the programming problems.

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Department : Computer Engg. Course Name : Advanced Data Structures Lab (C15P217) (210256), ACA.Year: 2019-20	
CO No.	Statement
C15P217.1	To apply appropriate advanced data structure and efficient algorithms to approach the problems of various domain.
C15P217.2	To design the algorithms to solve the programming problems.
C15P217.3	To use effective and efficient data structures in solving various Computer Engineering domain problems.
C15P217.4	To analyze the algorithmic solutions for resource requirements and optimization.
C15P217.5	To use appropriate modern tools to understand and analyze the functionalities confined to the data structure usage.
C15P217.6	To understand various algorithmic strategies to approach the problem solution.

Department : Computer Engg. Course Name : Microprocessor Laboratory (C15P218) (210257), ACA.Year: 2019-20	
CO No.	Statement
C15P218.1	To apply the assembly language programming to develop small real life embedded application.
C15P218.2	To understand the architecture of the advanced processor thoroughly to use the resources for programming.
C15P218.3	To understand the higher processor architectures descended from 80386 architecture.
C15P218.4	To understand the system level features and processes of advanced processor.
C15P218.5	To acquaint the learner with application instruction set and logic to build assembly language programs.
C15P218.6	To learn the architecture and programmer's model of advanced processor.

Department : Computer Engg. Course Name :Audit Course 2 Stress Relief: Yoga and Meditation VI (C15P219) (210258), ACA.Year: 2019-20	
CO No.	Statement
C15P219.1	Students understanding of philosophy and religion as well as daily life issues will be challenged and enhanced.
C15P219.2	Enhances the immune system.
C15P219.3	Intellectual and philosophical understanding of the theory of yoga and basic related Hindu scriptures will be developed.
C15P219.4	Powers of concentration, focus, and awareness will be heightened.

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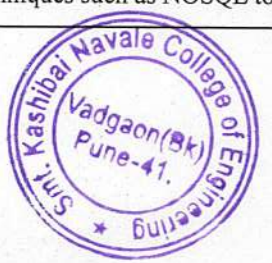
Course Outcome For TE Year Sem-I Course	
Department : Computer Engg. Course Name : Theory of Computation (C15P301) (310241), ACA.Year: 2019-20	
CO No.	Statement
C15P301.1	Understand formal language, translation logic, essentials of translation, alphabets, language representation and apply it to design Finite Automata and its variants.
C15P301.2	Understand basic building blocks of regular expression and apply them to construct regular expression. Understand the pumping Lemma and its use in theoretica computer science.
C15P301.3	Define and identify the properties of context free grammars. Illustrate different forms of grammar and its use in parsing. Learn to simplify the grammar.
C15P301.4	Demonstrate the push down automaton model for the context free language by designing and studying its different applications
C15P301.5	Understand the representation and Language Acceptability by Turing Machine. Design Turing machine for the different requirements outlined by theoretical computer science
C15P301.6	Acquire awareness about different classes of Problems, classify them and analyse them and study concepts of NP completeness.

Department : Computer Engg. Course Name : Database Management Systems (C15P302) (310242), ACA.Year: 2019-20	
CO No.	Statement
C15P302.1	Understand the fundamental concepts of database management as well as Analyse and Design Database model using E-R Diagram.
C15P302.2	Study and implement SQL and Pl/SQL CURD operations on large volume of structured database
C15P302.3	Design a good relational database using techniques like Normalization, CODDs Rules to eliminate or reduce redundancy
C15P302.4	Identify the issues of transaction processing and concurrency control in relational database System.
C15P302.5	Study of different Database Architectures and its real time applications.
C15P302.6	Learn powerful, flexible, scalable and modern database programming techniques such as NOSQL to handle big data.



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Department : Computer Engg. Course Name : Software Engineering & Project Management (C15P303) (310243), ACA.Year: 2019-20	
CO No.	Statement
C15P303.1	Understand the fundamentals of software engineering and decide on process models and tools.
C15P303.2	Apply methods of capturing, specifying, visualizing and analyzing software requirements
C15P303.3	Analyze ways of design concept at architectural, component &interface level.
C15P303.4	Discuss various estimation and scheduling techniques and apply them.
C15P303.5	Know project risk management, software configuration management, maintenance and reengineering.
C15P303.6	Analyse testing types and tools and create test cases.

Department : Computer Engg. Course Name : Information System & Engineering Economics (C15P304) (310244), ACA.Year: 2019-20	
CO No.	Statement
C15P304.1	Understand the importance of various forms of an Information Systems and its application to an organization
C15P304.2	Learn the role of vendor management and understand ethical, social and privacy issues in IT governance.
C15P304.3	Study Information System Development and Project Management.
C15P304.4	Understand engineering economic analysis in decision making for earning and evaluating.
C15P304.5	Analyse the effects of inflation , economic equivalence of the project and calculate the present worth of a project
C15P304.6	Adapt perfect decisions for investment in business projects to reduce the tax.

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Department : Computer Engg. Course Name : Computer Networks (C15P305) (310245), ACA.Year: 2019-20	
CO No.	Statement
C15P305.1	Explain the basic concepts used in networking and layered architecture of computer network and intersect the components of network to flow.
C15P305.2	Illustrate different link layer terminologies like error detection-correction and flow control used in network.
C15P305.3	Analyse and select appropriate channel allocation methodologies and different Multiple access protocol used in network
C15P305.4	Demonstrate the subnet formation with IP allocation mechanism and apply various routing algorithms to find shortest paths for network-layer packet delivery.
C15P305.5	Describe and Implement the services provided by TCP and UDP protocols used for reliable data transfer maintaining flow control and congestion control.
C15P305.6	Comprehend basic protocols of application layer with selection and usage for various sectors of user community.

Department : Computer Engg. Course Name : Skill Development Lab (C15P306) (310246), ACA.Year: 2019-20	
CO No.	Statement
C15P306.1	To adapt the usage of modern tools and recent software.
C15P306.2	To evaluate problems and analyze data using current technologies
C15P306.3	To learn the process of creation of data-driven web applications using current technologies
C15P306.4	To understand how to incorporate best practices for building enterprise applications
C15P306.5	To learn how to employ Integrated Development Environment(IDE) for implementing and testing of software solution
C15P306.6	To construct software solutions by evaluating alternate architectural patterns.

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Department : Computer Engg. Course Name : Database Management System Lab (C15P307) (310247), ACA.Year: 2019-20	
CO No.	Statement
C15P307.1	To develop basic, intermediate and advanced Database programming skills
C15P307.2	To develop basic Database administration skills
C15P307.3	To percept transaction processing
C15P307.4	To Develop the ability to handle databases of varying complexities
C15P307.5	Implement advanced database Programming concepts

Department : Computer Engg. Course Name : Computer Networks Lab (C15P308) (310248), ACA.Year: 2019-20	
CO No.	Statement
C15P308.1	To establish communication among the computing nodes in P2P and Client-Server architecture
C15P308.2	Configure the computing nodes with understanding of protocols and technologies
C15P308.3	Use different communicating modes and standards for communication
C15P308.4	Use modern tools for network traffic analysis
C15P308.5	To learn network programming.

Department : Computer Engg. Course Name : Audit Course 3 I Cyber Security (C15P309) (310249), ACA.Year: 2019-20	
CO No.	Statement
C15P309.1	Compare the interrelationships among security roles and responsibilities in a modern information-driven enterprise—to include interrelationships across security do mains (IT, physical, classification, personnel, and so on)
C15P309.2	Assess the role of strategy and policy in determining the success of information security
C15P309.3	Estimate the possible consequences of misaligning enterprise strategy, security policy, and security plans

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Course Outcome For TE Year Sem-II Course

Department : Computer Engg. Course Name : Design and Analysis of Algorithms (C15P310) (310250), ACA.Year: 2019-20	
CO No.	Statement
C15P310.1	Understand the performance parameter for recursive and non-recursive algorithms and use it in the design of algorithms for engineering problems
C15P310.2	Develop the skill to find the suitable algorithmic model for problems from functional and imperative models.
C15P310.3	Discuss different algorithmic strategies and apply them to solve various problems and analyse them
C15P310.4	Explain complexity theory along with different classes of problems and formulate solutions to problems.
C15P310.5	Summarize amortised analysis and apply on various types of algorithms. Synthesise algorithms to common engineering situations
C15P310.6	Analyse the properties of multithreaded, distributed algorithms and the string matching algorithm.

Department : Computer Engg. Course Name : Systems Programming and Operating System(C15P311) (310251), ACA.Year: 2019-20	
CO No.	Statement
C15P311.1	Understand the basic concepts of System Software. Analyse and implement Pass and Phase concepts for assembler design
C15P311.2	Analyse and synthesize macro processor design using efficient data structures.
C15P311.3	Study of language translator and tools viz. LEX &YACC to implement lexical analysis and syntax analysis.
C15P311.4	Study and Implement operating system functions to improve performance of operating system.
C15P311.5	Summarize the programming model for memory management and simulate the algorithms for performance analysis.
C15P311.6	Study and implement the I/O management and file management.

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Department : Computer Engg. Course Name : Embedded Systems and Internet of Things(C15P312) (310252), ACA.Year: 2019-20	
CO No.	Statement
C15P312.1	Describe fundamentals of embedded systems with ARM and IoT including essence and basic design strategy of IoT
C15P312.2	Describe IoT based application according to IoT platform design methodology
C15P312.3	Develop real world IoT application &deploy it on physical devices by understanding pillars of embedded IoT
C15P312.4	Understand Protocol Standardization and Security for IoT.
C15P312.5	To understand the importance of web and cloud in IoT.
C15P312.6	Understand the architecture of cloud of things &Build web applications by using python web application framework

Department : Computer Engg. Course Name : Software Modelling & Design (C15P313) (310253), ACA.Year: 2019-20	
CO No.	Statement
C15P313.1	Analyse the problem statement (SRS) and choose proper design technique for designing web based/ desktop application
C15P313.2	Design and analyze an application using UML modeling as fundamental tool
C15P313.3	Apply design patterns to understand reusability in OO design
C15P313.4	Decide and apply appropriate modern tool for designing and modelling
C15P313.5	Decide and apply appropriate modern testing tool for testing web-based/desktop application

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Department : Computer Engg. Course Name : Web Technology (C15P314) (310254), ACA.Year: 2019-20	
CO No.	Statement
C15P314.1	Perceive the basics of web and Design static web based application using HTML,CSS,XML
C15P314.2	Understand and employ Javascript, Jquery to design and develop Static and dynamic web based applications.
C15P314.3	To understand and apply the concepts of Servlet and JSP using different JSP elements
C15P314.4	To acquaint and employ PHP, AJAX programming functionalities including MYSQL integration. To design and evaluate dynamic web applications with PHP, AJAX and MYSQL.
C15P314.5	To design, understand, implement MVC architecture with AngularJS and NodeJS functionalities.
C15P314.6	To understand web services and content management.

Department : Computer Engg. Course Name : Seminar and Technical Communication (C15P315) (310255), ACA.Year: 2019-20	
CO No.	Statement
C15P315.1	To explore the basic principles of communication (verbal and non-verbal) and active, empathetic listening, speaking and writing techniques.
C15P315.2	To expose the student to new technologies, researches, products, algorithms, services
C15P315.3	To explore to be familiar with basic technical writing concepts and terms, such as audience analysis, jargon, format, visuals, and presentation.
C15P315.4	To improve skills to read, understand, and interpret material on technology
C15P315.5	To improve communication and writing skills

Department : Computer Engg. Course Name : Web Technology Lab (C15P316),(310256), ACA.Year: 2019-20	
CO No.	Statement
C15P316.1	To use current client side and server side web technologies
C15P316.2	To implement communication among the computing nodes using curren client side and server side technologies
C15P316.3	To design and implement web services with content management

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Department : Computer Engg. Course Name : System Programming &Operating System Lab (C15P317) (310257), ACA.Year: 2019-20	
CO No.	Statement
C15P317.1	To implement basic language translator by using various needed data structures
C15P317.2	To implement basic Macroprocessor
C15P317.3	To design and implement Dynamic Link Libraries
C15P317.4	To implement scheduling schemes

Department : Computer Engg. Course Name : Embedded Systems & Internet of Things Lab(C15P318) (310258), ACA.Year: 2019-20	
CO No.	Statement
C15P318.1	To understand functionalities of various single board embedded platforms fundamentals
C15P318.2	To develop comprehensive approach towards building small low cost embedded IoT system.
C15P318.3	To implement the assignments based on sensory inputs

Department : Computer Engg. Course Name : Audit Course 4 I Digital and Social Media Marketing(C15P319) ((310259), ACA.Year: 2019-20	
CO No.	Statement
C15P319.1	To Identify best practices for Social Media Marketing, including platform level best practices
C15P319.2	To Connect business objectives to appropriate Social Media tactics.
C15P319.3	To Create strong content that engages their target audience with their marketing message.

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Course Outcome For BE Year Sem-I Course

Department : Computer Engg. Course Name : High Performance Computing (C15P401) (410241), ACA.Year: 2019-20

CO No.	Statement
C15P401.1	Transform algorithms in the computational area to efficient programming code for modern computer architectures
C15P401.2	Write, organize and handle programs for scientific computations
C15P401.3	Exploring tools for performance optimization and debugging of parallel algorithms.
C15P401.4	Present analysis of code with respect to performance and implement performance improvements
C15P401.5	To present test cases to solve problems using multi-core and distributed environments
C15P401.6	Analysis and design of novel techniques to parallelize the programming task

Department : Computer Engg. Course Name : Artificial Intelligence and Robotics (C15P402) (410242), ACA.Year: 2019-20

CO No.	Statement
C15P402.1	Identify and apply suitable searching techniques for Artificial Intelligent Systems
C15P402.2	Decomposition of problem for development of suitable algorithms for constraint satisfaction and planning
C15P402.3	Apply logic and infer new facts using previous knowledge
C15P402.4	Construct Machine language translation by applying Natural Language Processing and simulation using Artificial Neural Networks.
C15P402.5	Develop mobile robotic system with deployment of various environment sensors and development of strategies for path finding.
C15P402.6	Design and Develop robots for various real time applications.

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Department : Computer Engg. Course Name : Data Analytics (C15P403) (410243), ACA.Year: 2019-20	
CO No.	Statement
C15P403.1	Write case studies in Business Analytic and Intelligence using mathematical models
C15P403.2	Present a survey on applications for Business Analytic and Intelligence
C15P403.3	Provide problem solutions for multi-core or distributed, concurrent/Parallel environments

Department : Computer Engg. Course Name : Data Mining & Warehousing (C15P404(D)) (410244(D)), ACA.Year: 2019-20	
CO No.	Statement
C15P404(D).1	Acquire various techniques to mine the data.
C15P404(D).2	Describe data warehouse with dimensional modelling and OLAP operations
C15P404(D).3	Recognize similarity and dissimilarity of the data and analyse its proximity to discover the patterns in data.
C15P404(D).4	Employ market basket analysis to generate association rules using mining algorithms
C15P404(D).5	Apply the various data mining techniques to classify the data
C15P404(D).6	Evaluate performance of classifier by applying machine learning techniques

Department : Computer Engg. Course Name : Software Testing & Quality Assurance (C15P405(B)) (410245(B)), ACA.Year: 2019-20	
CO No.	Statement
C15P405(B).1	Describe fundamental concepts in software testing such as manual testing, automation testing and software quality assurance.
C15P405(B).2	Design and develop project test plan, design test cases, test data, and conduct test operations
C15P405(B).3	Apply recent automation tool for various software testing for testing software
C15P405(B).4	Understand in details working of selenium automation testing tool
C15P405(B).5	Apply different approaches of quality management, assurance, and quality standard to software system
C15P405(B).6	Apply and analyse effectiveness Software Quality Tools

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Department : Computer Engg. Course Name : Laboratory Practice I (C15P406) (410246), ACA.Year: 2019-20	
CO No.	Statement
C15P406.1	To be conversant with performance analysis and modeling of parallel programs
C15P406.2	To understand the options available to parallelize the programs
C15P406.3	To learn various peculiar search strategies for AI
C15P406.4	To develop a mind to solve real world problems unconventionally with optimality
C15P406.5	To apply algorithmic strategies while solving problems
C15P406.6	To study algorithmic examples in distributed, concurrent and parallel environments

Department : Computer Engg. Course Name : Laboratory Practice II (C15P407) (410247), ACA.Year: 2019-20	
CO No.	Statement
C15P407.1	To be conversant with performance analysis and modeling of parallel programs
C15P407.2	To understand the options available to parallelize the programs
C15P407.3	To learn various peculiar search strategies for AI
C15P407.4	To develop a mind to solve real world problems unconventionally with optimality
C15P407.5	To apply algorithmic strategies while solving problems
C15P407.6	To study algorithmic examples in distributed, concurrent and parallel environments

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Department : Computer Engg. Course Name : Project Work Stage I (C15P408) (410248), ACA.Year: 2019-20	
CO No.	Statement
C15P408.1	To develop problem solving ability
C15P408.2	To Organize, sustain and report on a substantial piece of team work over a period of several months
C15P408.3	To Evaluate alternative approaches, and justify the use of selected tools and methods
C15P408.4	To find information for yourself from appropriate sources such as manuals, books, research journals and from other sources, and in turn increase analytical skills

Department : Computer Engg. Course Name : Audit Course 5 II Botnet of Things (C15P409) (410249), ACA.Year: 2019-20	
CO No.	Statement
C15P409.1	Implement security as a culture and show mistakes that make applications vulnerable to attacks.
C15P409.2	Understand various attacks like DoS, buffer overflow, web specific, database specific, web -spoofing attacks.
C15P409.3	Demonstrate skills needed to deal with common programming errors that lead to most security problems and to learn how to develop secure application

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Course Outcome For BE Year Sem-II Course

Department : Computer Engg. Course Name : Machine Learning (C15P410) (410250), ACA.Year: 2019-20	
CO No.	Statement
C15P410.1	Apply Machine learning concepts to distinguish different learning based applications.
C15P410.2	Synthesis with feature selection methodologies, design learning models and evaluate.
C15P410.3	Design and implement regression models and evaluate performance
C15P410.4	Design and Implement supervised learning algorithms with different learning models.
C15P410.5	Design and implement decision trees and Ensemble Learning
C15P410.6	Design and implement different state of the art clustering techniques.

Department : Computer Engg. Course Name : Information and Cyber Security (C15P411) (410251), ACA.Year: 2019-20	
CO No.	Statement
C15P411.1	Understand the security basics and elements of information security.
C15P411.2	Understand symmetric and asymmetric algorithms for encryption and decryption to secure data across networks.
C15P411.3	Apply the standard algorithms while communicating in cyberspace to provide data integrity, confidentiality and authentication.
C15P411.4	Analyze various protocols to ensure security over networks.
C15P411.5	Design intrusion detection system and security solutions against cyber-attacks by applying policies of firewall
C15P411.6	Acquire the knowledge of Personally Identifiable Information (PII) and Indian Information Protection Law.

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Department : Computer Engg. Course Name : Elective III (Soft Computing and Optimization Algorithms) (C15P412 D) (410252(D)), ACA.Year: 2019-20	
CO No.	Statement
C15P412D.1	Understand and apply soft computing methodologies, including artificial neural networks, fuzzy logic, and genetic algorithms. Identify its real time applications.
C15P412D.2	Develop an efficient parallel algorithm to solve a given problem.
C15P412D.3	Apply the fuzzy logic &rules for reasoning to formulate the conclusions for the problem statements.
C15P412D.4	Design and development of certain scientific and commercial application using evolutionary processes
C15P412D.5	To design and develop commercial applications using Genetic Algorithms.
C15P412D.6	Learn a swarm intelligence, PSO &ACO, its formulation, topology, and different parameters.

Department : Computer Engg. Course Name : Elective IV(Human Computer Interface) (C15P413) (410253(B)), ACA.Year: 2019-20	
CO No.	Statement
C15P413.1	Understand the foundation of Human Computer Interaction and methods for evaluation of user interface.
C15P413.2	Understand HCI key design principles, rules and standards.
C15P413.3	Develop the design concepts with implementation tools, technology and identify errors.
C15P413.4	Evaluate the model to make products and services more usable, easy to learn and intuitive for the user
C15P413.5	Understand various users model like Predictive Models, Cognitive Models and apply it for evaluating the quality of a user interface
C15P413.6	Apply appropriate task models and dialogs to design systems that are usable by people

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Department : Computer Engg. Course Name : Laboratory Practice III (C15P414) (410254), ACA.Year: 2019-20	
CO No.	Statement
C15P414.1	Apply Machine learning concepts to distinguish different learning based applications.
C15P414.2	Synthesis with feature selection methodologies, design learning models and evaluate.
C15P414.3	Design and implement regression models and evaluate performance
C15P414.4	Understand the security basics and elements of information security.
C15P414.5	Understand symmetric and asymmetric algorithms for encryption and decryption to secure data across networks.
C15P414.6	Apply the standard algorithms while communicating in cyberspace to provide data integrity, confidentiality and authentication.

Department : Computer Engg. Course Name : Laboratory Practice IV (C15P415) (410255), ACA.Year: 2019-20	
CO No.	Statement
C15P415.1	Understand and apply soft computing methodologies, including artificial neural networks, fuzzy logic, and genetic algorithms. Identify its real time applications.
C15P415.2	Develop an efficient parallel algorithm to solve a given problem.
C15P415.3	Apply the fuzzy logic &rules for reasoning to formulate the conclusions for the problem statements.
C15P415.4	Understand the foundation of Human Computer Interaction and methods for evaluation of user interface.
C15P415.5	Understand HCI key design principles, rules and standards.
C15P415.6	Develop the design concepts with implementation tools, technology and identify errors.

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Department : Computer Engg. Course Name : Project Work Stage II (C15P416) (410256), ACA.Year: 2019-20	
CO No.	Statement
C15P416.1	Show evidence of independent investigation
C15P416.2	Critically analyze the results and their interpretation.
C15P416.3	Report and present the original results in an orderly way and placing the open questions in the right perspective.
C15P416.4	Link techniques and results from literature as well as actual research and future research lines with the research.
C15P416.5	Appreciate practical implications and constraints of the specialist subject

Department : Computer Engg. Course Name : Audit Course 6 I Business Intelligence (C15P417) (410257), ACA.Year: 2019-20	
CO No.	Statement
C15P417.1	Apply the concepts of Business Intelligence in real world applications
C15P417.2	Explore and use the data warehousing wherever necessary
C15P417.3	Design and manage practical BI system

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Department of Computer Engineering

Academic Year 2019-20

Post Graduate Programme on Computer Engineering (M.E. computer Engineering)

Program Outcomes

PO1	**Scholarship of Knowledge:** Acquire in-depth knowledge of Computer Science and Engineering, including wider and global perspective, with an ability to discriminate, evaluate, analyze and synthesize existing and new knowledge, and integration of the same for enhancement of knowledge.
PO2	**Critical Thinking:** Analyze complex engineering problems critically; apply independent judgment for synthesizing information to make intellectual and/or creative advances for conducting research in a wider theoretical, practical and policy context.
PO3	**Problem Solving:** Think laterally and originally, conceptualize and solve engineering problems, evaluate a wide range of potential solutions for those problems and arrive at feasible, optimal solutions after considering public health and safety, cultural, societal and environmental factors in the core areas of expertise.
PO4	**Research Skills:** Extract information pertinent to unfamiliar problems through literature survey and experiments, apply appropriate research methodologies, techniques and tools, design, conduct experiments, analyze and interpret data, demonstrate higher order skill and view things in a broader perspective, contribute individually/in group(s) to the development of scientific/technological knowledge in one or more domains of engineering.
PO5	**Usage of Modern Tools:** Create, select, learn 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	**Collaborative and Multidisciplinary work:** Possess knowledge and understanding of group dynamics, recognize opportunities and contribute positively to collaborative-multidisciplinary scientific research, demonstrate a capacity for self-management and teamwork, decision-making based on open-mindedness,objectivity and rational analysis in order to achieve common goals and further the learning of themselves as well as others.
PO7	**Project Management and Finance:** Demonstrate knowledge and understanding of Computer Science & Engineering and management principles and apply the same to one's own work, as a member and leader in a team, manage projects efficiently in respective disciplines and multidisciplinary environments after consideration of economical and financial factors.
PO8	**Communication:** Communicate with the engineering community, and with society at large, regarding complex engineering activities confidently and effectively, such as, being able to comprehend and write effective reports and design documentation by adhering to appropriate standards, make effective presentations, and give and receive clear instructions.
PO9	**Life-long learning:** Recognize the need for, and have the preparation and ability to engage in life-long learning independently, with a high level of enthusiasm and commitment to improve knowledge and competence continuously.
PO10	**Ethical Practices and Social Responsibility:** Acquire professional and intellectual integrity, professional code of conduct, ethics of research and scholarship, consideration of the impact of research outcomes on professional practices and an understanding of responsibility to contribute to the community for sustainable development of society
PO11	**Independent and Reflective Learning:** Observe and examine critically the outcomes of one's actions and make corrective measures subsequently, and learn from mistakes without depending on external feedback

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Program Specific Outcomes (PSO)

A graduate of the Computer Engineering Program will demonstrate

PSO1	Professional Skills: The ability to understand, analyze and develop software in the areas related to system software, multimedia, web design, big data analytics, networking, and algorithms for efficient design of computer-based systems of varying complexities.
PSO2	Successful Career and Entrepreneurship- The ability to employ modern computer languages, Benvironments, and platforms in creating innovative career paths to be an entrepreneur, and a zest for higher studies.

Program Educational Objectives

PEO1	To prepare globally competent post graduates with enhanced domain knowledge and skills attaining professional excellence and updated with modern technology to provide effective solutions for engineering and research problems
PEO2	To prepare the post graduates to work as a committed professionals with strong professional ethics and values, sense of responsibilities, understanding of legal, safety, health, societal, cultural and environmental issues.
PEO3	To prepare committed and motivated post graduates with research attitude, lifelong learning, investigative approach, and multidisciplinary thinking to succeed in the career in industry/academia/research.
PEO4	To prepare the post graduates with strong managerial and communication skills to work effectively as individual as well as in teams.

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Course outcomes for all courses

2017 Pattern

Course Outcome For M.E. Computer Engineering First Year Sem-I

Department : Computer Engg. Course Name : Research Methodology (510101), ACA.Year: 2019-20	
CO No.	Statement
510101.1	Discuss some basic concepts of research and its code of ethics.
510101.2	Identify appropriate research topics through literature search and review.
510101.3	Discuss various statistical analysis tools to measure errors in research.
510101.4	Discuss various optimization techniques in engineering research.
510101.5	Apply ethics and practices in survey based research methods.
510101.6	Write and present a research report.

Department : Computer Engg. Course Name : Bio-Inspired Optimization Algorithm (510102), ACA.Year: 2019-20	
CO No.	Statement
510102.1	Understand and design algorithms for particular classes of problems
510102.2	Apply various evolutionary computation methods and algorithms for particular classes of problems.
510102.3	Discuss the basics of AI and different optimizations techniques.
510102.4	Select the optimal solution based on bio-inspired algorithms
510102.5	Apply nature-inspired algorithms to optimization
510102.6	Discuss the natural phenomena that motivate the algorithms

Department : Computer Engg. Course Name : Software Development and Version Control (510103), ACA.Year: 2019-20	
CO No.	Statement
510103.1	Discuss and apply the design patterns for software development.
510103.2	Understand different software architectural designs.
510103.3	Discuss the basics of identify and assess the quality attributes of a system at the architectural level of AI and different optimizations techniques.
510103.4	Discuss basic principles and purposes of Software Configuration Management (SCM)
510103.5	Discuss the need of software version control.
510103.6	Apply and Use of open source version control tool.

Department : Computer Engg. Course Name : Embedded and Real Time Operating System (510104), ACA.Year: 2019-20	
CO No.	Statement
510104.1	Recognize and classify embedded and real-time systems
510104.2	Apply various real time algorithms for building embedded systems.
510104.3	Discuss various I/O communication mechanism in embedded system.
510104.4	Design real time embedded systems using the concepts of RTOS.
510104.5	Discuss the communication bus protocols used for real-time systems.
510104.6	Categorize and represent scheduling algorithms.

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Department : Computer Engg. Course Name : Data Mining(510105), ACA.Year: 2019-20	
CO No.	Statement
510105.1	Discuss various data mining phases and various ways of data mining.
510105.2	Recognize similarity and dissimilarity of the data and analyse its proximity to discover the patterns in data.
510105.3	Optimize the mining process by choosing best data mining technique
510105.4	Apply the various data mining techniques to classify the data
510105.5	Apply data mining techniques to discover patterns in data
510105.6	Apply data mining for any project

Department : Computer Engg. Course Name : Laboratory Proficiency I (510106), ACA.Year: 2019-20	
CO No.	Statement
510106.1	Perform research based literature survey of any research paper
510106.2	Apply numerical and statistical modeling on a dataset
510106.3	Design any nature inspired algorithm
510106.4	Study of open source system/application software like Version Control in Linux Kernel
510106.5	Simulation/ Design, planning and modeling of a Real-Time / Embedded System
510106.6	Design and develop any data mining algorithm

Course Outcome For M.E. Computer Engineering First Year Sem-II

Department : Computer Engg. Course Name : Operations Research (510108), ACA.Year: 2019-20	
CO No.	Statement
510108.1	Model and solve linear programming problems using appropriate techniques.
510108.2	Identify and develop operational research models from the verbal description of the real system.
510108.3	Understand mathematical models used in Operations Research.
510108.4	Construct various dynamic and adaptive models
510108.5	Build up mathematical skills to analyse and solve integer programming problems from a wide range of applications
510108.6	Develop critical thinking and objective analysis of decision problems

Department : Computer Engg. Course Name : System Simulation and Modeling (510109), ACA.Year: 2019-20	
CO No.	Statement
510109.1	Apply modelling to understand system behaviour
510109.2	Design the simulation scheme for particular system
510109.3	Analyse the modelled and simulated systems
510109.4	Develop skills to apply simulation software to construct and execute goal-driven system models.
510109.5	Understand the definition of a stochastic process and its behaviour.
510109.6	Compare the results of simulations confined to real world applications.

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Department : Computer Engg. Course Name : Machine Learning (510110), ACA.Year: 2019-20	
CO No.	Statement
510110.1	Apply Machine learning concepts to distinguish different learning based applications.
510110.2	Design and evaluate learning models and synthesize it with feature selection methodologies.
510110.3	Design and implement regression models and evaluate its performance.
510110.4	Design and implement supervised learning algorithms with different learning models.
510110.5	Formulate a given problem within the Bayesian learning framework with focus on building lifelong learning ability
510110.6	Apply the algorithms to a real problem, optimize the models learned and report on the expected accuracy that can be achieved by applying the models

Department : Computer Engg. Course Name : Pervasive and Ubiquitous Computing (510111), ACA.Year: 2019-20	
CO No.	Statement
510111.1	Describe the characteristics of pervasive computing applications including the basic computing application problems, performance objectives and architectures of the systems.
510111.2	Analyze and estimate the impact of pervasive computing on future computing applications and society
510111.3	Describe the characteristics of personal digital assistant and its applications including the basic computing application problems, performance objectives and architectures of the systems.
510111.4	Recognize the different ways that humans will interact with systems in a ubiquitous environment and account for these accordingly
510111.5	Solve various interface issues in pervasive computing.
510111.6	Explore the trends and problems of current pervasive computing systems using examples.

Department : Computer Engg. Course Name : Seminar - I (510112), ACA.Year: 2019-20	
CO No.	Statement
510112.1	To use multiple thinking strategies to examine real-world issues and explore creative avenues of expression.
510112.2	To acquire, articulate, create and convey intended meaning using verbal and non-verbal method of communication
510112.3	To learn and integrate, through independent learning in sciences and technologies, with disciplinary specialization and the ability to integrate information across
510112.4	Apply communication skills to effectively communicate in seminar presentation
510112.5	Apply writing skills to effectively document the findings
510112.6	Explore the trends and problems related to research area explored in Seminar - I

Department : Computer Engg. Course Name : Laboratory Proficiency - II (510113), ACA.Year: 2019-20	
CO No.	Statement
510113.1	Explore and compare various operations research algorithms
510113.2	Design and develop an algorithmic solutoin for transportation and related problems
510113.3	Design simulation solution for any automobile manufacturing or any other industry
510113.4	Explore and compare various machine learning algorithms and its applications
510113.5	Design and develop machine learning solutions for problems
510113.6	Design network security solutions

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Course Outcome For M.E. Computer Engineering Second Year Sem-I

Department : Computer Engg. Course Name : Fault Tolerant Systems (610101), ACA.Year: 2019-20	
CO No.	Statement
610101.1	Discuss the need and necessity to consider fault tolerant design in digital systems
610101.2	Discuss various techniques for fault modelling and tests generation
610101.3	Discuss fault tolerance routing and its algorithms.
610101.4	Evaluate reliability of systems in Hierarchical Interconnection Networks
610101.5	Evaluate fault tolerance and reliability of systems in networks.
610101.6	Apply important methods in distributed systems to support scalability and fault tolerance.

Department : Computer Engg. Course Name : Information Retrieval (610102), ACA.Year: 2019-20	
CO No.	Statement
610102.1	Discuss basic concepts and techniques in Information Retrieval
610102.2	Evaluate and analyse retrieved information
610102.3	Generate quality information out of retrieved information
610102.4	Apply clustering and classification algorithms to analyze the information
610102.5	Identify and discuss language models for information retrieval.
610102.6	Design information retrieval system.

Department : Computer Engg. Course Name : Cloud Security (610103A), ACA.Year: 2019-20	
CO No.	Statement
610103A.1	Articulate the differences between deployment models (public, private, hybrid, and community) versus service models (infrastructure-, platform-, and software-as-a-service) of cloud computing
610103A.2	Discuss computing security fundamentals confined to cloud environment
610103A.3	Identify the threats, risks, vulnerabilities, side-channel attacks, and privacy issues associated with cloud-
610103A.4	Describe cloud computing security architectures
610103A.5	Choose the appropriate technologies, algorithms, and approaches for the cloud security issues.
610103A.6	Apply security architectures that assure secure isolation of physical and logical infrastructures.

Department : Computer Engg. Course Name : Seminar - II (610104), ACA.Year: 2019-20	
CO No.	Statement
610104.1	To use multiple thinking strategies to examine real-world issues and explore creative avenues of expression,.
610104.2	To acquire, articulate, create and convey intended meaning using verbal and non-verbal method of
610104.3	To learn and integrate, through independent learning in sciences and technologies, with disciplinary specialization and the ability to integrate information across
610104.4	Apply communication skills to effectively communicate in seminar presentation
610104.5	Apply writing skills to effectively document the findings
610104.6	Explore the trends and problems related to research area explored in Seminar - II

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Department : Computer Engg. Course Name : Dissertation Stage - I (610105), ACA.Year: 2019-20	
CO No.	Statement
610105.1	Conduct thorough literature survey confined to the domain of choice
610105.2	Perform critical analysis on the literature survey and find the research gap
610105.3	Design preliminary solution to the research gap
610105.4	Analyze the findings and work of various authors confined to the chosen domain
610105.5	Develop presentation skills to deliver the technical contents
610105.6	Furnish the report of the technical research domain

Course Outcome For M.E. Computer Engineering Second Year Sem - II

Department : Computer Engg. Course Name : Seminar - III (610107), ACA.Year: 2019-20	
CO No.	Statement
610107.1	To use multiple thinking strategies to examine real-world issues and explore creative avenues of expression,.
610107.2	To acquire, articulate, create and convey intended meaning using verbal and non-verbal method of
610107.3	To learn and integrate, through independent learning in sciences and technologies, with disciplinary specialization and the ability to integrate information across
610107.4	Apply communication skills to effectively communicate in seminar presentation
610107.5	Apply writing skills to effectively document the findings
610107.6	Explore the trends and problems related to research area explored in Seminar - II

Department : Computer Engg. Course Name : Dissertation Stage - II (610108), ACA.Year: 2019-20	
CO No.	Statement
610108.1	Show evidence of independent investigation
610108.2	Critically analyze the results and their interpretation ; infer findings
610108.3	Report and present the original results in an orderly way and placing the open questions in the right perspective
610108.4	Link techniques and results from literature as well as actual research and future research lines with the
610108.5	Appreciate practical implications and constraints of the specialist subject
610108.6	Write and present the well documented findings in the report of Dissertation Stage - II

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Program Outcomes:	
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, 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.

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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 Teamwork 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.

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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 (LLL) in the broadest context of technological change.

Program Specific Outcomes (PSO):

PSO 1
PSO 2

Program Educational Objctives (PEOs):

PEO 1: Development of fundamental concepts To develop strong fundamental concepts for solving
PEO 2: Core Excellence
PEO 3: Versatility
PEO 4: Ethical and Social Development

2015 Pattern

Course Outcome For Second Year Sem-I Course

Department of Information Technoloy, Course Name: Discrete Structures, A.Y 2018-19

CO No	Statement
I15P201.1	Analyze and evaluate the combinatorial problems by using probability theory.
I15P201.2	Formulate and apply formal proof techniques and solve the problems with logical reasoning.
I15P201.3	Analyze types of relations and functions to provide solution to computational problems.
I15P201.4	Understand and Apply the concepts of graph theory to devise mathematical models.

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I15P201.5	Apply different algorithms to find minimum spanning tree.
I15P201.6	Identify fundamental algebraic structures.
Department of Information Technoloy, Course Name: Computer Organization &Architecture, A.Y	
CO No	Statement
I15P202.1	Solve problems based on computer arithmetic.
I15P202.2	Explain processor structure & its functions.
I15P202.3	Obtain knowledge about micro-programming of a processor.
I15P202.4	Understand concepts related to memory & IO organization.
I15P202.5	Acquire knowledge about instruction level parallelism & parallel organization of multi-processors & multi core systems.
I15P202.6	Understand concepts related the processor
Department of Information Technoloy, Course Name:Digital Electronics and Logic Design, A.Y 2018-	
CO No	Statement
I15P203.1	Spectacle an awareness and apply knowledge of number systems, codes, Boolean algebra and use necessary A.C, D.C Loading characteristics as well as functioning while designing with logic gates.
I15P203.2	Use logic function representation for simplification with K-Maps and analyze as well as design Combinational logic circuits using SSI & MSI chips.
I15P203.3	Analyze Sequential circuits like Flip-Flops (Truth Table, Excitation table), their conversion & design the applications.
I15P203.4	Analyze Sequential circuits like shift regiaters, counters (Truth Table, Excitation table), their applications & design sequence generator using counters and shift generator.
I15P203.5	Identify the Digital Circuits, Input/Outputs to replace by FPGA
I15P203.6	Use VHDL programming technique with different modeling styles for any digital circuits.
Department of Information Technoloy,Course Name:Fundamentals of Data Structures , A.Y A.Y	
CO No	Statement
I15P204.1	Understand and Apply constructs of C language.

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I15P204.2	Exemplify and Apply pointers , file handling in C.
I15P204.3	Classifying Data Structures and analyze algorithm based on time and space complexity.
I15P204.4	Understand and Implement different searching and sorting techniques for application development.
I15P204.5	Understand and Apply Linear data structures using sequential organization.
I15P204.6	Understand and Apply Linear data structures using linked organization.

Department of Information Technoloy, Course Name:Problem Solving and Object Oriented

CO No	Statement
I15P205.1	Employ a problem-solving strategy to breakdown a complex problem into a series of simpler tasks.
I15P205.2	Execute problem-solving actions appropriate to completing a variety of sub problems
I15P205.3	Apply analytical and logical thinking to extract facts from a problem description and determine how they relate to one another and to the problems to be solved.
I15P205.4	Design and implement an object oriented solution to solve a real life problem
I15P205.5	Understand and apply logic to create files for persistent data storage for real world application.
I15P205.6	Develop problem-solving and programming skills using OOP concept.
I15P205.7	Apply appropriate design patterns to provide object-oriented solutions

Course Outcome For SE Year Sem-II Course 2015 Pattern

Department of Information Technoloy,Course Name:Engineering Mathematics, A.Y 2018-19

CO No	Statement

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I15P206.1	Solve higher order linear differential equations and apply to Control systems, Computer vision, and Robotics
I15P206.2	Solve problems related to Fourier transform, Z-transform and applications to Image processing
I15P206.3	Apply statistical methods like correlation, regression analysis in to analyze data and to make predictions applicable to machine intelligence.
I15P206.4	Perform Vector differentiation and analyze the vector fields
I15P206.5	Perform Vector integration and APPLY to fluid flow problems
I15P206.6	Analyze Complex functions, conformal mappings and contour integration applicable to Image processing, Digital filters and Computer graphics.

Department of Information Technoloy,Course Name:Computer Graphics, A.Y 2018-19	
CO No	Statement
I15P207.1	Apply mathematics and logic to develop Computer programs for elementary graphic operations
I15P207.2	Develop scientific and strategic approach to solve complex problems in the domain of Computer Graphics
I15P207.3	Develop the competency to understand the concepts related to Computer Vision and Virtual reality
I15P207.4	Apply the logic to develop animation and gaming programs
I15P207.5	Perceive the concepts of virtual reality.
I15P207.6	Understand Computer Gaming Concepts

Department of Information Technoloy,Course Name:Processor Architecture and Interfacing, A.Y	
CO No	Statement
I15P208.1	Learn architectural details of 80386 microprocessor
I15P208.2	Learn assembly language programming of 80386 microprocessors.
I15P208.3	Understand memory management and multitasking of 80386 microprocessor
I15P208.4	Understand architecture and memory organization of 8051microcontroller
I15P208.5	Timers and interrupts of 8051 microcontroller and its interfacing with I/O devices

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I15P208.6	Learn interfacing of real world input and output devices to 8051 microcontroller

Department of Information Technoloy, Course Name: Data Structures and Files A.Y 2018-19	
CO No	Statement
I15P209.1	Understand, Analyze, Design and implement the stack and queue abstract data type.
I15P209.2	Understand, Analyze, Design and implement Tree as an abstract data type with traversals.
I15P209.3	Understand, Analyze, Design and implement graph as an abstract data type with traversals.
I15P209.4	Illustrate and implement symbol table,hash tables.
I15P209.5	Inferring and implement concept of advance trees like TBT with traversals, AVL Trees, B trees, B+ trees, Splay trees etc.
I15P209.6	Compare and implement different file types and file organization.

Department of Information Technoloy,Course Name:Foundations of Communication and Computer	
CO No	Statement
I15P2010.1	Understand data/signal transmission over communication media
I15P2010.2	Recognize usage of various modulation techniques in communication
I15P2010.3	Analyze various spread spectrum and multiplexing techniques
I15P2010.4	Use concepts of data communication to solve various related problems
I15P2010.5	Understand error correction and detection techniques.
I15P2010.6	Acquaint with transmission media and their standards

Course Outcomes for Third Year Sem-I Course 2015 Pattern

Department of Information Technoloy, Course Name: Theory of Computation, A.Y 2018-19	
CO Number	Statement
I15P301.1	Solve higher order linear differential equations and apply to Control systems, Computer vision, and Robotics

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I15P301.2	Solve problems related to Fourier transform, Z-transform and applications to Image processing
I15P301.3	Apply statistical methods like correlation, regression analysis in to analyze data and to make predictions applicable to machine intelligence.
I15P301.4	Perform Vector differentiation and analyze the vector fields
I15P301.5	Perform Vector integration and APPLY to fluid flow problems
I15P301.6	Analyze Complex functions, conformal mappings and contour integration applicable to Image processing, Digital filters and Computer graphics.

Department of Information Technoloy,Course Name: Database Management Systems, A.Y 2018-19

CO No	Statement
I15P302.1	Understand the fundamental concepts and basic functions of DBMS and RDBMS
I15P302.2	Apply normalization techniques for database design improvement and understand SQL
I15P302.3	Explain basic concept of query processing and transaction management
I15P302.4	Explain the concurrency control, recovery algorithms and database architectures
I15P302.5	Design and implement a database schema for a given problem-domain
I15P302.6	Identify the key processes of data mining, data warehousing and knowledge discovery process and Analyze various database architectures and technologies.

Department of Information Technoloy,Course Name: Software Engineering & Project Management,

CO No	Statement
I15P303.1	Recognize unique features of various software application domains and classify software applications.
I15P303.2	Choose and apply an appropriate lifecycle model of software development.
I15P303.3	Describe principles of agile development, discuss the SCRUM process and distinguish agile process models from other process models.
I15P303.4	Analyze software requirements by applying various modeling techniques.
I15P303.5	List and classify CASE tools and discuss recent trends and research in software engineering.

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I15P303.6	Understand IT project management through the life cycle of the project and future trends in IT Project Management.

Department of Information Technoloy, Course Name: Operating Systemt, A.Y 2018-19	
CO No	Statement
I15P304.1	Understand the fundamentals and Roles of Operating System
I15P304.2	understand the concept of a process, thread and solve problems based on process scheduling algorithms
I15P304.3	Understand the concept of process synchronization, mutual exclusion and deadlock and solve Deadlock avoidance
I15P304.4	Illustrate and Differentiate various memory management techniques
I15P304.5	Clarify the concept of I/O management and File system and analyse the seek time using disk scheduling algorithm
I15P304.6	Understand the linux operating system with it's components

Department of Information Technoloy, Course Name: Human-Computer Interaction, A.Y A.Y 2018-	
CO No	Statement
CO No	Statement
I15P305.2	To develop understanding of human factors in HCI design.
I15P305.3	To develop understanding of models, paradigms and context of interactions.
I15P305.4	To design effective user-interfaces following a structured and organized UCD process.
I15P305.5	To evaluate usability of a user-interface design.
I15P305.6	To apply cognitive models for predicting human-computer-interactions.

Course Outcomes for Second Year Sem-II Course

Department of Information Technoloy, Course Name: Computer Network Technology, A.Y 2018-19	
CO Number	Statement
I15P306.1	Understand and recall responsibilities, services offered and protocol used at each layer of OSI and TCP/IP model .

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I15P306.2	Understand different addressing techniques, design network and analyze network traffic.
I15P306.3	Implement client server paradigm and test different application layer protocols
I15P306.4	Illustrate the different wireless technologies and IEEE standards.
I15P306.5	Identify and understand issues, design goals and ptotocols in Ad Hoc wireless network
I15P306.6	Understand and explore recent trends in communication network

Department of Information Technoloy,Course Name: Systems Programming, A.Y 2018-19

CO No	Statement
I15P307.1	Learn independently modern software development tools and creates novel solutions for language processing applications
I15P307.2	Understand and implement assemblers and macro processors
I15P307.3	Apply LEX tool for generation of Lexical Analyzer.
I15P307.4	Apply YACC tool for generation of syntax analyzer
I15P307.5	Construct output for all the phases of compiler
I15P307.6	Apply code optimization in the compilation process

Department of Information Technoloy, Course Name: Design and Analysis of Algorithms A.Y 2018-

CO No	Statement
I15P308.1	To calculate computational complexity using asymptotic notations for various algorithms.
I15P308.2	To apply Divide & Conquer as well as Greedy approach to design algorithms.
I15P308.3	To practice principle of optimality.
I15P308.4	To illustrate different problems using Backtracking.
I15P308.5	To compare different methods of Branch and Bound strategy.
I15P308.6	To explore the concept of P, NP, NP-complete, NP-Hard and parallel algorithms.

Department of Information Technoloy, Course Name: Cloud Computing, A.Y 2018-19

CO No	Statement
I15P309.1	Understand the Fundamentals of Cloud Computing
I15P309.2	Understand Virtualization in cloud computing and to analyze Common Standards in Cloud Computing

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I15P309.3	Analyze environments and to Understand Applications of cloud computing
I15P309.4	Explain security related terms in cloud along with security issues
I15P309.5	State trends in ubiquitous computing, to analyze cloud enabling technologies for IoT and to understand innovative applications of IoT
I15P309.6	Interpret change in OS along with intelligent applications and future of intelligent devices
Department of Information Technoloy, Course Name: Data Science & Big Data Analytics, A.Y 2018-	
CO No	Statement
I15P310.1	Understand Data Science and Big Data primitives.
I15P310.2	Apply different mathematical models for Big Data.
I15P310.3	Determine Big Data learning skills by developing industry or research applications.
I15P310.4	Analyze each learning model and perform on different datasets.
I15P310.5	Understand needs, challenges and techniques for big data visualization
I15P310.6	Identify different applications of Big Data technologies.
Course Outcomes for Fourth Year Sem-I Course 2015 Pattern	

Department of Information Technoloy, Course Name: Information and Cyber Security, A.Y A.Y	
CO Number	**Statement**
I15P401.1	Use basic cryptographic techniques in application development.
I15P401.2	Apply methods for authentication, access control, intrusion detection and prevention.
I15P401.3	To apply the scientific method to digital forensics and perform forensic investigations
I15P401.4	To develop computer forensics awareness
I15P401.5	To study network defence tools
I15P401.6	To study network defence tools
Department of Information Technoloy,Course Name: Machine Learning and Applications, A.Y	
CO No	Statement
I15P402.1	Understand the fundamentals and types of Machine Learning

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I15P402.2	Discriminate and solve different classification machine learning problems and asses the performance of them.
I15P402.3	Clarify different types of linear regression models and their performance matrices
I15P402.4	Illustrate probability concepts and probabilistic models and solve Bayes theorem based problems
I15P402.5	Identify different techniques to combine multiple machine learning models for ensemble learning
I15P402.6	Understand the concepts of reinforcement and deep learning concepts

Department of Information Technoloy,Course Name: Software Design and Modeling, A.Y 2018-19

CO No	Statement
I15P403.1	Understand object oriented methodologies, basics of Unified Modeling Language (UML).
I15P403.2	Understand analysis process, use case modeling, domain/class modeling
I15P403.3	Discriminate interaction and behavior modeling
I15P403.4	Analyze Understand design process and business, access and view layer class design
I15P403.5	Illustrate GRASP principles and GoF design patterns.
I15P403.6	Understand architectural design principles and guidelines in the various type of application development.

Department of Information Technoloy, Course Name: Business Analytics and Intelligence, A.Y 2018-

CO No	Statement
I15P404.1	Comprehend the Information Systems and development approaches of Intelligent
I15P404.2	Evaluate and Apply business processes using information systems.
I15P404.3	Propose the Framework for business intelligence.
I15P404.4	Get acquainted with the Theories, techniques, and considerations for capturing organizational intelligence.
I15P404.5	Formulate business intelligence with business strategy.
I15P404.6	Apply the techniques for implementing business intelligence systems.

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Department of Information Technoloy, Course Name: Software Testing and Quality Assurance, A.Y	
CO No	Statement
I15P405.1	Explain the basics of software testing and various types of defect classes.
I15P405.2	Explain different types of testing and study different levels of testing (-Unit Testing, Integration Testing) in detail.
I15P405.3	Explain,Scope of automation , design for automation and how to use metrics and models.
I15P405.4	Explain components of the Software Quality Assurance System, and planning for software quality.
I15P405.5	Design models for quality assurance , and how it is utilised for better productivity.
I15P405.6	Describe software process methodology, internal Auditing and Assessments process.

Course Outcomes for Fourth Year Sem-II Course	
Department of Information Technoloy,Course Name: Distributed Computing System, A.Y 2018-19	
CO Number	Statement
I15P406.1	Understand the principles and desired properties of distributed systems on which the internet and other distributed systems are based.
I15P406.2	Understand and apply the basic theoretical concepts and algorithms of distributed systems in problem solving.
I15P406.3	Recognize the inherent difficulties that arise due to distributed-ness of computing resources.
I15P406.4	Identify the challenges in developing distributed applications.
I15P406.5	Identify storage techniques applicable for distributed systems
I15P406.6	Categorize different security measures in distributed systems
Department of Information Technoloy,Course Name: Ubiquitous Computing A.Y 2018-19	
CO No	Statement
I15P407.1	Demonstrate the knowledge of design of Ubicomp and its applications.

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I15P407.2	Explain smart devices and services used Ubicomp.
I15P407.3	Describe the significance of actuators and controllers in real time application design.
I15P407.4	Use the concept of HCI to understand the design of automation applications.
I15P407.5	Classify Ubicomp privacy and explain the challenges associated with Ubicomp privacy.
I15P407.6	Get the knowledge of ubiquitous and service oriented networks along with Ubicomp management.

Department of Information Technoloy,Course Name: Internet of Things (IoT), A.Y 2018-19

CO No	Statement
I15P408.1	Understand what is internet of things.
I15P408.2	Understand architecture and design of IoT.
I15P408.3	Describe the objects connected in IoT.
I15P408.4	Understand the underlying Technologies.
I15P408.5	Understand the platforms in IoT.
I15P408.6	Understand cloud interface to IoT.

Department of Information Technoloy, Course Name: Social Media Analytics, A.Y 2018-19

CO No	Statement
I15P409.1	Understand the basics of Social Media Analytics
I15P409.2	Explain the significance of Data mining in Social media.
I15P409.3	Demonstrate the algorithms used for text mining.
I15P409.4	Apply network measures for social media data.
I15P409.5	Explain Behavior Analytics techniques used for social media data
I15P409.6	Apply social media analytics for Face book and Twitter kind of applications.

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DEPARTMENT OF E & TC ENGINEERING
Criterion No.: 2.6.1
Academic Year 2019-20

Program Outcomes:

Engineering Graduates will be able to:

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

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

3. **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.

4. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the

5. **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

6. **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

7. **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

8. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of

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

10. **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.

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

12. **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.

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Criterion No.: 2.6.1
Academic Year 2019-20

Program Educational Outcomes:

Graduates will be able to

1. Apply concepts of mathematics, science and engineering for design - development of creative interdisciplinary frameworks for advancement of the society.

2. Demonstrate quantifiable advancement in the careers they decide to seek after.

3. Adopt life-long learning with high morals to outshine in the volatile economic and technological environment.

Jagtap

Dr. S.K. Jagtap
HOD (E &TC)

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Academic Year 2019-20

Program Specific Outcomes:

PSOs are the statement that describe what a graduate of specific program should be able to do -

PSO1 To design and Implement Modern Electronic Systems utilizing knowledge of Embedded Systems, VLSI and Signal Processing

PSO2 Identify and apply appropriate Modern tools for the design and implementation of communication using IoT, AI and Robotics

Jagtap

Dr. S.K. Jagtap
HOD (E &TC)

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Criterion No.: 2.6.1
LIST OF COURSE OUTCOMES IN ACADEMIC YEAR 2019-20

Course Outcomes for Second Year First Semester Course (2015 Pattern)	
Department: Electronics & Telecommunication, Course Name:Signals and Systems (204181)	
CO No.	**Statement**
CO1	Understand mathematical description and representation of continuous and discrete time signals and systems.
CO2	Develop input output relationship for linear shift invariant systems and understand the convolution operator for continuous and discrete time systems.
CO3	Understand and resolve the signals in frequency domain using Fourier series and Fourier transforms.
CO4	Understand the limitations of Fourier transform and need for Laplace transform and develop the ability to analyze the system in s- domain
CO5	Understand the basic concept of probability, random variables & random signals and develop the ability to find correlation, CDF, PDF and probability of a given event.
Department: Electronics & Telecommunication, Course Name:Electronic Devices and Circuits (204182)	
CO No.	**Statement**
CO1	Comply and verify parameters after exciting devices by any stated approach.
CO2	Discuss, examine and enforce circuit and test the realization
CO3	Define, outline, build and test small signal model of FET and MOSFET.
CO4	Define, illustrate and validate performance of FET at low frequency.
CO5	Outline, design and implement adjustable voltage regulator circuit electronic applications.
Department: Electronics & Telecommunication, Course Name:Electrical Circuits and Machines (204183)	
CO No.	**Statement**
CO1	Analyze the simple DC and AC circuit with circuit simplification techniques and Network Theorems.
CO2	Select the proper type of the transformer.
CO3	Explain construction, working and applications of DC Machines / Single Phase & Three Phase AC Motors
CO4	Classify motors and prefer appropriate electrical motor for given application.
Department: Electronics & Telecommunication, Course Name:Data Structures and Algorithms (204184)	
CO No.	**Statement**
CO1	Recall fundamentals of procedure-oriented programming and understand the computational efficiency of the principal algorithms such as sorting & searching.
CO2	Implement different searching and sorting methods.
CO3	Compare & use concepts of stack & queue for various applications.
CO4	Explain how arrays, linked structures are represented in memory and use them in algorithms.
CO5	Demonstrate various terminologies and traversals of trees and apply them for various applications.
CO6	Classify various terminologies and traversals of graphs and use them for various applications.

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Department: Electronics & Telecommunication, Course Name:Digital Electronics (204185)	
CO No.	**Statement**
CO1	Explain the basic logic gates and various reduction techniques of digital logic circuit in detail.
CO2	Design and identify complex examples of combinational circuits (Adders and their use as a Subtractor and sequential circuits (Shift Registers Counters).
CO3	Explain, identify state machines (FSM, ASM) and design, implement state machines and realize sequential circuits.
CO4	Explain, compare and classify digital logic families, PLDs and semiconductor memories.
CO5	Design and implement hardware circuits to test performance and application.
CO6	Describe the architecture and use of microcontrollers for basic operations and write simple assembly/C programs using 8051 microcontrollers.
Department: Electronics & Telecommunication, Course Name:Electronic Measuring Instruments and Tools(204186)	
CO No.	**Statement**
CO1	Understand fundamental of various electrical measurements
CO2	Understand and describe specifications, features and capabilities of electronic instruments.
CO3	From the specifications of instrument and select an appropriate instrument for given measurement.
CO4	Carry out required measurement using various instruments under different setups

Course Outcomes for Second Year Second Semester Course (2015 Pattern)

Department: Electronics & Telecommunication, Course Name:Engineering Mathematics III (207005)	
CO No.	**Statement**
CO1	Solve higher order linear differential equations using appropriate techniques for modelling, analysing electrical circuits and control systems.
CO2	Solve problems related to Fourier transform, Z-transform and applications to Communication systems and Signal processing.
CO3	Evaluate Interpolating polynomials, numerically differentiate and integrate functions, numerical solutions of differential equations using single step and multi-step iterative methods used in modern scientific computing.
CO4	Represent vector differentiation, analyse the vector fields and apply to Electro-Magnetic fields.
CO5	Solve problems related to vector integration by Green's theorem, Stokes theorem and Gauss Divergence theorem which gives relations between line, surface and Volume Integrals and apply it to Electro- Magnetic fields?
CO6	Analyze conformal mappings, transformations and perform contour integration of complex functions in the study of electrostatics and signal processing.
Department: Electronics & Telecommunication, Course Name:Integrated Circuits (204187)	
CO No.	**Statement**
CO1	Understand the characteristics of IC and Op-Amp and identify the internal structure.
CO2	Understand and identify various manufacturing techniques.
CO3	Derive and determine various performances based parameters and their significance for Op-Amp.
CO4	Comply and verify parameters referring data sheet.
CO5	Analyze and identify the closed loop stability considerations and I/O limitations.
CO6	Analyze and identify linear and nonlinear applications of Op-Amp.

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Department: Electronics & Telecommunication, Course Name:Control Systems (204188)	
CO No.	**Statement**
CO1	Develop mathematical model of physical systems and also evaluate Transfer Function of System by Block Diagram Reduction and Signal Flow Graph techniques.
CO2	Evaluate Time Domain response of first and second order system for Standard test signals.
CO3	Apply concept of Stability to analyse system using Routh criteria and Root Locus.
CO4	Analyze Frequency Response of system using Bode plots and Nyquist Criteria.
CO5	Express the system equations in state variable form.
CO6	Apply concepts of Digital Control System, PID controller and PLC in control system applications.
Department: Electronics & Telecommunication, Course Name:Analog Communication (204189)	
CO No.	**Statement**
CO1	Summarize generation of various types of Amplitude Modulation schemes and draw time domain and frequency domain waveforms related to them.
CO2	Describe superheterodyne receiver for AM demodulation and understand various properties like sensitivity, selectivity, fidelity.
CO3	Discuss generation of Frequency and Phase Modulation schemes and draw time domain and frequency domain waveforms related to them.
CO4	Describe superheterodyne receiver for FM demodulation and compare it with AM receiver
CO5	Calculate noise voltage, signal to noise ratio, noise figure and noise temperature for single and cascaded stages in a communication system.
CO6	Differentiate analog pulse modulation techniques like PAM, PWM, PPM and digital modulation technique like PCM.
Department: Electronics & Telecommunication, Course Name:Object Oriented Programming (204190)	
CO No.	**Statement**
CO1	Explain the principles of object oriented programming and basics of C++ programing language.
CO2	Summarize the concepts of classes, objects, constructors, destructors and operators used for overloading concepts and concept of inheritance.
CO3	Describe the fundamental concepts in Java programming.
CO4	Apply concept of classes, objects and various methods in java programming.
CO5	Differentiate the basic concepts of Inheritance, Packages and Interfaces in java.
CO6	Illustrate the concept of multithreading, Exception handling and difference between applet and applications using Java programs.
Department: Electronics & Telecommunication, Course Name:Employability Skill Development (204191)	
CO No.	**Statement**
CO1	Solve the arithmetic and calculate LCM, HCF
CO2	Describe Bloom taxonomy and analyze the strength and weakness also improve weakness
CO3	Develop effective communication skills and problem solving abilities in order to fetch employability opportunities and further success in the workplace
CO4	write the paragraph, story and letter also solve real problem using problem solving
CO5	Construct the team and identify and solve the problem
CO6	Represent and judge themselves

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Course Outcomes for Third Year First Semester Course (2015 Pattern)	
Department: E &TC Engineering. Course Name: Digital Communication (304181)	
CO No.	**Statement**
CO1	Describe various building blocks of digital communication systems and the signal flow with different waveform coding techniques.
CO2	Analyze the performance of baseband digital transmission and draw various data formats.
CO3	Describe various random processes and mean, autocorrelation, cross correlation, probability density functions related to it.
CO4	Explain time and frequency domain analysis of the signals in a digital communication system
CO5	Analyze the performance of pass band digital communication system in terms of error rate and spectral efficiency and sketch their waveforms.
CO6	Understand working of spread spectrum communication system and its performance
Department: E &TC Engineering. Course Name: Digital Signal Processing (304182)	
CO No.	**Statement**
CO1	Define, classify and discuss various types of signals, analyse signals and apply mathematical concept for signal processing.
CO2	Analyze the discrete time signals and system using different transform domain techniques.
CO3	Design & implement various filters for filtering different real world signals.
CO4	Apply DSP in different real world signal processing applications.
Department: E &TC Engineering. Course Name: Electromagnetics (304183)	
CO No.	**Statement**
CO1	Apply basic mathematical concepts related to electromagnetic vector fields.
CO2	Apply the principles of electrostatics to the solutions of problems relating to electric field and electric potential, boundary conditions and electric energy density.
CO3	Apply the principles of magneto statics to the solutions of problems relating to magnetic field and magnetic potential, boundary conditions and magnetic energy density.
CO4	Analyze time varying fields using the concepts related to Faraday's law, induced emf and Maxwell's equations.
CO5	Analyze transmission line problems using Smith Chart.
CO6	Apply Maxwell's equations to solve problems related to uniform plane wave propagation.
Department: E &TC Engineering. Course Name: Microcontrollers (304184)	
CO No.	**Statement**
CO1	Describe 8-bit Microcontroller Architecture of 8051.
CO2	Explain programming in assembly language for 8051 and to study various software and hardware tools for developing applications.
CO3	Explain interfacing of real world peripheral devices.
CO4	Describe PIC18FXX Microcontroller Architecture.
CO5	Explain interfacing of real world peripheral devices using Embedded C.
CO6	Explain interfacing of real world peripheral devices using different communication protocol.

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Department: E &TC Engineering. Course Name: Mechatronics (304185)	
CO No.	**Statement**
CO1	Describe key elements of the mechatronics system and its representation in terms of block diagram.
CO2	Identify basic principles of Sensors and Transducers.
CO3	Classify various types of mechatronics system components and its applications.
CO4	Describe case study of the mechatronics system.
CO5	Identify Electrical Actuators, Electron-mechanical actuators
CO6	Describe case study of the mechatronics system.
Department: E &TC Engineering. Course Name: Signal Processing and Communication Lab (304191)	
CO No.	**Statement**
CO1	Visualize and practically implement various baseband and passband modulation techniques.
CO2	Analyze various aspects related to Spread Spectrum Techniques
CO3	Simulate performance parameters of baseband and passband modulation techniques using MATLAB.
CO4	Understand the digital signal processing, sampling and aliasing.
CO5	Analyze various properties of DFT.
CO6	Apply different window methods to realize IIR filter design.
Department: E &TC Engineering. Course Name: Microcontrollers and Mechatronics Lab (304192)	
CO No.	**Statement**
CO1	Explain programming in assembly language for 8051 and Explain interfacing of real world peripheral device.
CO2	Explain interfacing of real world peripheral devices using Embedded C for PIC18FXX Microcontroller
CO3	Explain interfacing of real world peripheral devices using different communication protocol.
CO4	Understand the key elements of Mechatronics design process and the basic concepts of engineering system with dynamic response of the system.
CO5	Realize the concepts of real time interfacing and data acquisition and discuss the operating principles of hydraulic and Pneumatic systems.
CO6	Understanding the concepts of design of Mechatronics system through case studies.
Department: E &TC Engineering. Course Name: Electronics System Design (304193)	
CO No.	**Statement**
CO1	Assess the fundamental steps and working principles of electronics devices to build electronics systems.
CO2	Understand datasheets and select suitable components and devices.
CO3	Implement prototype of Data Acquisition system by selecting proper transducer and signal conditioning circuit.
CO4	Develop an electronic system/sub-system and verify its performance by simulating the same.
CO5	Customized an EDA tool for circuit schematic and simulation.
CO6	Construct, accomplish the database and query handling using suitable tools.

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Course Outcomes for Third Year Second Semester Course (2015 Pattern)	
Department: E &TC Engineering. Course Name: Power Electronics (304186)	
CO No.	**Statement**
CO1	Design and implement a triggering / gate drive circuit for a power device.
CO2	Understand and analyze different phase controlled converters
CO3	Construct the design and control of rectifier and inverter circuits.
CO4	Experiment the working of DC-DC converters and AC voltage controllers.
CO5	Explain the working of resonant circuits and design protection circuits used in power electronic applications.
CO6	Examine different special motor drives for various industrial applications.
Department: E &TC Engineering. Course Name: Information Theory Coding and Communication Networks (304187)	
CO No.	**Statement**
CO1	Perform information analysis and design of different source coding technique for data compression.
CO2	Explain different channel coding theorems for communication system and Analyze the performance of error control codes.
CO3	Design a channel coding scheme in communication system.
CO4	Design of encoding and decoding circuits for channel performance improvement against burst error.
CO5	Apply and define fundamental principles of data communication and its components.
CO6	Understand flow and error control techniques in communication networks.
Department: E &TC Engineering. Course Name: Business Management (304188)	
CO No.	**Statement**
CO1	Grasp the fundamentals of management as a function and put it into use.
CO2	Understand the importance of quality in a business and the various philosophies & tools on quality
CO3	Demonstrate knowledge of the financial position of an organization and its use along the project management life cycle.
CO4	Illustrate the importance of human resource and the various stages a employee has to be managed through case studies
CO5	Explain the concept of entrepreneurship, demonstrate the various activities to be carried out for entrepreneurship and the support available to encourage entrepreneurship.
CO6	Outline the role of marketing and examining the various traditional and modern marketing techniques.
Department: E &TC Engineering. Course Name: Advanced Processors (304189)	
CO No.	**Statement**
CO1	Describe the features, advantages of ARM 7, ARM 9 & ARM11.
CO2	Describe the ARM 7 microprocessor architectures and its features.
CO3	Design and Interface the advanced peripherals to ARM based microcontroller.
CO4	Design embedded system with available resources.
CO5	Describe the C67X processors architecture and its features.
CO6	Apply DSP Processors and resources for signal processing applications.

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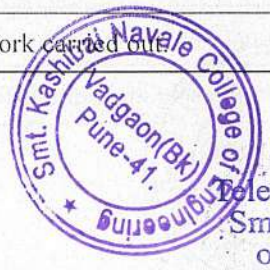
Department: E &TC Engineering. Course Name: System Programming and Operating Systems (304190)	
CO No.	**Statement**
CO1	Establish the awareness of different components of Systems Programming.
CO2	Analyze and investigate the different implementation techniques of system programming operating system abstractions.
CO3	Demonstrate and interpret different OS functions, process management policies and scheduling of processes by CPU.
CO4	Discover the requirement for process synchronization and deadlock.
CO5	Understand the Memory management systems and its allocation policies, Virtual Memory and Paging systems.
CO6	Develop knowledge of file management techniques, various I/O devices and scheduling algorithms.
Department: E &TC Engineering. Course Name: Power and ITCT Lab (304194)	
CO No.	**Statement**
CO1	Understand the characteristics of different power electronic devices.
CO2	Discuss, analyse different controlled converters.
CO3	Implementation of various power electronics applications.
CO4	Discuss, distinguish and interpret entropies and mutual information for Noise free, Error free, Binary Symmetric and Noisy Channel
CO5	Discuss, analyse and interpret Shannon-Fano, Huffman, Linear Block, Cyclic, Convolutional, BCH-RS Coding and decoding
CO6	Discuss networking components and LAN and simulate ARQ techniques.
Department: E &TC Engineering. Course Name: Advanced Processors and System Programming Lab (304195)	
CO No.	**Statement**
CO1	Understand and interpret basics of LPC2148 also interfacing of LPC2148 with display, GSM.
CO2	Analyze the concepts of finding current location latitude and longitude values with the help of GPS also demonstrate the concept of ADC.
CO3	Examine interfacing of SD card to LPC 2148 using SPI also interfacing of EEPROM to PLC2148 using I2C protocol.
CO4	Understand and interpret the basics of the Linux operating system using various functions.
CO5	Describe and design various components of system software.
CO6	Demonstrate and implement various process and memory management algorithms.
Department: E &TC Engineering. Course Name: Employability Skills and Mini Project (304196)	
CO No.	**Statement**
CO1	Understand, plan and execute a Mini Project with team.
CO2	Implement electronic hardware by learning PCB artwork design, soldering techniques, testing and troubleshooting etc.
CO3	Prepare a technical report based on the Mini project.
CO4	Deliver technical seminar based on the Mini Project work carried out.



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Course Outcomes for Fourth Year First Semester Course (2015 Pattern)	
Department: E &TC Engineering. Course Name: VLSI Design and Technology (404181)	
CO No.	**Statement**
CO1	Write effective HDL coding for digital design.
CO2	Apply knowledge of real time issues in digital design.
CO3	Model digital circuit with HDL, simulate, synthesize and prototype in PLDs.
CO4	Design CMOS circuits for basic digital circuits and specified applications.
CO5	Analyze various issues and constraints in design of an ASIC.
CO6	Apply knowledge of testability in design and build self-test circuit.
Department: E &TC Engineering. Course Name: Computer Networks and Security (404182)	
CO No.	**Statement**
CO1	Compare different types of network; network Topology, different network devices.
CO2	Understand TCP/IP protocol suite.
CO3	Compare and Understand IPv4 and IPv6 IP addressing.
CO4	Apply basic knowledge of installing and configuring networking applications.
CO5	Apply a basic knowledge of network security.
Department: E &TC Engineering. Course Name: Radiation and Microwave Techniques (404183)	
CO No.	**Statement**
CO1	Distinguish various performance parameters of radiating elements.
CO2	Define, analyse, and classify radiating elements and arrays.
CO3	Discuss, apply waveguide fundamentals in design of transmission lines.
CO4	Design and set up a system consisting of various passive microwave components.
CO5	Apply and analyse tube based and solid state active devices along with their application.
CO6	Define and measure performance parameters of microwave components.
Department: E &TC Engineering. Course Name: Digital Image and Video Processing (404184)	
CO No.	**Statement**
CO1	Develop and implement basic mathematical operations on digital images (2-D) and using fundamental concepts of Digital Image Processing with basic relationship of pixels.
CO2	Investigate image enhancement techniques and restoration problems.
CO3	Apply and classify various 2-D data compression techniques for 2-D digital images.
CO4	Categorize and design image processing techniques for segmentation and Morphological operators.
CO5	Interpret objects and regions of the image with appropriate representation techniques.
CO6	Explore video signal representation and different algorithms for video processing.

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Department: E &TC Engineering. Course Name: Embedded Systems and RTOS (404184)	
CO No.	**Statement**
CO1	Identify design metrics of embedded systems to design real time applications.
CO2	Explain the concept of Real Time Operating Systems in embedded applications.
CO3	Summarize concepts of µC/OS RTOS.
CO4	Select and make use of modern architecture for embedded system design.
CO5	Select Linux for embedded system development.
CO6	Develop an embedded product using an open source platform.
Department: E &TC Engineering. Course Name: Artificial Intelligence (404185A)	
CO No.	**Statement**
CO1	Describe the modern view of AI as the study of agents that receive precepts from the Environment and perform actions.
CO2	Demonstrate awareness of informed search and exploration methods.
CO3	Explain about AI techniques for knowledge representation, planning and uncertainty Management.
CO4	Develop knowledge of decision making and learning methods.
CO5	Design and develop different pattern recognition and expert system algorithms for various applications.
CO6	Outline the fundamentals of Natural Language Processing.
Department: E &TC Engineering. Course Name: Electronic Product Design (404185B)	
CO No.	**Statement**
CO1	Familiar with various stages of Electronic Product Design.
CO2	Understand different considerations of analog, digital and mixed circuit design.
CO3	Familiar with different considerations of software design and testing methods.
CO4	Get acquainted with methods of PCB design and different tools.
CO5	Understand the importance of product test and test specification.
CO6	Get acquainted with the process and importance of documentation.
Department: E &TC Engineering. Course Name: Lab Practice – I (CNS + RMT) (404186)	
CO No.	**Statement**
CO1	Select a suitable LAN topology for the given network.
CO2	Identify a given class of IP address.
CO3	Understand simulation of different application layer protocols in Cisco Packet Tracer.
CO4	Differentiate various antenna and antenna array by calculating performance parameters
CO5	Design and set up a system consisting of various passive, active microwave components.
CO6	Measure performance parameter of microwave components.

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Department: E &TC Engineering. Course Name: Lab Practice – II (VLSI + Elec – I (DIVP) (404187)	
CO No.	**Statement**
CO1	Model various combinational and sequential circuits using HDL and simulate using EDA tool.
CO2	Design and implement a Digital system on an FPGA board.
CO3	Design and implementation of CMOS Digital Circuit Layout using EDA tool.
CO4	Understand fundamentals operation of Digital Image and its process
CO5	Asses the different types of image enhancement techniques for the perfection of pictographic information for human perceptions
CO6	Understand the concepts of image segmentation, compression and recognition techniques to remove redundancy pixel transmit the image/Video using less bandwidth and object detection.

Department: E &TC Engineering. Course Name: Lab Practice – II (VLSI + Elec – I (ES & RTOS) (404187)	
CO No.	**Statement**
CO1	Model various combinational and sequential circuits using HDL and simulate using EDA tool.
CO2	Design and implement a Digital system on an FPGA board.
CO3	Design and implementation of CMOS Digital Circuit Layout using EDA tool.
CO4	Explain task controlling procedures
CO5	Perform Interfacing with peripheral devices
CO6	Implement controller programming platforms

Department: E &TC Engineering. Course Name: Project Stage - I (404188)	
CO No.	**Statement**
CO1	Apply their acquired skills to define problem statements and objectives.
CO2	Paraphrase abstract and synopsis for selected problems.
CO3	Analyze related research work and summarize in the form of literature survey.
CO4	Demonstrate their knowledge of technological tools and techniques for planning and execution of project.

Course Outcomes for Fourth Year Second Semester Course (2015 Pattern)

Department: E &TC Engineering. Course Name: Mobile Communication (404189)	
CO No.	**Statement**
CO1	Describe how wireless networks are penetrating our lives for data, multimedia and voice transmission.
CO2	Analyze different traffic model to predict and measure the propagation loss.
CO3	Understand basic concepts of cellular system, wireless propagation and the techniques used to maximize the capacity of cellular network.
CO4	Understand the detailed Architecture of GSM with the call establishment process.
CO5	Evaluate the performance of CDMA and GSM system.
CO6	Get the overview of LTE architecture, and opportunities and requirements in 5G networks.

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Department: E &TC Engineering. Course Name: Broadband Communication Systems (404190)	
CO No.	**Statement**
CO1	Select various components such as optical source, detector and fiber of Optical Communication system.
CO2	Demonstrate Link power budget and Rise Time Budget by proper selection of components and check its viability.
CO3	Identify state of the art active and passive WDM components.
CO4	Analyze Orbital parameters of Satellite Orbits.
CO5	Determine various subsystems in Satellite Communication.
CO6	Design Uplink and Downlink Satellite System.
Department: E &TC Engineering. Course Name: Machine Learning (404191)	
CO No.	**Statement**
CO1	Differentiate between various learning approaches and illustrate the steps involved in designing a different machine learning algorithm.
CO2	Demonstrate the application of supervised learning algorithms like regression and classification for solving real world problems.
CO3	Develop unsupervised learning algorithms to solve complex problems with an understanding of the trade-offs involved.
CO4	Analyze basic concepts of neural networks and different learning mechanisms for societal applications.
CO5	Investigate various neural network algorithms to solve real world problems.
CO6	Formulate deep learning algorithms such as Convolutional Neural Networks (CNN's) for image recognition applications.
Department: E &TC Engineering. Course Name: Audio Video Processing (404191)	
CO No.	**Statement**
CO1	Analyze different parameters of color television system.
CO2	Study and understand various HDTV standards and Digital TV broadcasting systems.
CO3	Illustrate different video, audio and image compressing techniques.
CO4	Understand Audio systems and PA systems.
CO5	Understand various acoustic systems.
Department: E &TC Engineering. Course Name: Robotics (404192)	
CO No.	**Statement**
CO1	Familiar with the history, concept development and key components of robotics technologies.
CO2	Understand mathematical manipulations of spatial coordinate representation and transformation.
CO3	Solve basic robot forward and inverse kinematic problems.
CO4	Understand and able to solve basic robotic dynamics, path planning and control problems.
CO5	Get acquainted with advanced robotic techniques.
CO6	Acquire basic knowledge of developing and building a robot.

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Department: E &TC Engineering. Course Name: Wireless Sensor Networks (404192)	
CO No.	**Statement**
CO1	Describe, distinguish & interpret various concepts and terminologies used in WSN.
CO2	Classify and summarize use of various radio communication and link management in WSN.
CO3	Define and compare various wireless standards and protocols associated with WSN.
CO4	Recognize and illustrate importance of localization and routing techniques used in WSN.
CO5	Understand and discuss techniques of data aggregation and importance of security in WSN.
CO6	Analyze, compare and examine the issues involved in design and deployment of WSN.
Department: E &TC Engineering. Course Name: Biomedical Electronics (404192)	
CO No.	**Statement**
CO1	Model the physiology of the biomedical system.
CO2	Understand functioning of heart; principle and working of Biomedical Instruments for cardiovascular system with various sources of bio- signal distortions and its remedial techniques.
CO3	Describe the structure of the nervous system and analyse EEG signals for disease detection like Epilepsy and Sleep apnea.
CO4	Select appropriate filters like Active, Wiener and Adaptive Filters for artifact removal in ECG signal.
CO5	Analyze ECG signals and apply knowledge of electronics engineering for noise removal and highlight the features.
CO6	Discuss the application of Electronics in diagnostics and therapeutic areas.
Department: E &TC Engineering. Course Name: Lab Practice III (MCS + BCS) (404193)	
CO No.	**Statement**
CO1	Understand and perform practical based on telephone switching.
CO2	Analyze and perform experiment on telecommunication traffic.
CO3	Understand and simulate wireless channel model.
CO4	Identify various components such as optical source, detector and Fiber of Optical Communication system
CO5	Determine Power budget and Time budget analysis of optical fiber system.
CO6	Design an AUDIO-VIDEO satellite link between Transmitter and Receiver and transmit three separate signals (Audio, Video, and Tone) simultaneously through satellite Link.
Department: E &TC Engineering. Course Name: Lab Practice –IV Machine Learning) (404194)	
CO No.	**Statement**
CO1	Understand the fundamental theory and concepts of neural networks.
CO2	Apply different neural network architectures and algorithms to solve real time problems such as classification and regression.
CO3	Develop and characterize various machine learning algorithms such as supervised, unsupervised to solve real-life problems such as classification and regression.
CO4	Understand the fundamental concept of deep learning architecture and algorithm such as convolutional neural networks.

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Department: E &TC Engineering. Course Name: Lab Practice –IV(Audio Video Engineering) (404194)	
CO No.	**Statement**
CO1	Understand the various concepts, terminologies and working of television systems.
CO2	Study and understand various audio and video formats, compression techniques.
CO3	Illustrate different audio systems and PA systems.
Department: E &TC Engineering. Course Name: Project Stage –II (404195)	
CO No.	**Statement**
CO1	Design solution for the problem defined.
CO2	Execute the project to find a solution which is ethical and professional.
CO3	Prepare a detailed report of work carried in the process of execution of the project.
CO4	Demonstrate oral, written and technical skills acquired during the process of completion of the project.

Jagtap

Dr. S.K. Jagtap
HOD (E &TC)
Head
Dept. of Electronics &
Telecommunication Engineering
Smt. Kashibai Navale College
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Sinhgad Technical Education Society's
Smt. Kashibai Navale College Of Engineering, Pune
Department of Mechanical Engineering **Academic Year-2019-20**

Program Outcomes:

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, 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 Teamwork 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 (LLL) in the broadest context of technological change.

Program Specific Outcomes (PSO):

PSO1	Core Competence in Mechanical Engineering : Student will be able to comprehend, synthesize and analyse the problems in the field of Thermal engineering, Design engineering, Manufacturing engineering and Mechatronics.
PSO2	Competence in Computational Tools : Student will be able to apply the knowledge of mechanical engineering software tools for solving engineering problems for developing products & Processes related to mechanical & alligned engineering feilds.

Program Educational Objctives (PEOs):

PEO 1	Core Competence in Mechanical Engineering: Employable in core mechanical industries, multidisciplinary sectors like government organizations, software industries, practice entrepreneurship and pursue higher education.
PEO 2	Innovation and Research: Able to solve complex mechanical engineering problems through innovation and research.
PEO 3	Professionalism and Ethics: Able to practice professionalism as a team or an individual considering ethics, social and environmental responsibility

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HoD, Department of Mechanical Engineering

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Course Outcome For Second Year Sem-I Course 2015 Pattern

CO No	Statement
Department of Mechanical Engineering, Course Name: Engineering Mathematics -III (M15P201), A.Y 2019-20	
M15P201.1	Solve higher order linear differential equations and apply to modeling and analyzing mass spring systems.
M15P201.2	Apply Laplace transform and Fourier transform techniques to solve differential equationsi nvolved in Vibration theory, Heat transfer and related engineering applications
M15P201.3	Apply statistical methods like correlation, regression analysis in analyzing, interpretinge xperimental data .
M15P201.4	Apply probability theory in testing and quality control.
M15P201.5	Perform Vector differentiation & integration, analyze the vector fields and APPLY to fluidf low problems
M15P201.6	Solve various partial differential equations such as wave equation, one and two dimensional heat flow equations.
Department of Mechanical Engineering, Course Name: Manufacturing Process -I (M15P202), A.Y 2019-20	
M15P202.1	DIFERENTIATE various Casting process and ANALYZE moulds used for sand casting process
M15P202.2	Identify,Differentiate metal forming process & estimate dimension of die used for open die forging.
M15P202.3	Understand, differentiate and compare different plastic moulding technique.
M15P202.4	IDENTIFY various metal joining techniques.
M15P202.5	Identify various sheet metal process and analyze progressive and drawing dies.
M15P202.6	Understand the construction of centre lathe, various attachments of the machine and various operations performed using the lathe
Department of Mechanical Engineering, Course Name: Computer Aided Machine Drawing(M15P203), A.Y 2019-20	
M15P203.1	Understand the importance of CAD in the light of allied technologies such as CAM, CAE, FEA, CFD and PLM
M15P203.2	Draw 2D sketching using parametric technology
M15P203.3	Draw 3D machine components modeling using parametric feature-based modeling
M15P203.4	Create 3D assemblies that represent static or dynamic Mechanical Systems
M15P203.5	Understand and impliment Geometric Dimensioning and Tolerancing
M15P203.6	Communicate between Design and Manufacturing using 2D drawings

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	epartment of Mechanical Engineering, Course Name: Thermodynamics (M15P A.Y 2019-20
M15P204.1	Understand and apply laws of thermodynamics to various processes and thermodynamic systems
M15P204.2	Apply the concept of Entropy and determine thermodynamic properties for various ideal gas processes.
M15P204.3	Estimate performance of various Thermodynamic cycles and availability in each case.
M15P204.4	Estimate the quality of steam and performance of vapour cycle.
M15P204.5	Evaluate the performance of steam generators.
M15P204.6	Demonstrate Psychrometric processes using psychrometric chart.
	Department of Mechanical Engineering, Course Name: Material Science (M15P205), A.Y 2019-20
M15P205.1	Demonstrate the basic concept and properties of Material.
M15P205.2	Demonstrate and apply fundamental material/metallurgical theories behind material processing.
M15P205.3	Evaluate material properties through experimentation and analyze and interpret results.
M15P205.4	Define and analyze engineering problems related to corrosion and achieving a practical solution.
M15P205.5	Recognize how surfaces of the materials can be strengthened using various surface modification techniques.
M15P205.6	Select proper metal, alloys, nonmetal and powder metallurgical component for specific
	Department of Mechanical Engineering, Course Name: Strength of Materials (M15P206), A.Y 2019-20
M15P206.1	ANALYSE various types of stresses and strain developed on determinate and indeterminate members.
M15P206.2	CONSTRUCT shear force and bending moment diagram for various types of transverse loading and support.
M15P206.3	EVALUATE bending stress and shear stress distribution in machine elements
M15P206.4	DETERMINE slope and deflection of beam and EVALUATE strain energy stored due to various types of load.
M15P206.5	CALCULATE torsional shear stress developed in shaft and buckling of column.
M15P206.6	APPLY the concept of principal stresses and theories of failure to determine stresses.

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Course Outcome For Second Year Sem-I Course 2015 Pattern

CO No	Statement
Department of Mechanical Engineering, Course Name: Engineering Mathematics -III (M15P201), A.Y 2019-20	
M15P201.1	Solve higher order linear differential equations and apply to modeling and analyzing mass spring systems.
M15P201.2	Apply Laplace transform and Fourier transform techniques to solve differential equationsi nvolved in Vibration theory, Heat transfer and related engineering applications
M15P201.3	Apply statistical methods like correlation, regression analysis in analyzing, interpretinge xperimental data .
M15P201.4	Apply probability theory in testing and quality control.
M15P201.5	Perform Vector differentiation & integration, analyze the vector fields and APPLY to fluidf low problems
M15P201.6	Solve various partial differential equations such as wave equation, one and two dimensional heat flow equations.
Department of Mechanical Engineering, Course Name: Manufacturing Process -I (M15P202), A.Y 2019-20	
M15P202.1	DIFERENTIATE various Casting process and ANALYZE moulds used for sand casting process
M15P202.2	Identify,Differentiate metal forming process & estimate dimension of die used for open die forging.
M15P202.3	Understand, differentiate and compare different plastic moulding technique.
M15P202.4	IDENTIFY various metal joining techniques.
M15P202.5	Identify various sheet metal process and analyze progressive and drawing dies.
M15P202.6	Understand the construction of centre lathe, various attachments of the machine and various operations performed using the lathe
Department of Mechanical Engineering, Course Name: Computer Aided Machine Drawing(M15P203), A.Y 2019-20	
M15P203.1	Understand the importance of CAD in the light of allied technologies such as CAM, CAE, FEA, CFD and PLM
M15P203.2	Draw 2D sketching using parametric technology
M15P203.3	Draw 3D machine components modeling using parametric feature-based modeling
M15P203.4	Create 3D assemblies that represent static or dynamic Mechanical Systems
M15P203.5	Understand and impliment Geometric Dimensioning and Tolerancing
M15P203.6	Communicate between Design and Manufacturing using 2D drawings

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Department of Mechanical Engineering, Course Name: Audit Course -I (M15P[illegible]A.Y 2019-20	
M15P207.1	Generate awareness about number of people dyeing every year in road accidents, traffic rules and characteristics of accident.
M15P207.2	Understand the importance of multidisciplinary approach to planning for traffic safety and rehabilitation
M15P207.3	Gain information and knowledge about people responsible for accidents and their duties
M15P207.4	Understand 5 P's of road safety education
Course Outcome For SE Year Sem-II Course 2015 Pattern	
Department of Mechanical Engineering, Course Name: Fluid Mechanics (M15P208), A.Y 2019-20	
M15P208.1	DETERMINE various properties of fluid
M15P208.2	APPLY the laws of fluid statics and concepts of buoyancy
M15P208.3	IDENTIFY types of fluid flow and terms associated in fluid kinematics
M15P208.4	UNDERSTAND and APPLY principles of fluid dynamics to laminar flow
M15P208.5	ESTIMATE friction and minor losses in internal flows and UNDERSTAND the concept of boundary layer formation over an external surface
M15P208.6	CONSTRUCT mathematical correlation considering dimensionless parameters, also ABLE to predict the performance of prototype using model laws
Department of Mechanical Engineering, Course Name: Soft Skills (M15P209), A.Y 2019-20	
M15P209.1	Understand about SWOT analysis & identify their Strenghts,Weakness,Opportunity & Threats
M15P209.2	understand the differnce between listening & Hearing
M15P209.3	Improve presentation &speaking skills
M15P209.4	write their resume
M15P209.5	Apply businees etiquette for right attitudinal behavioural change
M15P209.6	Communicate effectively in a group with help of social media

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Department of Mechanical Engineering, Course Name: Theory of Machines -I (M15P210), A.Y 2019-20	
M15P210.1	IDENTIFY mechanisms in real life applications.
M15P210.2	PERFORM kinematic analysis of simple mechanisms.
M15P210.3	PERFORM static and dynamic force analysis of slider crank mechanism.
M15P210.4	DETERMINE moment of inertia of rigid bodies experimentally
M15P210.5	ANALYZE velocity and acceleration of mechanisms by vector and graphical methods
Department of Mechanical Engineering, Course Name: Engineering Metallurgy (M15P211), A.Y 2019-20	
M15P211.1	UNDERSTAND the basic concept of Engineering Metallurgy and construct Equilibrium diagrams.
M15P211.2	PREPARE the specimen for Metallography and analyze microstructures for ferrous and nonferrous metals for Industrial applications.
M15P211.3	COMPARE various types of steels and alloys for its applications.
M15P211.4	IDENTIFY the suitable heat treatment methods for different types of steels.
M15P211.5	DIFFERENTIATE various specific grades of steels and modern materials for engineering practices.
M15P211.6	CLASSIFY the various Nonferrous metals and their alloys for industrial applications.
Department of Mechanical Engineering, Course Name: Applied Thermodynamics (M15P212), A.Y 2019-20	
M15P212.1	Classify various types of Engines, Compare Air standard, Fuel Air and Actual cycles and identify various losses in real cycles.
M15P212.2	Understand fundametales of petrol engine including Theory of Carburetion, Stages of Combustion in S. I. Engines and Theory of Detonation, and factors affecting detonation
M15P212.3	Understand fundametales of petrol engine including Fuel Supply system, Types of Injectors and Injection Pumps,Comparison of SI and CI Combustion and Knocking and Factors affecting, Criteria for good combustion chamber and types
M15P212.4	Investigate performance parameters of I. C. Engines
M15P212.5	Describe construction and working of various I. C. Engine systems also various harmful gases emitted from exhaust and different devices to control pollution and emission norms for pollution control
M15P212.6	Describe construction, working of various types of reciprocating and rotary compressors with performance calculations of positive displacement compressors

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Department of Mechanical Engineering, Course Name: Electrical & Electronics Engineering (M15P213), A.Y 2019-20	
M15P213.1	Explain the operation of DC motor ,its speed control methods and braking
M15P213.2	Describe the operation of Induction Motor and its speed control methods.
M15P213.3	Select sutaible special purpose motor and its industrial applications.
M15P213.4	Compare between microprocessor and microcontroller & apply programming concept.
M15P213.5	Understand Interfacing of Peripheral output devices
M15P213.6	Devlop interfacing of different types of sensors and other hardware devices with Atmega328p based Arduino board.
Department of Mechanical Engineering, Course Name: Machine Shop -I (M15P214), A.Y 2019-20	
M15P214.1	Manufacture spur gear on milling machine using indexing head
M15P214.2	Perform surface grinding using table grinder
M15P214.3	Prepare sheet metal component involving metal forming operations
M15P214.4	Produce component using injection type plastic moulding machine
Course Outcome For TE Sem-I Course 2015 Pattern	
Department of Mechanical Engineering, Course Name: Design of Machine Elements -I (M15P301), A.Y 2019-20	
M15P301.1	Design the cotter joints, knuckle joints, levers and component subjected to eccentric loading.
M15P301.2	Design shafts,keys and couplings under static load conditions
M15P301.3	Analyze different stresses in power screws and apply those in the procedure to design screw jack
M15P301.4	Evaluate dimensions of machine components under fluctuating load condition
M15P301.5	Evaluate and interpret the stress developed in welded and threaded joints
M15P301.6	Apply the design and development procedure for different types of springs

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	Department of Mechanical Engineering, Course Name: Heat Transfer (M15P30 Y 2019-20
M15P302.1	Analyze the various modes of heat transfer and implement the basic heat conduction equations for steady one dimensional thermal system.
M15P302.2	Apply general heat conduction equation to thermal systems with internal heat generation & evaluate heat transfer through extended surfaces
M15P302.3	Validate lumped system analysis for transient heat conduction and identify insulating materials
M15P302.4	Analyze the heat transfer rate in natural and forced convection and evaluate through experimental investigation
M15P302.5	Estimating heat transfer by radiation between objects with different geometries
M15P302.6	Analyze the heat transfer equipments and estimate their performance
	Department of Mechanical Engineering, Course Name: Theory of Machines -II (M15P303), A.Y 2019-20
M15P303.1	Understand fundamental of gear which will be the prerequisite for gear design.
M15P303.2	Perform force analysis of Spur, Helical , Bevel , worm & Worm Gear
M15P303.3	Analyze speed & torque in epi-cyclic gear train which will help in gear design
M15P303.4	Design cam profile with particular follower motion & understand cam jump phenomenon , advance cam curves
M15P303.5	Synthesize a four bar mechanism with analytical & graphical methods
M15P303.6	Analyze the gyroscopic couple or its effect for stabilization of ship, aeroplane , Four wheeler vehicle & they will also choose appropriate drive for given application.

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epartment of Mechanical Engineering, Course Name: Turbo Machines (M15P A.Y 2019-20	
M15P304.1	Know the basic principles, governing equations and applications of turbo Machines
M15P304.2	Understand construction and working principle of Turbo Machines.
M15P304.3	Design and evaluate different parameters for Turbo Machines.
M15P304.4	Analyse different Turbo Machines.
M15P304.5	Predict performance of different Turbo Machines applying model analysis.
M15P304.6	Evaluate the performance characteristics of Turbo Machines.

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Dep. ...ent of Mechanical Engineering, Course Name: Metrology & Quality Controls ...P305), A.Y 2019-20	
M15P305.1	Select the appropriate measuring instruments (standards), design guages and calibrate measuring instruments.
M15P305.2	Understand the conventional methods of measurements and estimate the different parameters of gear and threads.
M15P305.3	Understand the advanced methods of measurements such as CMM, Machine Vision System, Interferometer and Laser Metrology.
M15P305.4	Associate quality control tools (Techniques) for industrial applications.
M15P305.5	Apply the appropriate statistical tools to investigate and predict the quality of product/process.
M15P305.6	Describe the different techniques in total quality management systems.

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	epartment of Mechanical Engineering, Course Name: Skill Development (M15), A.Y 2019-20
M15P306.1	Assemble the different components such as tail stock, IC engine which are required for shop floor working
M15P306.2	Acquire the knowledge of tool and tackles used in machine assembly shop
M15P306.3	use the Therotical knowledge in practical work
	Department of Mechanical Engineering, Course Name: NMAO (M15P307), A.Y 2019-20
M15P307.1	Implement appropriate numerical methods and solver to evaluate roots of equation. Measure the numerical errors.
M15P307.2	Apply direct and approximate methods to solve linear algebric equations and formulation of algorithms and programs.
M15P307.3	Build solutions for real life problem using optimization techniques.
M15P307.4	Choose and validate appropriate methods to solve initial and boundary value problems in Ordinary Differential Equations and Partial Differential Equatons.
M15P307.5	Apply and validate various techniques for regression analysis and curve fitting.
M15P307.6	Analyze different numerical integration methods.
	Course Outcome For TE Year Sem-II Course 2015 Pattern
CO No	Statement

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Department of Mechanical Engineering, Course Name: Design of Machine Elements -I (M15P308), A.Y 2019-20	
M15P308.1	Design Spur, Helical, Bevel and Worm gears and apply it for industrial applications
M15P308.2	Analyze Rolling contact bearing and its selection from manufacturer's Catalogue
M15P308.3	Select belt, rope and chain drive from manufacturer's Catalogue
M15P308.4	Analyze and select sliding contact bearing for industrial applications
Department of Mechanical Engineering, Course Name: Refrigeration & Air Conditioning (M15P309), A.Y 2019-20	
M15P309.1	Know the applications of refrigeration and air conditioning systems and present the properties, applications and environmental issues of different refrigerants.
M15P309.2	Obtain cooling capacity and coefficient of performance by conducting test on vapour compression refrigeration and vapour absorption refrigeration systems.
M15P309.3	Analyze the refrigeration cycles and methods for improving performance of refrigeration systems.
M15P309.4	Understand basic air conditioning processes on psychrometric chart and calculate cooling load for various comfort and industrial air conditioning applications.
M15P309.5	Choose different components of refrigeration and air conditioning systems as per their operating principles and the requirement.
M15P309.6	Select air distribution and air handling systems as per requirement.
Department of Mechanical Engineering, Course Name: Mechatronics (M15P310), A.Y 2019-20	
M15P310.1	Understand principle of sensors, its characteristics and applications in mechatronics system
M15P310.2	Identify key elements of mechatronics system and represention in terms of block diagram
M15P310.3	Sensors and Actuators interfacing with DAQ using appropriate microcontroller
M15P310.4	Develop PLC ladder programming for various control system application.
M15P310.5	System modelling & stability analysis in frequency domain for control system application
M15P310.6	Implementation of PID control on real time systems

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Department of Mechanical Engineering, Course Name: Manufacturing Process -II (M15P311), A.Y 2019-20	
M15P311.1	Apply the knowledge of various manufacturing Processes
M15P311.2	Identify various process parameter and their effect on processes
M15P311.3	Figure out application of Modern Machining
M15P311.4	Aapply the knowledge of different advanced machining processes
M15P311.5	Get familiarize with control systems, Manual part programming (plain milling and turning), Subroutine, Canned cycle
M15P311.6	Get the knowledge of Jigs and Fixtures for variety of operations.
Department of Mechanical Engineering, Course Name: Machine Shop- II (M15P312), A.Y 2019-20	
M15P312.1	Understand and implement process planning sheet of job
M15P312.2	Draft jog and fixture drawing maually
M15P312.3	Excute various opertions on lathe machine to develop proposed mechanical component
Department of Mechanical Engineering, Course Name: Seminar (M15P313), A.Y 2019-20	
M15P313.1	Establish motivation for any topic of interest and develop a thought process for technical presentation
M15P313.2	Organize a detailed literature survey and build a document with respect to technical publications.
M15P313.3	Analysis and comprehension of proof-of-concept and related data.
M15P313.4	Effective presentation and improve soft skills.
M15P313.5	Make use of new and recent technology (e.g. Latex) for creating technical reports

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	partment of Mechanical Engineering, Course Name: Audit Course -II (M15P A.Y 2019-20
M15P314.1	Appreciate the concept of Entrepreneurship
M15P314.2	Identify Entrepreneurship opportunity .
M15P314.3	Develop winning business plans.

	Course Outcome For BE Sem-I Course 2015 Pattern
	Department of Mechanical Engineering, Course Name: Hydraulics & Pneumatics (M15P401), A.Y 2019-20
CO No	Statement
M15P401.1	Understand working principle of components used in hydraulic & pneumatic systems
M15P401.2	Identify various applications of hydraulic & pneumatic systems
M15P401.3	Selection of appropriate components required for hydraulic and pneumatic systems
M15P401.4	Analyse hydraulic and pneumatic systems for industrial/mobile applications
M15P401.5	Design a system according to the requirements
M15P401.6	Develop and apply knowledge to various applications

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Department of Mechanical Engineering, Course Name: CAD / CAM Automation (M15P402), A.Y 2019-20	
M15P402.1	Associate and apply homogeneous transformation matrices for geometrical transformations mapping of 2D CAD entities.
M15P402.2	Estimate analytical and synthetic curve profiles and associate various types of surfaces and solid modeling approaches for part modeling.
M15P402.3	Simulate the structural analysis of simple mechanical elements like bars, beams, trusses, etc. using Finite Element Analysis software like ANSYS and comment on their safety.
M15P402.4	Program CNC code for Turning / Milling operations and simulate tool path using CAM software.
M15P402.5	Differentiate various additive rapid manufacturing techniques for engineering applications.
M15P402.6	Differentiate roles and components of various industrial automation strategies.
Department of Mechanical Engineering, Course Name: Dynamics of Machinery (M15P403), A.Y 2019-20	
M15P403.1	Understand different methods to determine natural frequency for single DOF undamped & damped free vibratory systems.
M15P403.2	Analyze response of forced vibrations due to harmonic excitation, base excitation and excitation due to unbalanced forces.
M15P403.3	Evaluate natural frequencies, mode shapes for 2 DOF undamped free longitudinal and torsional vibratory systems.
M15P403.4	Apply balancing technique for static and dynamic balancing of multi cylinder inline and radial engines.
M15P403.5	Understand uses of vibration measuring instruments for industrial / real life applications along with suitable method for vibration control.
M15P403.6	Analyze noise measurement & noise reduction techniques for industry and day today life problems.
Department of Mechanical Engineering, Course Name: Elective -I Finite Element (M15P 404A), A.Y 2019-20	
M15P404A.1	Understand basic fundamentals of finite element model using different approaches.
M15P404A.2	Apply FEA technique to solve problems on bar, beams and truss for calculating displacement, stresses and reaction.
M15P404A.3	Evaluate stresses and displacements of 2D problems by using FEA.
M15P404A.4	Implement the concept of isoparametric Elements, Co-ordinate Mapping & Numerical Integration in FEA.
M15P404A.5	Formulate the Finite Element model and Implement it to solve one dimensional heat transfer problem.
M15P404A.6	Apply lumped and mass system methods and investigate dynamic behavior for bar, truss and beam element.

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Department of Mechanical Engineering, Course Name: Elective -I Computational Fluid Dynamics (M15P 404B), A.Y 2019-20	
M15P404B.1	Students should be able to model fluid / heat transfer problems and apply fundamental conservation principles
M15P404B.2	Students should be able to do discretize the governing equations by Finite Difference Method and Finite volume Method.
M15P404B.3	Students should be able to develop programming skills by in-house code development for conduction, convection and fluid dynamics problems.
M15P404B.4	Students should be able to solve basic convection and diffusion equations and understands the role in fluid flow and heat transfer.
M15P404B.5	To prepare the students for research leading to higher studies.
M15P404B.6	To prepare the students for career in CAE industry using software tools.
Department of Mechanical Engineering, Course Name: Elective -I Heating Ventilation & Air Conditioning (M15P 404C), A.Y 2019-20	
M15P404C.1	Evaluate the performance parameters of trans-critical & ejector refrigeration systems
M15P404C.2	Estimate thermal performance of compressor, evaporator, condenser and cooling tower.
M15P404C.3	Analyze refrigerant piping design, capacity & safety controls and balancing of vapour compressor system.
M15P404C.4	Estimate heat transmission through building walls using CLTD and decrement factor &time lag methods with energy-efficient and cost-effective measures for building envelope.
M15P404C.5	Recognise working of types of desiccant, evaporative, thermal storage, radiant cooling, clean room and heat pump air-conditioning systems.
M15P404C.6	Evaluate working of types of desiccant, evaporative, thermal storage, radiant cooling, clean room and heat pump air-conditioning systems.
Department of Mechanical Engineering, Course Name: Elective -II Automobile Engineering (M15P 405A), A.Y 2019-20	
M15P405A.1	Understanding the automobile vehicle and it's layout. Demonstrate Automobile Transmission system like clutch, gear box, etc
M15P405A.2	Demonstrate Automobile control system like Axle, steering, suspension, wheels and tyres with it's construction and working.
M15P405A.3	Demonstrate system like Suspension and Brakes with its Contruction and working principle
M15P405A.4	Demonstrate of vehicle performance and safety of vehicle based on various road conditions
M15P405A.5	Demonstrate electrical system like lighting, starting charging with its Contruction and working principle. also demonstrate Automobile maintenance
M15P405A.6	Demonstrate the Automobile system like Electrical and hybrid vehicles with their construction and working. Environment importance to use this vehicles and future scope.

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Department of Mechanical Engineering, Course Name: Elective -II Operational Research (M15P 405B), A.Y 2019-20	
M15P405B.1	Apply the knowledge of LPP and decision theory to solve the problems related to top level management.
M15P405B.2	Optimize the available resources with the help of transportation and assignment models.
M15P405B.3	Select the optimal strategies in conflicting situations and solve simple problems of replacement.
M15P405B.4	Solve, analyze and optimize the simple problems of CPM and PERT by using project management techniques.
M15P405B.5	Improve the decision making and also critical thinking related to sequencing as well as queuing models.
M15P405B.6	Optimize multi stage decision making environments.
Department of Mechanical Engineering, Course Name: Elective-II Energy Audit & Management (M15P 405A), A.Y 2019-20	
M15P405C.1	Identify the demand supply gap of energy in Indian scenario
M15P405C.2	Carry out energy audit of an industry/Organization.
M15P405C.3	Draw the energy flow diagram of an industry and identify the energy wasted or a waste stream.
M15P405C.4	Select appropriate energy conservation method to reduce the wastage of energy.
M15P405C.5	Evaluate the techno economic feasibility of the energy conservation technique adopted.
M15P405C.6	Select appropriate cogeneration technique suitable for organization
Department of Mechanical Engineering, Course Name: Project -I (M15P 406), A.Y 2019-20	
M15P406.1	Students will be able to find out the gap between existing mechanical systems and develop new creative new mechanical system.
M15P406.2	Students will be able to learn about the literature review.
M15P406.3	Students will be able to get the experience to handle various tools, tackles and machines.

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Course Outcome For BE Year Sem-II Course 2015 Pattern	
Department of Mechanical Engineering, Course Name: Energy Engineering /Power Plant Engineering (M15P 407), A.Y 2019-20	
M15P407.1	Describe present Energy generation scenario and Analyze the improved Rankine cycle with reheat and regenration, Cogeneration cycle .
M15P407.2	Analyze the steam condensers, recognize the an environmental impacts of thermal power plant and method to control the same
M15P407.3	Interpret the hydrograph and Analyze the flow duration curve
M15P407.4	Analyze Diesel Engine power plant & Gas turbine power cycle.
M15P407.5	Explain the fundamentals of non-conventional power plants
M15P407.6	Select power generation Equipment & determine depreciation cost.
Department of Mechanical Engineering, Course Name: Mechanical System Design (M15P 408), A.Y 2019-20	
M15P408.1	Design and model machine tool gear boxes for stated specifications
M15P408.2	Apply the statistical considerations in design to analyze the defects and failure modes in industrial products.
M15P408.3	Design Belt Conveyor System for Material Handling applications
M15P408.4	Design and model cylinders and pressure vessels for engineering applications
M15P408.5	Design I.C. engine components for stated specifications
M15P408.6	Apply appropriate optimum design principles to mechanical components.
Department of Mechanical Engineering, Course Name: Elective -III Tribology (M15P 409A), A.Y 2019-20	
M15P409A.1	Know the significance of role of tribology in Industry.
M15P409A.2	know the the basic concepts of friction and wear mechanism and their measurement along with lubrication methods.
M15P409A.3	Analyze the performance Hydrodynamic Bearings analytically.
M15P409A.4	Analyze the performance Hydrostatic Bearings analytically.
M15P409A.5	Know the mechanism of Elastohydrodynamic bearing and get the knowledge of advanced lubrication methods.
M15P409A.6	Apply the principles surface engineering in different applications of tribology.

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Department of Mechanical Engineering, Course Name: Elective -III Industrial Engineering (M15P 409B), A.Y 2019-20	
M15P409B.1	Apply the Industrial Engineering concept in the industrial environment.
M15P409B.2	Manage and implement different concepts involved in methods study and understanding of work content in different situations
M15P409B.3	Undertake small case study based project works regarding work measurement and time study.
M15P409B.4	Planning and controlling of production system and use of modern forecasting and mangement techniques for different types of industries Apply inventory models and techniques to create and recommend appropriate stocking solutions in various business settings.
M15P409B.5	Develop capability in integrating knowledge of design along with other aspects of value addition in the conceptualization and manufacturing stage of various products.
M15P409B.6	Identify various cost accounting and financial management practices widely applied in industries.
Department of Mechanical Engineering, Course Name: Elective -III Robotics (M15P 409C), A.Y 2019-20	
M15P409C.1	Identify different type of robot configuration and design gripper
M15P409C.2	select necessary Sensors, Drives and Control systems for Robot
M15P409C.3	Calculate forward and inverse kinematics and velocity in robotic systems by representing DH parameters
M15P409C.4	Plan trajectory for desired motion using trajectory planning tools for robot
M15P409C.5	Understand machine vision and select appropriate robot programming for given application
M15P409C.6	Understand Artificial intelligence, IoT, machine learning, and select simulation for robot configuration
Department of Mechanical Engineering, Course Name: Elective -IV Advanced Manufacturing Processes (M15P 410A), A.Y 2019-20	
M15P410A.1	Classify and analyze special forming processes
M15P410A.2	Analyze and identify applicability of advanced joining processes
M15P410A.3	Understand and analyze the basic mechanisms of hybrid non-conventional machining techniques
M15P410A.4	Select appropriate micro and nano fabrication techniques for engineering applications.
M15P410A.5	apply various additive manufacturing technology for product development in industrial applications
M15P410A.6	Compare various material characterization techniques used to analyze effects of chemical composition, crystal structure, topography etc. of specimens.

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Department of Mechanical Engineering, Course Name: Elective -IV Product Design & Development (M15P 410A), A.Y 2019-20	
M15P410B.1	On completion of the course, Students will be able to understand essential factors for product design.
M15P410B.2	On completion of the course, Students will be able to design product as per customer needs and satisfaction
M15P410B.3	On completion of the course, Students will be able to understand Processes and concepts during product development On completion of the course,
M15P410B.4	On completion of the course, Students will be able to understand methods and processes of Forward and Reverse engineering
M15P410B.5	On completion of the course, students will be able to carry various design processes as DFA, DFMEA, design for safety
M15P410B.6	On completion of the course, students will be able to understand the product life cycle and product data management
Department of Mechanical Engineering, Course Name: Project -II (M15P 411), A.Y 2019-20	
M15P411.1	Design and develope manufacturing set up /simulate various mechanical systems using various manufacturing processes / softwares
M15P411.2	Evaluate the solution to a problem defined on the basis of research gap
M15P411.3	Formulate a dissertation report

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Department of Enfineering Sciences

Criteria 2.6.1

List of CO of All Course for A.Y.: 2019-20

SUBJECT	ENGINEERING MATHEMATICS I
SUBJECT CODE	107001
CODE	Co with Statements
107001.1	Mean value theorems and its generalizations leading to taylors and maclaurians series useful in the analysis of engineering problems.
107001.2	The fourier series representation and harmonic analysis for design and analysis of periodic continuous and discrete systems.
107001.3	To deal with derivative of functions of several variables that are essential in various branches of engineering.
107001.4	To apply the concept of jacobian to find partial derivative of implicit function and functional dependence. use of partial derivatives in estimating errors and approximations and finding extreme values of function.
107001.5	The essential tool of matrices and ;linear algebra ina a comprehensive manner for analysis of system of linear equations.
107001.6	Finding linear and orthogonal transformations eigen values and eigen vectors applicable to engineering problems.
SUBJECT	ENGINEERING PHYSICS
SUBJECT CODE	107002
CODE	Co with Statements
107002.1	Develop understanding of interference, diffraction and polarization; connect it to few engineering applications.
107002.2	Learn basics of lasers and optical fibers and their use in some applications.
107002.3	Understand concepts and principles in quantum mechanics. Relate them to some applications.
107002.4	Understand theory of semiconductors and their applications in some semiconductor devices.
107002.5	Summarize basics of magnetism and superconductivity. Explore few of their technological applications.
107002.6	Comprehend use of concepts of physics for Non Destructive Testing. Learn some properties of nanomaterials and their application.

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SUBJECT	SYSTEMS OF MECHANICAL ENGINEERING
SUBJECT CODE	102003
CODE	Co with Statements
102003.1	Describe and compare the conversion of energy from renewable and non-renewable energy sources
102003.2	Explain basic laws of thermodynamics, heat transfer and their applications.
102003.3	List down the types of road vehicles and their specifications
102003.4	Illustrate various basic parts and transmission system of a road vehicle
102003.5	Discuss several manufacturing processes and identify the suitable process
102003.6	Explain various types of mechanism and its application
SUBJECT	BASICS ELECTRICAL ENGINEERING
SUBJECT CODE	103004
CODE	Co with Statements
103004.1	Differentiate between electrical and magnetic circuits and derive mathematical relation for self and mutual inductance along with coupling effect.
103004.2	Calculate series, parallel and composite capacitor as well as characteristics parameters of alternating quantity and phasor arithmetic
103004.3	Derive expression for impedance, current, power in series and parallel RLC circuit with AC supply along with phasor diagram.
103004.4	Relate phase and line electrical quantities in polyphase networks, demonstrate the operation of single phase transformer and calculate efficiency and regulation at different loading conditions
103004.5	Apply and analyze the resistive circuits using star-delta conversion KVL, KCL and different network theorems under DC supply.
103004.6	Evaluate work, power, and energy relations and suggest various batteries for different applications, concept of charging and discharging and depth of charge.

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SUBJECT	PROGRAMMING AND PROBLEM SOLVING
SUBJECT CODE	110005
CODE	Co with Statements
110005.1	Inculcate and apply various skills in problem solving and learn program design tools.
110005.2	Choose most appropriate programming constructs and features to solve the problems in diversified domains using python
110005.3	Exhibit the Modular programming skills for the problems which require the logical constructs of python language.
110005.4	Know library functions and develop programs dealing with Strings
110005.5	Learn Object oriented Programming concepts and implement the same developing python programs
110005.6	Study data storage and demonstrate the same using File handling using python programs
SUBJECT	WORKSHOP
SUBJECT CODE	111006
CODE	Co with Statements
111006.1	Familiar with safety norms to prevent any mishap in workshop.
111006.2	Able to handle appropriate hand tool, cutting tool and machine tools to manufacture a job.
111006.3	Able to understand the construction, working and functions of machine tools and their parts.
111006.4	Able to know simple operations (Turning and Facing) on a centre lathe.
SUBJECT	ENVIRONMENTAL SCIENCE I (AUDIT COURCE I)
SUBJECT CODE	101007
CODE	Co with Statements
101007.1	To explain the concepts and strategies related to sustainable development and various components of environment.
101007.2	To examine biotic and abiotic factors within an ecosystem, to identify food chains, webs, as well as energy flow and relationships.
101007.3	To identify and analyze various conservation methods and their effectiveness in relation to renewable and nonrenewable natural resources.
101007.4	To gain an understanding of the value of biodiversity and current efforts to conserve biodiversity on national and local scale.

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SUBJECT	ENGINEERING MATHEMATICS II
SUBJECT CODE	107008
CODE	Co with Statements
107008.1	The effective mathematical tools for solutions of first order differential equations that model physical processes such as Newton's law of cooling, electrical circuit, rectilinear motion, mass spring systems, heat transfer etc.
107008.2	The effective mathematical tools for solutions of first order differential equations that model physical processes such as Newton's law of cooling, electrical circuit, rectilinear motion, mass spring systems, heat transfer etc.
107008.3	Advanced integration techniques such as Reduction formulae, Beta functions, Gamma functions, Differentiation under integral sign and Error functions needed in evaluating multiple integrals and their applications.
107008.4	Trace the curve for a given equation and measure arc length of various curves.
107008.5	The concepts of solid geometry using equations of sphere, cone and cylinder in a comprehensive manner.
107008.6	Evaluation of multiple integrals and its application to find area bounded by curves, volume bounded by surfaces, Centre of gravity and Moment of inertia.
SUBJECT	ENGINEERING CHEMISTRY
SUBJECT CODE	107009
CODE	Co with Statements
107009.1	Apply the different methodologies for analysis of water and techniques involved in softening of water as commodity.
107009.2	Select appropriate electro-technique and method of material analysis.
107009.3	Demonstrate the knowledge of advanced engineering materials for various engineering applications
107009.4	Analyze fuel and suggest use of alternative fuels.
107009.5	Identify chemical compounds based on their structure.
107009.6	Explain causes of corrosion and methods for minimizing corrosion.

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SUBJECT	BASIC ELECTRONICS ENGINEERING
SUBJECT CODE	104010
CODE	Co with Statements
104010.1	Differentiate between electrical and magnetic circuits and derive mathematical relation for self and mutual inductance along with coupling effect.
104010.2	Calculate series, parallel and composite capacitor as well as characteristics parameters of alternating quantity and phasor arithmetic
104010.3	Derive expression for impedance, current, power in series and parallel RLC circuit with AC supply along with phasor diagram.
104010.4	Relate phase and line electrical quantities in polyphase networks, demonstrate the operation of single phase transformer and calculate efficiency and regulation at different loading conditions
104010.5	Apply and analyze the resistive circuits using star-delta conversion KVL, KCL and different network theorems under DC supply.
104010.6	Evaluate work, power, and energy relations and suggest various batteries for different applications, concept of charging and discharging and depth of charge.
SUBJECT	ENGINEERING MECHANICS
SUBJECT CODE	101011
CODE	Co with Statements
101011.1	Determine resultant of various force systems.
101011.2	Determine centroid, moment of inertia and solve problems related to friction.
101011.3	Determine reactions of beams, calculate forces in cables using principles of equilibrium.
101011.4	Solve trusses, frames for finding member forces and apply principles of equilibrium to forces in space.
101011.5	Calculate position, velocity and acceleration of particle using principles of kinematics.
101011.6	Calculate position, velocity and acceleration of particle using principles of kinetics and Work, Power, Energy.

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SUBJECT	ENGINEERING GRAPHICS
SUBJECT CODE	102012
CODE	Co with Statements
102012.1	Draw the fundamental engineering objects using basic rules and able to construct the simple geometries.
102012.2	Construct the various engineering curves using the drawing instrument
102012.3	Apply the concept of orthographic projection of an object to draw several 2D views and its sectional views for visualizing the physical state of the object.
102012.4	Apply the visualization skill to draw a simple isometric projection from given orthographic views precisely using drawing equipment.
102012.5	Draw the development of lateral surfaces for cut section of geometrical solids.
102012.6	Draw fully-dimensioned 2D,3D drawings using computer aided drafting tools.
SUBJECT	PROJECT BASED LEARNING
SUBJECT CODE	110013
CODE	Co with Statements
110013.1	Project based learning will increase their capacity and learning through shared cognition
110013.2	Students able to draw on lessons from several disciplines and apply them in practical way
110013.3	Learning by doing approach in PBL will promote long-term retention of material and replicable skill, as well as improve teachers' and students' attitudes towards
SUBJECT	ENVIRONMENTAL SCIENCE II (AUDIT COURCE 2)
SUBJECT CODE	101014
CODE	Co with Statements
101014.1	To provide a comprehensive overview of environmental pollution and the science and technology associated with the monitoring and control
101014.2	To understand the evolution of environmental policies and laws.
101014.3	To explain the concepts behind the interrelations between environment and the development.
101014.4	To examine a range of environmental issues in the field, and relate these to scientific theory.

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SUBJECT	PHYSICAL EDUCATION
SUBJECT CODE	107015
CODE	Co with Statements
107015.1	Concept of Physical Education, its Definition and Scope
107015.2	Fitness Assessment

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Department of Computer Engineering

Academic Year 2018-19

Program Outcomes

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
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,
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
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 Skills	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,
PO11	Project Management and Finance	Demonstrate knowledge and understanding of 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
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.

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Program Specific Outcomes (PSO)

A graduate of the Computer Engineering Program will demonstrate

PSO1	Professional Skills-The ability to understand, analyse and develop computer programs in the areas related to algorithms, system software, multimedia, web design, big data analytics, and networking for efficient design of computer-based systems of varying.
PSO2	Problem-Solving Skills- The ability to apply standard practices and strategies in software project development using open-ended programming environments to deliver a quality product for business success.
PSO3	Successful Career and Entrepreneurship- The ability to employ modern computer languages, Benvironments, and platforms in creating innovative career paths to be an entrepreneur, and a zest for higher studies.

Program Educational Objectives

PEO1	To prepare globally competent graduates having strong fundamentals and domain knowledge to provide effective solutions for engineering problems.
PEO2	To prepare the graduates to work as a committed professionals with strong professional ethics and values, sense of responsibilities, understanding of legal, safety, health, societal, cultural and environmental issues.
PEO3	To prepare committed and motivated graduates with research attitude, lifelong learning, investigative approach, and multidisciplinary thinking.
PEO4	To prepare the graduates with strong managerial and communication skills to work effectively as individual as well as in teams.

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Department of Computer Engineering

Course outcomes for all courses

2015 Pattern

Course Outcome For SE Year Sem-I Course

Department : Computer Engg. Course Name : Discreate Mathematics (C15P201)(210241), ACA.Year: 2018-19	
CO No.	Statement
C15P201.1	Design and analyze real world engineering problems by applying set theory, propositional logic and mathematical induction
C15P201.2	Develop skill in expressing mathematical properties of relation and function
C15P201.3	Identify number of logical possibilities of events to design professional engineering Solutions
C15P201.4	Model and solve computing problem using graph theory
C15P201.5	Evaluate tree structure to find out optimal solution to complex real world problems
C15P201.6	Analyze the properties of binary operations and evaluate the algebraic structure

Department : Computer Engg. Course Name : Digital Electronics and Logic Design (C15P202)(210242), ACA.Year: 2018-19	
CO No.	Statement
C15P202.1	Design and implement Combinational digital circuits using Algebraic simplifications methods.
C15P202.2	Design and Implement Sequential digital circuits as per the specifications.
C15P202.3	Construct ASM Chart and demonstrate the digital systems using VHDL
C15P202.4	Describe different types of Programmable logic devices(PLD's).
C15P202.5	Understand the working of logic families & Apply the knowledge to select the logic families IC packages as per the design specifications.
C15P202.6	Differentiate between Microprocessor and Microcontroller 8051 to develop a minimum embedded system for simple real world application.

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Department : Computer Engg. Course Name : Data Structures and Algorithms (C15P203)(210243), ACA.Year: 2018-19	
CO No.	Statement
C15P203.1	Describe and study data structure classification, programming constructs and algorithmic analysis.
C15P203.2	Demonstrate the use of array as a linear data structure, it's operations and applications.
C15P203.3	Discuss dynamic memory allocation using Linked List and performing operations along with its applications.
C15P203.4	Understand ,Implement and Apply operations performed on stack using array and linked representation.
C15P203.5	Analyze problems to use variants of queue and solve various queuing problems.
C15P203.6	Recognize the differences between various searching and sorting algorithms and discover efficient algorithms by analyzing computational efficiency of given searching/sorting algorithms.

Department : Computer Engg. Course Name : Computer Organization and Architecture (C15P204)(210244), ACA.Year: 2018-19	
CO No.	Statement
C15P204.1	Understand the structure, function and characteristics of Computer Systems.
C15P204.2	Acknowledge the design of various functional units and components of digital computers.
C15P204.3	Analyze the principles and functions of core architecture , Memory Access techniques and I/O system.
C15P204.4	Ascertain the foundation of instruction sets and illuminate their impact on processor design.
C15P204.5	Identify and compare the various I/O interfacing techniques.
C15P204.6	Understand basic concepts and perform arithmetic and logical operations.

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Department : Computer Engg. Course Name : Object Oriented Programming (C15P205)(210245), ACA.Year: 2018-19	
CO No.	Statement
C15P205.1	Analyse the strengths of classes and objects using object oriented programming
C15P205.2	Design and apply the concepts of inheritance and polymorphism OOP principles for effective programming
C15P205.3	Develop programming application using object oriented programming language C++ by virtual functions
C15P205.4	Analyse the Templates and Exception Handling used in OOP principles
C15P205.5	Design and apply the concepts of Files and Streams
C15P205.6	Design and apply the concepts of Standard Template Library (STL)

Department : Computer Engg. Course Name : Digital Electronics Lab (C15P206)(210246), ACA.Year: 2018-19	
CO No.	Statement
C15P206.1	Simplify Boolean Expressions using K Map.
C15P206.2	Design and implement combinational circuits.
C15P206.3	Design and implement sequential circuits.
C15P206.4	Develop simple real-world application using ASM and PLD.
C15P206.5	Choose appropriate logic families IC packages as per the given design specifications.
C15P206.6	Explain organization and architecture of computer system

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Department : Computer Engg. Course Name : Data Structures Lab (C15P207) (210247), ACA.Year: 2018-19	
CO No.	Statement
C15P207.1	To demonstrate a detailed understanding of behaviour of data structures like array, linked list, stack, and queue by developing programs.
C15P207.2	To use appropriate algorithmic strategy for better efficiency
C15P207.3	To summarize data searching and sorting techniques.
C15P207.4	To discriminate the usage of various structures in approaching the problem solution.
C15P207.5	To analyze and use effective and efficient data structures in solving various Computer Engineering domain problems.
C15P207.6	To design the algorithms to solve the programming problems.

Department : Computer Engg. Course Name : Object Oriented Programming Lab (C15P208) (210248), ACA.Year: 2018-19	
CO No.	Statement
C15P208.1	Analyze the strengths of object oriented programming.
C15P208.2	Design and apply OOP principles for effective programming.
C15P208.3	Develop programming application using object oriented programming language C++.
C15P208.4	Percept the utility and applicability of OOP.
C15P208.5	To use the object-oriented paradigm in program design.
C15P208.6	To understand object-oriented concepts such as data abstraction, encapsulation, inheritance, dynamic binding, and polymorphism.

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Department : Computer Engg. Course Name : Soft Skills (C15P209) (210249), ACA.Year: 2018-19	
CO No.	Statement
C19P209.1	Express effectively through verbal/oral communication and improve listening skill
C19P209.2	Write precise briefs or reports technical documents
C19P209.3	Prepare for group discussion / meeting / interview and presentations
C19P209.4	Explore goal / target setting self-motivation and practicing creative thinking
C19P209.5	Operate effective in multidisciplinary and heterogeneous teams through the knowledge of team work , Inter-personal relationships, conflict management and leadership qualities.

Department : Computer Engg. Course Name : Audit Course 1 Smart Cities IV (C15P210) (210250), ACA.Year: 2018-19	
CO No.	Statement
C15P210.1	Better understanding of the dynamic behavior of the urban system by going beyond the physical appearance and by focusing on representations, properties and impact factors
C15P210.2	Exploration of the city as the most complex human-made organism with a metabolism that can be modeled in terms of stocks and flows
C15P210.3	Knowledge about data-informed approaches for the development of the future city, based on crowd sourcing and sensing
C15P210.4	Knowledge about the latest research results in for the development and management of future cities
C15P210.5	Understanding how citizens can benefit from data-informed design to develop smart and responsive cities

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Course Outcome For SE Year Sem-II Course

Department : Computer Engg. Course Name : Engineering Mathematics III (C15P211) (207003), ACA.Year: 2018-19	
CO No.	Statement
C15P211.1	Linear differential equations of higher order applicable to Control systems, Computer vision and Robotics.
C15P211.2	Transform techniques such as Fourier transform, Z-transform and applications to Image processing.
C15P211.3	Statistical methods such as correlation, regression analysis and probability theory to analyze data and to make predictions applicable to machine intelligence
C15P211.4	Vector calculus necessary to analyse and design complex electrical and electronic devices as appropriate to Computer engineering
C15P211.5	Complex functions, conformal mappings and contour integration applicable to Image processing, Digital filters and Computer graphics.

Department : Computer Engg. Course Name : Computer Graphics (C15P212) (210251), ACA.Year: 2018-19	
CO No.	Statement
C15P212.1	Apply mathematics and logic to develop Computer programs for elementary graphic operations
C15P212.2	Develop scientific and strategic approach to solve complex problems in the domain of Computer Graphics
C15P212.3	Develop the competency to understand the concepts related to Computer Vision and Virtual reality
C15P212.4	Apply the logic to develop animation and gaming programs

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Department : Computer Engg. Course Name : Advanced Data Structures (C15P213) (210252), ACA.Year: 2018-19	
CO No.	Statement
C15P213.1	Identify the complexity goals of a good hashing technique and evaluation of the hashing technique with respect to a real world problem.
C15P213.2	Design and specify nonlinear data structure and implementation of binary tree along with its operations.
C15P213.3	Discuss graph ADT. Explore,analyse and apply various graph algorithms.
C15P213.4	Describe the algorithmic solutions for resource requirements and optimization using search trees.
C15P213.5	State and explain indexing methods and multiway search techniques.
C15P213.6	Describe the importance of secondary storage and indicate the real world usage. Demonstrate file organization techniques and illustrate the time and space complexities.

Department : Computer Engg. Course Name : Microprocessor (C15P214) (210253), ACA.Year: 2018-19	
CO No.	Statement
C15P214.1	Comprehend/ acquire the knowledge of the programmer's model of advanced processors and its memory organization
C15P214.2	Understand the functionality and concept of memory management and apply instruction set to develop assembly language programs
C15P214.3	Relate the system level features to implement multitasking and protection in 386 processor
C15P214.4	Identity and handle Exceptions and Interrupts for better resource utilization
C15P214.5	Apply and Identify debugging and testing techniques confined to 80386 DX.
C15P214.6	Construct different mathematical operations such as trigonometric floating point and statistical using Co-processor.

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Department : Computer Engg. Course Name : Principles of Programming Languages (C15P215) (210254), ACA.Year: 2018-19	
CO No.	Statement
C15P215.1	Analyze the strengths and weaknesses of programming languages for effective and efficient program development.
C15P215.2	Inculcate the principles underlying the programming languages enabling to learn new programming languages
C15P215.3	Understand different programming paradigms
C15P215.4	Know the programming paradigms effectively in application development
C15P215.5	Utilize the concept of inheritance, packages and interface in java
C15P215.6	Apply the exception handling in script programming for web development

Department : Computer Engg. Course Name :Computer Graphics Lab (C15P216) (210255), ACA.Year: 2018-19	
CO No.	Statement
C15P216.1	Define basic terminologies of Computer Graphics, interpret the mathematical foundation of the concepts of computer graphics and apply mathematics to develop Computer programs for elementary graphic operations.
C15P216.2	Define the concept of windowing and clipping and apply various algorithms to fill and clip polygons.
C15P216.3	Implement the core concepts of computer graphics, including transformation in two and three dimensions, viewing and projection.
C15P216.4	Explain the concepts of color models, lighting, shading models and hidden surface elimination.
C15P216.5	Describe the fundamentals of curves, fractals, animation and gaming.
C15P216.6	To design the algorithms to solve the programming problems.

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Department : Computer Engg. Course Name : Advanced Data Structures Lab (C15P217) (210256), ACA.Year: 2018-19	
CO No.	Statement
C15P217.1	To apply appropriate advanced data structure and efficient algorithms to approach the problems of various domain.
C15P217.2	To design the algorithms to solve the programming problems.
C15P217.3	To use effective and efficient data structures in solving various Computer Engineering domain problems.
C15P217.4	To analyze the algorithmic solutions for resource requirements and optimization.
C15P217.5	To use appropriate modern tools to understand and analyze the functionalities confined to the data structure usage.
C15P217.6	To understand various algorithmic strategies to approach the problem solution.

Department : Computer Engg. Course Name : Microprocessor Laboratory (C15P218) (210257), ACA.Year: 2018-19	
CO No.	Statement
C15P218.1	To apply the assembly language programming to develop small real life embedded application.
C15P218.2	To understand the architecture of the advanced processor thoroughly to use the resources for programming.
C15P218.3	To understand the higher processor architectures descended from 80386 architecture.
C15P218.4	To understand the system level features and processes of advanced processor.
C15P218.5	To acquaint the learner with application instruction set and logic to build assembly language programs.
C15P218.6	To learn the architecture and programmer's model of advanced processor.

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Department : Computer Engg. Course Name :Audit Course 2 Stress Relief: Yoga and Meditation VI (C15P219) (210258), ACA.Year: 2018-19	
CO No.	Statement
C15P219.1	Students understanding of philosophy and religion as well as daily life issues will be challenged and enhanced.
C15P219.2	Enhances the immune system.
C15P219.3	Intellectual and philosophical understanding of the theory of yoga and basic related Hindu scriptures will be developed.
C15P219.4	Powers of concentration, focus, and awareness will be heightened.

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2015 Pattern	
Course Outcome For TE Year Sem-I Course	
Department : Computer Engg. Course Name : Theory of Computation (C15P301) (310241), ACA.Year: 2018-19	
CO No.	Statement
C15P301.1	Understand formal language, translation logic, essentials of translation, alphabets, language representation and apply it to design Finite Automata and its variants.
C15P301.2	Understand basic building blocks of regular expression and apply them to construct regular expression. Understand the pumping Lemma and its use in theoretical computer science.
C15P301.3	Define and identify the properties of context free grammars. Illustrate different forms of grammar and its use in parsing. Learn to simplify the grammar.
C15P301.4	Demonstrate the push down automaton model for the context free language by designing and studying its different applications
C15P301.5	Understand the representation and Language Acceptability by Turing Machine. Design Turing machine for the different requirements outlined by theoretical computer science
C15P301.6	Acquire awareness about different classes of Problems, classify them and analyse them and study concepts of NP completeness.

Department : Computer Engg. Course Name : Database Management Systems (C15P302) (310242), ACA.Year: 2018-19	
CO No.	Statement
C15P302.1	Understand the fundamental concepts of database management as well as Analyse and Design Database model using E-R Diagram.
C15P302.2	Study and implement SQL and PI/SQL CURD operations on large volume of structured database
C15P302.3	Design a good relational database using techniques like Normalization, CODDs Rules to eliminate or reduce redundancy
C15P302.4	Identify the issues of transaction processing and concurrency control in relational database System.
C15P302.5	Study of different Database Architectures and its real time applications.
C15P302.6	Learn powerful, flexible, scalable and modern database programming techniques such as NOSQL to handle big data.

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Department : Computer Engg. Course Name : Software Engineering & Project Management (C15P303) (310243), ACA.Year: 2018-19	
CO No.	Statement
C15P303.1	Understand the fundamentals of software engineering and decide on process models and tools.
C15P303.2	Apply methods of capturing, specifying, visualizing and analyzing software requirements
C15P303.3	Analyze ways of design concept at architectural, component &interface level.
C15P303.4	Discuss various estimation and scheduling techniques and apply them.
C15P303.5	Know project risk management, software configuration management, maintenance and reengineering.
C15P303.6	Analyse testing types and tools and create test cases.

Department : Computer Engg. Course Name : Information System & Engineering Economics (C15P304) (310244), ACA.Year: 2018-19	
CO No.	Statement
C15P304.1	Understand the importance of various forms of an Information Systems and its application to an organization
C15P304.2	Learn the role of vendor management and understand ethical, social and privacy issues in IT governance.
C15P304.3	Study Information System Development and Project Management.
C15P304.4	Understand engineering economic analysis in decision making for earning and evaluating.
C15P304.5	Analyse the effects of inflation , economic equivalence of the project and calculate the present worth of a project
C15P304.6	Adapt perfect decisions for investment in business projects to reduce the tax.

Department : Computer Engg. Course Name : Computer Networks (C15P305) (310245), ACA.Year: 2018-19	
CO No.	Statement
C15P305.1	Explain the basic concepts used in networking and layered architecture of computer network and intersect the components of network to flow.
C15P305.2	Illustrate different link layer terminologies like error detection-correction and flow control used in network.
C15P305.3	Analyse and select appropriate channel allocation methodologies and different Multiple access protocol used in network
C15P305.4	Demonstrate the subnet formation with IP allocation mechanism and apply various routing algorithms to find shortest paths for network-layer packet delivery.
C15P305.5	Describe and Implement the services provided by TCP and UDP protocols used for reliable data transfer maintaining flow control and congestion control.
C15P305.6	Comprehend basic protocols of application layer with selection and usage for various sectors of user community.

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Department : Computer Engg. Course Name : Skill Development Lab (C15P306) (310246), ACA.Year: 2018-19	
CO No.	Statement
C15P306.1	To adapt the usage of modern tools and recent software.
C15P306.2	To evaluate problems and analyze data using current technologies
C15P306.3	To learn the process of creation of data-driven web applications using current technologies
C15P306.4	To understand how to incorporate best practices for building enterprise applications
C15P306.5	To learn how to employ Integrated Development Environment(IDE) for implementing and testing of software solution
C15P306.6	To construct software solutions by evaluating alternate architectural patterns.

Department : Computer Engg. Course Name : Database Management System Lab (C15P307) (310247), ACA.Year: 2018-19	
CO No.	Statement
C15P307.1	To develop basic, intermediate and advanced Database programming skills
C15P307.2	To develop basic Database administration skills
C15P307.3	To percept transaction processing
C15P307.4	To Develop the ability to handle databases of varying complexities
C15P307.5	Implement advanced database Programming concepts

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Department : Computer Engg. Course Name : Computer Networks Lab (C15P308) (310248), ACA.Year: 2018-19	
CO No.	Statement
C15P308.1	To establish communication among the computing nodes in P2P and Client-Server architecture
C15P308.2	Configure the computing nodes with understanding of protocols and technologies
C15P308.3	Use different communicating modes and standards for communication
C15P308.4	Use modern tools for network traffic analysis
C15P308.5	To learn network programming.

Department : Computer Engg. Course Name : Audit Course 3 I Cyber Security (C15P309) (310249), ACA.Year: 2018-19	
CO No.	Statement
C15P309.1	Compare the interrelationships among security roles and responsibilities in a modern information-driven enterprise—to include interrelationships across security do mains (IT, physical, classification, personnel, and so on)
C15P309.2	Assess the role of strategy and policy in determining the success of information security
C15P309.3	Estimate the possible consequences of misaligning enterprise strategy, security policy, and security plans

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Course Outcome For TE Year Sem-II Course

Department : Computer Engg. Course Name : Design and Analysis of Algorithms (C15P310) (310250), ACA.Year: 2018-19

CO No.	Statement
C15P310.1	Understand the performance parameter for recursive and non-recursive algorithms and use it in the design of algorithms for engineering problems
C15P310.2	Develop the skill to find the suitable algorithmic model for problems from functional and imperative models.
C15P310.3	Discuss different algorithmic strategies and apply them to solve various problems and analyse them
C15P310.4	Explain complexity theory along with different classes of problems and formulate solutions to problems.
C15P310.5	Summarize amortised analysis and apply on various types of algorithms. Synthesise algorithms to common engineering situations
C15P310.6	Analyse the properties of multithreaded, distributed algorithms and the string matching algorithm.

Department : Computer Engg. Course Name : Systems Programming and Operating System(C15P311) (310251), ACA.Year: 2018-19

CO No.	Statement
C15P311.1	Understand the basic concepts of System Software. Analyse and implement Pass and Phase concepts for assembler design
C15P311.2	Analyse and synthesize macro processor design using efficient data structures.
C15P311.3	Study of language translator and tools viz. LEX &YACC to implement lexical analysis and syntax analysis.
C15P311.4	Study and Implement operating system functions to improve performance of operating system.
C15P311.5	Summarize the programming model for memory management and simulate the algorithms for performance analysis.
C15P311.6	Study and implement the I/O management and file management.

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Department : Computer Engg. Course Name : Embedded Systems and Internet of Things(C15P312) (310252), ACA.Year: 2018-19	
CO No.	Statement
C15P312.1	Describe fundamentals of embedded systems with ARM and IoT including essence and basic design strategy of IoT
C15P312.2	Describe IoT based application according to IoT platform design methodology
C15P312.3	Develop real world IoT application &deploy it on physical devices by understanding pillars of embedded IoT
C15P312.4	Understand Protocol Standardization and Security for IoT.
C15P312.5	To understand the importance of web and cloud in IoT.
C15P312.6	Understand the architecture of cloud of things &Build web applications by using python web application framework

Department : Computer Engg. Course Name : Software Modelling & Design (C15P313) (310253), ACA.Year: 2018-19	
CO No.	Statement
C15P313.1	Analyse the problem statement (SRS) and choose proper design technique for designing web based/ desktop application
C15P313.2	Design and analyze an application using UML modeling as fundamental tool
C15P313.3	Apply design patterns to understand reusability in OO design
C15P313.4	Decide and apply appropriate modern tool for designing and modelling
C15P313.5	Decide and apply appropriate modern testing tool for testing web-based/desktop application

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Department : Computer Engg. Course Name : Web Technology (C15P314) (310254), ACA.Year: 2018-19	
CO No.	Statement
C15P314.1	Perceive the basics of web and Design static web based application using HTML,CSS,XML
C15P314.2	Understand and employ Javascript, Jquery to design and develop Static and dynamic web based applications.
C15P314.3	To understand and apply the concepts of Servlet and JSP using different JSP elements
C15P314.4	To acquaint and employ PHP, AJAX programming functionalities including MYSQL integration. To design and evaluate dynamic web applications with PHP, AJAX and MYSQL.
C15P314.5	To design, understand, implement MVC architecture with AngularJS and NodeJS functionalities.
C15P314.6	To understand web services and content management.

Department : Computer Engg. Course Name : Seminar and Technical Communication (C15P315) (310255), ACA.Year: 2018-19	
CO No.	Statement
C15P315.1	To explore the basic principles of communication (verbal and non-verbal) and active, empathetic listening, speaking and writing techniques.
C15P315.2	To expose the student to new technologies, researches, products, algorithms, services
C15P315.3	To explore to be familiar with basic technical writing concepts and terms, such as audience analysis, jargon, format, visuals, and presentation.
C15P315.4	To improve skills to read, understand, and interpret material on technology
C15P315.5	To improve communication and writing skills

Department : Computer Engg. Course Name : Web Technology Lab (C15P316),(310256), ACA.Year: 2018-19	
CO No.	Statement
C15P316.1	To use current client side and server side web technologies
C15P316.2	To implement communication among the computing nodes using current client side and server side technologies
C15P316.3	To design and implement web services with content management

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Department : Computer Engg. Course Name : System Programming &Operating System Lab (C15P317) (310257), ACA.Year: 2018-19	
CO No.	Statement
C15P317.1	To implement basic language translator by using various needed data structures
C15P317.2	To implement basic Macroprocessor
C15P317.3	To design and implement Dynamic Link Libraries
C15P317.4	To implement scheduling schemes

Department : Computer Engg. Course Name : Embedded Systems & Internet of Things Lab(C15P318) (310258), ACA.Year: 2018-19	
CO No.	Statement
C15P318.1	To understand functionalities of various single board embedded platforms fundamentals
C15P318.2	To develop comprehensive approach towards building small low cost embedded IoT system.
C15P318.3	To implement the assignments based on sensory inputs

Department : Computer Engg. Course Name : Audit Course 4 I Digital and Social Media Marketing(C15P319) ((310259), ACA.Year: 2018-19	
CO No.	Statement
C15P319.1	To Identify best practices for Social Media Marketing, including platform level best practices
C15P319.2	To Connect business objectives to appropriate Social Media tactics.
C15P319.3	To Create strong content that engages their target audience with their marketing message.

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Course Outcome For BE Year Sem-I Course

Department : Computer Engg. Course Name : High Performance Computing (C15P401) (410241), ACA.Year: 2018-19	
CO No.	Statement
C15P401.1	Transform algorithms in the computational area to efficient programming code for modern computer architectures
C15P401.2	Write, organize and handle programs for scientific computations
C15P401.3	Exploring tools for performance optimization and debugging of parallel algorithms.
C15P401.4	Present analysis of code with respect to performance and implement performance improvements
C15P401.5	To present test cases to solve problems using multi-core and distributed environments
C15P401.6	Analysis and design of novel techniques to parallelize the programming task

Department : Computer Engg. Course Name : Artificial Intelligence and Robotics (C15P402) (410242), ACA.Year: 2018-19	
CO No.	Statement
C15P402.1	Identify and apply suitable searching techniques for Artificial Intelligent Systems
C15P402.2	Decomposition of problem for development of suitable algorithms for constraint satisfaction and planning
C15P402.3	Apply logic and infer new facts using previous knowledge
C15P402.4	Construct Machine language translation by applying Natural Language Processing and simulation using Artificial Neural Networks.
C15P402.5	Develop mobile robotic system with deployment of various environment sensors and development of strategies for path finding.
C15P402.6	Design and Develop robots for various real time applications.

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Department : Computer Engg. Course Name : Data Analytics (C15P403) (410243), ACA.Year: 2018-19	
CO No.	Statement
C15P403.1	Write case studies in Business Analytic and Intelligence using mathematical models
C15P403.2	Present a survey on applications for Business Analytic and Intelligence
C15P403.3	Provide problem solutions for multi-core or distributed, concurrent/Parallel environments

Department : Computer Engg. Course Name : Data Mining & Warehousing (C15P404(D)) (410244(D)), ACA.Year: 2018-19	
CO No.	Statement
C15P404(D).1	Acquire various techniques to mine the data.
C15P404(D).2	Describe data warehouse with dimensional modelling and OLAP operations
C15P404(D).3	Recognize similarity and dissimilarity of the data and analyse its proximity to discover the patterns in data.
C15P404(D).4	Employ market basket analysis to generate association rules using mining algorithms
C15P404(D).5	Apply the various data mining techniques to classify the data
C15P404(D).6	Evaluate performance of classifier by applying machine learning techniques

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Department : Computer Engg. Course Name : Software Testing & Quality Assurance (C15P405(B)) (410245(B)), ACA.Year: 2018-19	
CO No.	Statement
C15P405(B).1	Describe fundamental concepts in software testing such as manual testing, automation testing and software quality assurance.
C15P405(B).2	Design and develop project test plan, design test cases, test data, and conduct test operations
C15P405(B).3	Apply recent automation tool for various software testing for testing software
C15P405(B).4	Understand in details working of selenium automation testing tool
C15P405(B).5	Apply different approaches of quality management, assurance, and quality standard to software system
C15P405(B).6	Apply and analyse effectiveness Software Quality Tools

Department : Computer Engg. Course Name : Laboratory Practice I (C15P406) (410246), ACA.Year: 2018-19	
CO No.	Statement
C15P406.1	To be conversant with performance analysis and modeling of parallel programs
C15P406.2	To understand the options available to parallelize the programs
C15P406.3	To learn various peculiar search strategies for AI
C15P406.4	To develop a mind to solve real world problems unconventionally with optimality
C15P406.5	To apply algorithmic strategies while solving problems
C15P406.6	To study algorithmic examples in distributed, concurrent and parallel environments

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Department : Computer Engg. Course Name : Laboratory Practice II (C15P407) (410247), ACA.Year: 2018-19	
CO No.	Statement
C15P407.1	To be conversant with performance analysis and modeling of parallel programs
C15P407.2	To understand the options available to parallelize the programs
C15P407.3	To learn various peculiar search strategies for AI
C15P407.4	To develop a mind to solve real world problems unconventionally with optimality
C15P407.5	To apply algorithmic strategies while solving problems
C15P407.6	To study algorithmic examples in distributed, concurrent and parallel environments

Department : Computer Engg. Course Name : Project Work Stage I (C15P408) (410248), ACA.Year: 2018-19	
CO No.	Statement
C15P408.1	To develop problem solving ability
C15P408.2	To Organize, sustain and report on a substantial piece of team work over a period of several months
C15P408.3	To Evaluate alternative approaches, and justify the use of selected tools and methods
C15P408.4	To find information for yourself from appropriate sources such as manuals, books, research journals and from other sources, and in turn increase analytical skills

Department : Computer Engg. Course Name : Audit Course 5 II Botnet of Things (C15P409) (410249), ACA.Year: 2018-19	
CO No.	Statement
C15P409.1	Implement security as a culture and show mistakes that make applications vulnerable to attacks.
C15P409.2	Understand various attacks like DoS, buffer overflow, web specific, database specific, web -spoofing attacks.
C15P409.3	Demonstrate skills needed to deal with common programming errors that lead to most security problems and to learn how to develop secure application

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Course Outcome For BE Year Sem-II Course

Department : Computer Engg. Course Name : Machine Learning (C15P410) (410250), ACA.Year: 2018-19	
CO No.	Statement
C15P410.1	Apply Machine learning concepts to distinguish different learning based applications.
C15P410.2	Synthesis with feature selection methodologies, design learning models and evaluate.
C15P410.3	Design and implement regression models and evaluate performance
C15P410.4	Design and Implement supervised learning algorithms with different learning models.
C15P410.5	Design and implement decision trees and Ensemble Learning
C15P410.6	Design and implement different state of the art clustering techniques.

Department : Computer Engg. Course Name : Information and Cyber Security (C15P411) (410251), ACA.Year: 2018-19	
CO No.	Statement
C15P411.1	Understand the security basics and elements of information security.
C15P411.2	Understand symmetric and asymmetric algorithms for encryption and decryption to secure data across networks.
C15P411.3	Apply the standard algorithms while communicating in cyberspace to provide data integrity, confidentiality and authentication.
C15P411.4	Analyze various protocols to ensure security over networks.
C15P411.5	Design intrusion detection system and security solutions against cyber-attacks by applying policies of firewall
C15P411.6	Acquire the knowledge of Personally Identifiable Information (PII) and Indian Information Protection Law.

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Department : Computer Engg. Course Name : Elective III (Soft Computing and Optimization Algorithms) (C15P412 D) (410252(D)), ACA.Year: 2018-19	
CO No.	Statement
C15P412D.1	Understand and apply soft computing methodologies, including artificial neural networks, fuzzy logic, and genetic algorithms. Identify its real time applications.
C15P412D.2	Develop an efficient parallel algorithm to solve a given problem.
C15P412D.3	Apply the fuzzy logic &rules for reasoning to formulate the conclusions for the problem statements.
C15P412D.4	Design and development of certain scientific and commercial application using evolutionary processes
C15P412D.5	To design and develop commercial applications using Genetic Algorithms.
C15P412D.6	Learn a swarm intelligence, PSO &ACO, its formulation, topology, and different parameters.

Department : Computer Engg. Course Name : Elective IV(Human Computer Interface) (C15P413) (410253(B)), ACA.Year: 2018-19	
CO No.	Statement
C15P413.1	Understand the foundation of Human Computer Interaction and methods for evaluation of user interface.
C15P413.2	Understand HCI key design principles, rules and standards.
C15P413.3	Develop the design concepts with implementation tools, technology and identify errors.
C15P413.4	Evaluate the model to make products and services more usable, easy to learn and intuitive for the user
C15P413.5	Understand various users model like Predictive Models, Cognitive Models and apply it for evaluating the quality of a user interface
C15P413.6	Apply appropriate task models and dialogs to design systems that are usable by people

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Department : Computer Engg. Course Name : Laboratory Practice III (C15P414) (410254), ACA.Year: 2018-19	
CO No.	Statement
C15P414.1	Apply Machine learning concepts to distinguish different learning based applications.
C15P414.2	Synthesis with feature selection methodologies, design learning models and evaluate.
C15P414.3	Design and implement regression models and evaluate performance
C15P414.4	Understand the security basics and elements of information security.
C15P414.5	Understand symmetric and asymmetric algorithms for encryption and decryption to secure data across networks.
C15P414.6	Apply the standard algorithms while communicating in cyberspace to provide data integrity, confidentiality and authentication.

Department : Computer Engg. Course Name : Laboratory Practice IV (C15P415) (410255), ACA.Year: 2018-19	
CO No.	Statement
C15P415.1	Understand and apply soft computing methodologies, including artificial neural networks, fuzzy logic, and genetic algorithms. Identify its real time applications.
C15P415.2	Develop an efficient parallel algorithm to solve a given problem.
C15P415.3	Apply the fuzzy logic &rules for reasoning to formulate the conclusions for the problem statements.
C15P415.4	Understand the foundation of Human Computer Interaction and methods for evaluation of user interface.
C15P415.5	Understand HCI key design principles, rules and standards.
C15P415.6	Develop the design concepts with implementation tools, technology and identify errors.

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Department : Computer Engg. Course Name : Project Work Stage II (C15P416) (410256), ACA.Year: 2018-19	
CO No.	Statement
C15P416.1	Show evidence of independent investigation
C15P416.2	Critically analyze the results and their interpretation.
C15P416.3	Report and present the original results in an orderly way and placing the open questions in the right perspective.
C15P416.4	Link techniques and results from literature as well as actual research and future research lines with the research.
C15P416.5	Appreciate practical implications and constraints of the specialist subject

Department : Computer Engg. Course Name : Audit Course 6 I Business Intelligence (C15P417) (410257), ACA.Year: 2018-19	
CO No.	Statement
C15P417.1	Apply the concepts of Business Intelligence in real world applications
C15P417.2	Explore and use the data warehousing wherever necessary
C15P417.3	Design and manage practical BI system

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Department of Computer Engineering

Academic Year 2018-19

Post Graduate Programme on Computer Engineering (M.E. computer Engineering)

Program Outcomes

PO1	Scholarship of Knowledge	Acquire in-depth knowledge of Computer Science and Engineering, including wider and global perspective, with an ability to discriminate, evaluate, analyze and synthesize existing and new knowledge, and integration of the same for enhancement of knowledge.
PO2	Critical Thinking	Analyze complex engineering problems critically; apply independent judgment for synthesizing information to make intellectual and/or creative advances for conducting research in a wider theoretical, practical and policy context.
PO3	Problem Solving	Think laterally and originally, conceptualize and solve engineering problems, evaluate a wide range of potential solutions for those problems and arrive at feasible, optimal solutions after considering public health and safety, cultural, societal and environmental factors in the core areas of expertise.
PO4	Research Skills	Extract information pertinent to unfamiliar problems through literature survey and experiments, apply appropriate research methodologies, techniques and tools, design, conduct experiments, analyze and interpret data, demonstrate higher order skill and view things in a broader perspective, contribute individually/in group(s) to the development of scientific/technological knowledge in one or more domains of engineering.
PO5	Usage of Modern Tools	Create, select, learn 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	Collaborative and Multidisciplinary work	Possess knowledge and understanding of group dynamics, recognize opportunities and contribute positively to collaborative-multidisciplinary scientific research, demonstrate a capacity for self-management and teamwork, decision-making based on open-mindedness,objectivity and rational analysis in order to achieve common goals and further the learning of themselves as well as others.
PO7	Project Management and Finance	Demonstrate knowledge and understanding of Computer Science & Engineering and management principles and apply the same to one's own work, as a member and leader in a team, manage projects efficiently in respective disciplines and multidisciplinary environments after consideration of economical and financial factors.

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PO8	Communication	Communicate with the engineering community, and with society at large, regarding complex engineering activities confidently and effectively, such as, being able to comprehend and write effective reports and design documentation by adhering to appropriate standards, make effective presentations, and give and receive clear instructions.
PO9	Life-long learning	Recognize the need for, and have the preparation and ability to engage in life-long learning independently, with a high level of enthusiasm and commitment to improve knowledge and competence continuously.
PO10	Ethical Practices and Social Responsibility	Acquire professional and intellectual integrity, professional code of conduct, ethics of research and scholarship, consideration of the impact of research outcomes on professional practices and an understanding of responsibility to contribute to the community for sustainable development of society
PO11	Independent and Reflective Learning	Observe and examine critically the outcomes of one's actions and make corrective measures subsequently, and learn from mistakes without depending on external feedback

Program Specific Outcomes (PSO)

A graduate of the Computer Engineering Program will demonstrate

PSO1	Professional Skills: The ability to understand, analyze and develop software in the areas related to system software, multimedia, web design, big data analytics, networking, and algorithms for efficient design of computer-based systems of varying complexities.
PSO2	Successful Career and Entrepreneurship- The ability to employ modern computer languages, Benvironments, and platforms in creating innovative career paths to be an entrepreneur, and a zest for higher studies.

Program Educational Objectives

PEO1	To prepare globally competent post graduates with enhanced domain knowledge and skills attaining professional excellence and updated with modern technology to provide effective solutions for engineering and research problems
PEO2	To prepare the post graduates to work as a committed professionals with strong professional ethics and values, sense of responsibilities, understanding of legal, safety, health, societal, cultural and environmental issues.
PEO3	To prepare committed and motivated post graduates with research attitude, lifelong learning, investigative approach, and multidisciplinary thinking to succeed in the career in industry/academia/research.
PEO4	To prepare the post graduates with strong managerial and communication skills to work effectively as individual as well as in teams.

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Department of Computer Engineering

Course outcomes for all courses

2017 Pattern

Course Outcome For M.E. Computer Engineering First Year Sem-I

Department : Computer Engg. Course Name : Research Methodology (510101), ACA.Year: 2018-19	
CO No.	**Statement**
510101.1	Discuss some basic concepts of research and its code of ethics.
510101.2	Identify appropriate research topics through literature search and review.
510101.3	Discuss various statistical analysis tools to measure errors in research.
510101.4	Discuss various optimization techniques in engineering research.
510101.5	Apply ethics and practices in survey based research methods.
510101.6	Write and present a research report.

Department : Computer Engg. Course Name : Bio-Inspired Optimization Algorithm (510102), ACA.Year: 2018-19	
CO No.	**Statement**
510102.1	Understand and design algorithms for particular classes of problems
510102.2	Apply various evolutionary computation methods and algorithms for particular classes of problems.
510102.3	Discuss the basics of AI and different optimizations techniques.
510102.4	Select the optimal solution based on bio-inspired algorithms
510102.5	Apply nature-inspired algorithms to optimization
510102.6	Discuss the natural phenomena that motivate the algorithms

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Department : Computer Engg. Course Name : Software Development and Version Control (510103), ACA.Year: 2018-19	
CO No.	**Statement**
510103.1	Discuss and apply the design patterns for software development.
510103.2	Understand different software architectural designs.
510103.3	Discuss the basics oIdentify and assess the quality attributes of a system at the architectural level.f AI and different optimizations techniques.
510103.4	Discuss basic principles and purposes of Software Configuration Management (SCM)
510103.5	Discuss the need of software version control.
510103.6	Apply and Use of open source version control tool.

Department : Computer Engg. Course Name : Embedded and Real Time Operating System (510104), ACA.Year: 2018-19	
CO No.	**Statement**
510104.1	Recognize and classify embedded and real-time systems
510104.2	Apply various real time algorithms for building embedded systems.
510104.3	Discuss various I/O communication mechanism in embedded system.
510104.4	Design real time embedded systems using the concepts of RTOS.
510104.5	Discuss the communication bus protocols used for real-time systems.
510104.6	Categorize and represent scheduling algorithms.

Department : Computer Engg. Course Name : Data Mining(510105), ACA.Year: 2018-19	
CO No.	**Statement**
510105.1	Discuss various data mining phases and various ways of data mining.
510105.2	Recognize similarity and dissimilarity of the data and analyse its proximity to discover the patterns in data.
510105.3	Optimize the mining process by choosing best data mining technique
510105.4	Apply the various data mining techniques to classify the data

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510105.5	Apply data mining techniques to discover patterns in data
510105.6	Apply data mining for any project

Department : Computer Engg. Course Name : Laboratory Proficiency I (510106), ACA.Year: 2018-19	
CO No.	**Statement**
510106.1	Perform research based literature survey of any research paper
510106.2	Apply numerical and statistical modeling on a dataset
510106.3	Design any nature inspired algorithm
510106.4	Study of open source system/application software like Version Control in Linux Kernel
510106.5	Simulation/ Design, planning and modeling of a Real-Time / Embedded System
510106.6	Design and develop any data mining algorithm

Course Outcome For M.E. Computer Engineering First Year Sem-II

Department : Computer Engg. Course Name : Operations Research (510108), ACA.Year: 2018-19	
CO No.	**Statement**
510108.1	Model and solve linear programming problems using appropriate techniques.
510108.2	Identify and develop operational research models from the verbal description of the real system.
510108.3	Understand mathematical models used in Operations Research.
510108.4	Construct various dynamic and adaptive models
510108.5	Build up mathematical skills to analyse and solve integer programming problems from a wide range of applications
510108.6	Develop critical thinking and objective analysis of decision problems

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Department : Computer Engg. Course Name : System Simulation and Modeling (510109), ACA.Year: 2018-19	
CO No.	**Statement**
510109.1	Apply modelling to understand system behaviour
510109.2	Design the simulation scheme for particular system
510109.3	Analyse the modelled and simulated systems
510109.4	Develop skills to apply simulation software to construct and execute goal-driven system models.
510109.5	Understand the definition of a stochastic process and its behaviour.
510109.6	Compare the results of simulations confined to real world applications.

Department : Computer Engg. Course Name : Machine Learning (510110), ACA.Year: 2018-19	
CO No.	**Statement**
510110.1	Apply Machine learning concepts to distinguish different learning based applications.
510110.2	Design and evaluate learning models and synthesize it with feature selection methodologies.
510110.3	Design and implement regression models and evaluate its performance.
510110.4	Design and implement supervised learning algorithms with different learning models.
510110.5	Formulate a given problem within the Bayesian learning framework with focus on building lifelong learning ability
510110.6	Apply the algorithms to a real problem, optimize the models learned and report on the expected accuracy that can be achieved by applying the models

Department : Computer Engg. Course Name : Pervasive and Ubiquitous Computing (510111), ACA.Year: 2018-19	
CO No.	**Statement**
510111.1	Describe the characteristics of pervasive computing applications including the basic computing application problems, performance objectives and architectures of the systems.

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510111.2	Analyze and estimate the impact of pervasive computing on future computing applications and society
510111.3	Describe the characteristics of personal digital assistant and its applications including the basic computing application problems, performance objectives and architectures of the systems.
510111.4	Recognize the different ways that humans will interact with systems in a ubiquitous environment and account for these accordingly
510111.5	Solve various interface issues in pervasive computing.
510111.6	Explore the trends and problems of current pervasive computing systems using examples.

Department : Computer Engg. Course Name : Seminar - I (510112), ACA.Year: 2018-19	
CO No.	**Statement**
510112.1	To use multiple thinking strategies to examine real-world issues and explore creative avenues of expression,.
510112.2	To acquire, articulate, create and convey intended meaning using verbal and non-verbal method of communication
510112.3	To learn and integrate, through independent learning in sciences and technologies, with disciplinary specialization and the ability to integrate information across
510112.4	Apply communication skills to effectively communicate in seminar presentation
510112.5	Apply writing skills to effectively document the findings
510112.6	Explore the trends and problems related to research area explored in Seminar - I

Department : Computer Engg. Course Name : Laboratory Proficiency - II (510113), ACA.Year: 2018-19	
CO No.	**Statement**
510113.1	Explore and compare various operations research algorithms
510113.2	Design and develop an algorithmic solutoin for transportation and related problems
510113.3	Design simulation solution for any automobile manufacturing or any other industry
510113.4	Explore and compare various machine learning algorithms and its applications
510113.5	Design and develop machine learning solutions for problems
510113.6	Design network security solutions

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Course Outcome For M.E. Computer Engineering Second Year Sem-I

Department : Computer Engg. Course Name : Fault Tolerant Systems (610101), ACA.Year: 2018-19	
CO No.	**Statement**
610101.1	Discuss the need and necessity to consider fault tolerant design in digital systems
610101.2	Discuss various techniques for fault modelling and tests generation
610101.3	Discuss fault tolerance routing and its algorithms.
610101.4	Evaluate reliability of systems in Hierarchical Interconnection Networks
610101.5	Evaluate fault tolerance and reliability of systems in networks.
610101.6	Apply important methods in distributed systems to support scalability and fault tolerance.

Department : Computer Engg. Course Name : Information Retrieval (610102), ACA.Year: 2018-19	
CO No.	**Statement**
610102.1	Discuss basic concepts and techniques in Information Retrieval
610102.2	Evaluate and analyse retrieved information
610102.3	Generate quality information out of retrieved information
610102.4	Apply clustering and classification algorithms to analyze the information
610102.5	Identify and discuss language models for information retrieval.
610102.6	Design information retrieval system.

Department : Computer Engg. Course Name : Cloud Security (610103A), ACA.Year: 2018-19	
CO No.	**Statement**
610103A.1	Articulate the differences between deployment models (public, private, hybrid, and community) versus service models (infrastructure-, platform-, and software-as-a-service) of cloud computing
610103A.2	Discuss computing security fundamentals confined to cloud environment

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610103A.3	Identify the threats, risks, vulnerabilities, side-channel attacks, and privacy issues associated with cloud-based services.
610103A.4	Describe cloud computing security architectures
610103A.5	Choose the appropriate technologies, algorithms, and approaches for the cloud security issues.
610103A.6	Apply security architectures that assure secure isolation of physical and logical infrastructures.

Department : Computer Engg. Course Name : Seminar - II (610104), ACA.Year: 2018-19	
CO No.	**Statement**
610104.1	To use multiple thinking strategies to examine real-world issues and explore creative avenues of expression,.
610104.2	To acquire, articulate, create and convey intended meaning using verbal and non-verbal method of communication
610104.3	To learn and integrate, through independent learning in sciences and technologies, with disciplinary specialization and the ability to integrate information across
610104.4	Apply communication skills to effectively communicate in seminar presentation
610104.5	Apply writing skills to effectively document the findings
610104.6	Explore the trends and problems related to research area explored in Seminar - II

Department : Computer Engg. Course Name : Dissertation Stage - I (610105), ACA.Year: 2018-19	
CO No.	**Statement**
610105.1	Conduct thorough literature survey confined to the domain of choice
610105.2	Perform critical analysis on the literature survey and find the research gap
610105.3	Design preliminary solution to the research gap
610105.4	Analyze the findings and work of various authors confined to the chosen domain
610105.5	Develop presentation skills to deliver the technical contents
610105.6	Furnish the report of the technical research domain

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Course Outcome For M.E. Computer Engineering Second Year Sem - II

Department : Computer Engg. Course Name : Seminar - III (610107), ACA.Year: 2018-19	
CO No.	**Statement**
610107.1	To use multiple thinking strategies to examine real-world issues and explore creative avenues of expression,.
610107.2	To acquire, articulate, create and convey intended meaning using verbal and non-verbal method of communication
610107.3	To learn and integrate, through independent learning in sciences and technologies, with disciplinary specialization and the ability to integrate information across
610107.4	Apply communication skills to effectively communicate in seminar presentation
610107.5	Apply writing skills to effectively document the findings
610107.6	Explore the trends and problems related to research area explored in Seminar - II

Department : Computer Engg. Course Name : Dissertation Stage - II (610108), ACA.Year: 2018-19	
CO No.	**Statement**
610108.1	Show evidence of independent investigation
610108.2	Critically analyze the results and their interpretation ; infer findings
610108.3	Report and present the original results in an orderly way and placing the open questions in the right perspective
610108.4	Link techniques and results from literature as well as actual research and future research lines with the research
610108.5	Appreciate practical implications and constraints of the specialist subject
610108.6	Write and present the well documented findings in the report of Dissertation Stage - II

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Program Outcomes:	
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, 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.

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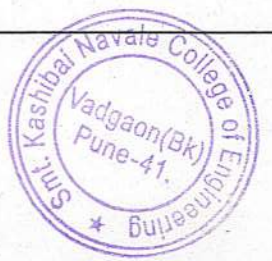
PO6	The Engineer and Society Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice
PO7	Environment and Sustainability Understand the impact of the professional 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 Teamwork 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 (LLL) in the broadest context of technological change.

Program Specific Outcomes (PSO):



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PSO 1 The skills to apply software engineering and management principles, to provide integrated solutions for complex computational problems by applying the knowledge of Information Technology fundamentals.
PSO 2 The ability to adapt rapid developments in technologies through life-long learning with an understanding of social and ecological problems related to Information Technology practices
Program Educational Objctives (PEOs):
PEO 1: Development of fundamental concepts To develop strong fundamental concepts for solving technical problems in mathematics, science, engineering and Technology.
PEO 2: Core Excellence To identify, conceive, analyze, design, execute & test complex computing problems by applying expertise along with skills in the field of Information technology
PEO 3: Versatility To develop approach, skills for entrepreneurship and higher education in the field of Information Technology.
PEO 4: Ethical and Social Development To be committed to ethical standards, community services through active engagement with professional bodies, voluntary groups or other community activitie
2015 Pattern
Course Outcome For Second Year Sem-I Course
Department of Information Technoloy, Course Name: Discrete Structures, A.Y 2019-20

CO No	Statement

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I15P201.1	Analyze and evaluate the combinatorial problems by using probability theory.
I15P201.2	Formulate and apply formal proof techniques and solve the problems with logical reasoning.
I15P201.3	Analyze types of relations and functions to provide solution to computational problems.
I15P201.4	Understand and Apply the concepts of graph theory to devise mathematical models.
I15P201.5	Apply different algorithms to find minimum spanning tree.
I15P201.6	Identify fundamental algebraic structures.

Department of Information Technoloy, Course Name: Computer Organization &Architecture, A.Y 2019-20

CO No	Statement
I15P202.1	Solve problems based on computer arithmetic.
I15P202.2	Explain processor structure & its functions.
I15P202.3	Obtain knowledge about micro-programming of a processor.
I15P202.4	Understand concepts related to memory & IO organization.
I15P202.5	Acquire knowledge about instruction level parallelism & parallel organization of multi-processors & multi core systems.
I15P202.6	Understand concepts related the processor

Department of Information Technoloy, Course Name:Digital Electronics and Logic Design, A.Y 2019-20

CO No	Statement
I15P203.1	Spectacle an awareness and apply knowledge of number systems, codes, Boolean algebra and use necessary A.C, D.C Loading characteristics as well as functioning while designing with logic gates.
I15P203.2	Use logic function representation for simplification with K-Maps and analyze as well as design Combinational logic circuits using SSI & MSI chips.
I15P203.3	Analyze Sequential circuits like Flip-Flops (Truth Table, Excitation table), their conversion & design the applications.
I15P203.4	Analyze Sequential circuits like shift regiaters, counters (Truth Table, Excitation table), their applications & design sequence generator using counters and shift generator.
I15P203.5	Identify the Digital Circuits, Input/Outputs to replace by FPGA
I15P203.6	Use VHDL programming technique with different modeling styles for any digital circuits.

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Department of Information Technoloy,Course Name:Fundamentals of Data Structures , A.Y 2019-20	
CO No	Statement
I15P204.1	Understand and Apply constructs of C language.
I15P204.2	Exemplify and Apply pointers , file handling in C.
I15P204.3	Classifying Data Structures and analyze algorithm based on time and space complexity
I15P204.4	Understand and Implement different searching and sorting techniques for application development.
I15P204.5	Understand and Apply Linear data structures using sequential organization.
I15P204.6	Understand and Apply Linear data structures using linked organization.

Department of Information Technoloy, Course Name:Problem Solving and Object Oriented Programming, A.Y 2019-20	
CO No	Statement
I15P205.1	Employ a problem-solving strategy to breakdown a complex problem into a series of simpler tasks.
I15P205.2	Execute problem-solving actions appropriate to completing a variety of sub problems
I15P205.3	Apply analytical and logical thinking to extract facts from a problem description and determine how they relate to one another and to the problems to be solved.
I15P205.4	Design and implement an object oriented solution to solve a real life problem
I15P205.5	Understand and apply logic to create files for persistent data storage for real world application.
I15P205.6	Develop problem-solving and programming skills using OOP concept.

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I15P205.7	Apply appropriate design patterns to provide object-oriented solutions

Course Outcome For SE Year Sem-II Course 2015 Pattern

Department of Information Technoloy,Course Name:Engineering Mathematics, A.Y 2019-20

CO No	Statement
I15P206.1	Solve higher order linear differential equations and apply to Control systems, Computer vision, and Robotics
I15P206.2	Solve problems related to Fourier transform, Z-transform and applications to Image processing
I15P206.3	Apply statistical methods like correlation, regression analysis in to analyze data and to make predictions applicable to machine intelligence.
I15P206.4	Perform Vector differentiation and analyze the vector fields
I15P206.5	Perform Vector integration and APPLY to fluid flow problems
I15P206.6	Analyze Complex functions, conformal mappings and contour integration applicable to Image processing, Digital filters and Computer graphics.

Department of Information Technoloy,Course Name:Computer Graphics, A.Y 2019-20

CO No	Statement
I15P207.1	Apply mathematics and logic to develop Computer programs for elementary graphic operations
I15P207.2	Develop scientific and strategic approach to solve complex problems in the domain of Computer Graphics
I15P207.3	Develop the competency to understand the concepts related to Computer Vision and Virtual reality
I15P207.4	Apply the logic to develop animation and gaming programs
I15P207.5	Perceive the concepts of virtual reality.
I15P207.6	Understand Computer Gaming Concepts

Department of Information Technoloy,Course Name:Processor Architecture and Interfacing, A.Y 2019-20

CO No	Statement
I15P208.1	Learn architectural details of 80386 microprocessor
I15P208.2	Learn assembly language programming of 80386 microprocessors.

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I15P208.3	Understand memory management and multitasking of 80386 microprocessor
I15P208.4	Understand architecture and memory organization of 8051microcontroller
I15P208.5	Timers and interrupts of 8051 microcontroller and its interfacing with I/O devices
I15P208.6	Learn interfacing of real world input and output devices to 8051 microcontroller

Department of Information Technoloy, Course Name: Data Structures and Files A.Y 2019-20

CO No	Statement
I15P209.1	Understand, Analyze, Design and implement the stack and queue abstract data type.
I15P209.2	Understand, Analyze, Design and implement Tree as an abstract data type with traversals.
I15P209.3	Understand, Analyze, Design and implement graph as an abstract data type with traversals.
I15P209.4	Illustrate and implement symbol table,hash tables.
I15P209.5	Inferring and implement concept of advance trees like TBT with traversals, AVL Trees, B trees, B+ trees, Splay trees etc.
I15P209.6	Compare and implement different file types and file organization.

Department of Information Technoloy,Course Name:Foundations of Communication and Computer Network A.Y 2019-20

CO No	Statement
I15P2010.1	Understand data/signal transmission over communication media
I15P2010.2	Recognize usage of various modulation techniques in communication
I15P2010.3	Analyze various spread spectrum and multiplexing techniques
I15P2010.4	Use concepts of data communication to solve various related problems
I15P2010.5	Understand error correction and detection techniques.
I15P2010.6	Acquaint with transmission media and their standards

Course Outcomes for Third Year Sem-I Course 2015 Pattern

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Department of Information Technoloy, Course Name: Theory of Computation, A.Y 2019-20	
CO Number	Statement
I15P301.1	Solve higher order linear differential equations and apply to Control systems, Computer vision, and Robotics
I15P301.2	Solve problems related to Fourier transform, Z-transform and applications to Image processing
I15P301.3	Apply statistical methods like correlation, regression analysis in to analyze data and to make predictions applicable to machine intelligence.
I15P301.4	Perform Vector differentiation and analyze the vector fields
I15P301.5	Perform Vector integration and APPLY to fluid flow problems
I15P301.6	Analyze Complex functions, conformal mappings and contour integration applicable to Image processing, Digital filters and Computer graphics.

Department of Information Technoloy,Course Name: Database Management Systems, A.Y 2019-20	
CO No	Statement
I15P302.1	Understand the fundamental concepts and basic functions of DBMS and RDBMS
I15P302.2	Apply normalization techniques for database design improvement and understand SQL
I15P302.3	Explain basic concept of query processing and transaction management
I15P302.4	Explain the concurrency control, recovery algorithms and database architectures
I15P302.5	Design and implement a database schema for a given problem-domain
I15P302.6	Identify the key processes of data mining, data warehousing and knowledge discovery process and Analyze various database architectures and technologies.

Department of Information Technoloy,Course Name: Software Engineering & Project Management, A.Y 2019-20	
CO No	Statement

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I15P303.1	Recognize unique features of various software application domains and classify software applications.
I15P303.2	Choose and apply an appropriate lifecycle model of software development.
I15P303.3	Describe principles of agile development, discuss the SCRUM process and distinguish agile process models from other process models.
I15P303.4	Analyze software requirements by applying various modeling techniques.
I15P303.5	List and classify CASE tools and discuss recent trends and research in software engineering.
I15P303.6	Understand IT project management through the life cycle of the project and future trends in IT Project Management.

Department of Information Technoloy, Course Name: Operating Systemt, A.Y 2019-20

CO No	Statement
I15P304.1	Understand the fundamentals and Roles of Operating System
I15P304.2	understand the concept of a process, thread and solve problems based on process scheduling algorithms
I15P304.3	Understand the concept of process synchronization, mutual exclusion and deadlock and solve Deadlock avoidance
I15P304.4	Illustrate and Differentiate various memory management techniques
I15P304.5	Clarify the concept of I/O management and File system and analyse the seek time using disk scheduling algorithm
I15P304.6	Understand the linux operating system with it's components

Department of Information Technoloy, Course Name: Human-Computer Interaction, A.Y 2019-20

CO No	Statement
CO No	Statement
I15P305.2	To develop understanding of human factors in HCI design.
I15P305.3	To develop understanding of models, paradigms and context of interactions.
I15P305.4	To design effective user-interfaces following a structured and organized UCD process.

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I15P305.5	To evaluate usability of a user-interface design.
I15P305.6	To apply cognitive models for predicting human-computer-interactions.

Course Outcomes for Second Year Sem-II Course

Department of Information Technoloy, Course Name: Computer Network Technology, A.Y 2019-20

CO Number	Statement
I15P306.1	Understand and recall responsibilities, services offered and protocol used at each layer of OSI and TCP/IP model .
I15P306.2	Understand different addressing techniques, design network and analyze network traffic.
I15P306.3	Implement client server paradigm and test different application layer protocols
I15P306.4	Illustrate the different wireless technologies and IEEE standards.
I15P306.5	Identify and understand issues, design goals and ptotocols in Ad Hoc wireless network
I15P306.6	Understand and explore recent trends in communication network

Department of Information Technoloy,Course Name: Systems Programming, A.Y 2019-20

CO No	Statement
I15P307.1	Learn independently modern software development tools and creates novel solutions for language processing applications
I15P307.2	Understand and implement assemblers and macro processors
I15P307.3	Apply LEX tool for generation of Lexical Analyzer.
I15P307.4	Apply YACC tool for generation of syntax analyzer
I15P307.5	Construct output for all the phases of compiler
I15P307.6	Apply code optimization in the compilation process

Department of Information Technoloy, Course Name: Design and Analysis of Algorithms A.Y 2019-20

CO No	Statement
I15P308.1	To calculate computational complexity using asymptotic notations for various algorithms.
I15P308.2	To apply Divide & Conquer as well as Greedy approach to design algorithms.
I15P308.3	To practice principle of optimality.

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I15P308.4	To illustrate different problems using Backtracking.
I15P308.5	To compare different methods of Branch and Bound strategy.
I15P308.6	To explore the concept of P, NP, NP-complete, NP-Hard and parallel algorithms.

Department of Information Technoloy, Course Name: Cloud Computing, A.Y 2019-20

CO No	Statement
I15P309.1	Understand the Fundamentals of Cloud Computing
I15P309.2	Understand Virtualization in cloud computing and to analyze Common Standards in Cloud Computing
I15P309.3	Analyze environments and to Understand Applications of cloud computing
I15P309.4	Explain security related terms in cloud along with security issues
I15P309.5	State trends in ubiquitous computing, to analyze cloud enabling technologies for IoT and to understand innovative applications of IoT
I15P309.6	Interpret change in OS along with intelligent applications and future of intelligent devices

Department of Information Technoloy, Course Name: Data Science & Big Data Analytics, A.Y 2019-20

CO No	Statement
I15P310.1	Understand Data Science and Big Data primitives.
I15P310.2	Apply different mathematical models for Big Data.
I15P310.3	Determine Big Data learning skills by developing industry or research applications.
I15P310.4	Analyze each learning model and perform on different datasets.
I15P310.5	Understand needs, challenges and techniques for big data visualization
I15P310.6	Identify different applications of Big Data technologies.

Course Outcomes for Fourth Year Sem-I Course 2015 Pattern

Department of Information Technoloy, Course Name: Information and Cyber Security, A.Y 2019-20

CO Number	Statement

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I15P401.1	Use basic cryptographic techniques in application development.
I15P401.2	Apply methods for authentication, access control, intrusion detection and prevention.
I15P401.3	To apply the scientific method to digital forensics and perform forensic investigations
I15P401.4	To develop computer forensics awareness
I15P401.5	To study network defence tools
I15P401.6	To study network defence tools

Department of Information Technoloy,Course Name: Machine Learning and Applications, A.Y 2019-20

CO No	Statement
I15P402.1	Understand the fundamentals and types of Machine Learning
I15P402.2	Discriminate and solve different classification machine learning problems and asses the performance of them.
I15P402.3	Clarify different types of linear regression models and their performance matrices
I15P402.4	Illustrate probability concepts and probabilistic models and solve Bayes theorem based problems
I15P402.5	Identify different techniques to combine multiple machine learning models for ensemble learning
I15P402.6	Understand the concepts of reinforcement and deep learning concepts

Department of Information Technoloy,Course Name: Software Design and Modeling, A.Y 2019-20

CO No	Statement
I15P403.1	Understand object oriented methodologies, basics of Unified Modeling Language (UML).
I15P403.2	Understand analysis process, use case modeling, domain/class modeling
I15P403.3	Discriminate interaction and behavior modeling
I15P403.4	Analyze Understand design process and business, access and view layer class design
I15P403.5	Illustrate GRASP principles and GoF design patterns.

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I15P403.6	Understand architectural design principles and guidelines in the various type of application development.

Department of Information Technoloy, Course Name: Business Analytics and Intelligence, A.Y 2019-20	
CO No	Statement
I15P404.1	Comprehend the Information Systems and development approaches of Intelligent
I15P404.2	Evaluate and Apply business processes using information systems.
I15P404.3	Propose the Framework for business intelligence.
I15P404.4	Get acquainted with the Theories, techniques, and considerations for capturing organizational intelligence.
I15P404.5	Formulate business intelligence with business strategy.
I15P404.6	Apply the techniques for implementing business intelligence systems.

Department of Information Technoloy, Course Name: Software Testing and Quality Assurance, A.Y 2019-20	
CO No	Statement
I15P405.1	Explain the basics of software testing and various types of defect classes.
I15P405.2	Explain different types of testing and study different levels of testing (-Unit Testing, Integration Testing) in detail.
I15P405.3	Explain,Scope of automation , design for automation and how to use metrics and models.
I15P405.4	Explain components of the Software Quality Assurance System, and planning for software quality.
I15P405.5	Design models for quality assurance , and how it is utilised for better productivity.
I15P405.6	Describe software process methodology, internal Auditing and Assessments process.

Course Outcomes for Fourth Year Sem-II Course
Department of Information Technoloy,Course Name: Distributed Computing System, A.Y 2019-20

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CO Number	Statement
I15P406.1	Understand the principles and desired properties of distributed systems on which the internet and other distributed systems are based.
I15P406.2	Understand and apply the basic theoretical concepts and algorithms of distributed systems in problem solving.
I15P406.3	Recognize the inherent difficulties that arise due to distributed-ness of computing resources.
I15P406.4	Identify the challenges in developing distributed applications.
I15P406.5	Identify storage techniques applicable for distributed systems
I15P406.6	Categorize different security measures in distributed systems

Department of Information Technoloy,Course Name: Ubiquitous Computing A.Y 2019-20

CO No	Statement
I15P407.1	Demonstrate the knowledge of design of Ubicomp and its applications.
I15P407.2	Explain smart devices and services used Ubicomp.
I15P407.3	Describe the significance of actuators and controllers in real time application design.
I15P407.4	Use the concept of HCI to understand the design of automation applications.
I15P407.5	Classify Ubicomp privacy and explain the challenges associated with Ubicomp privacy.
I15P407.6	Get the knowledge of ubiquitous and service oriented networks along with Ubicomp management.

Department of Information Technoloy,Course Name: Internet of Things (IoT), A.Y 2019-20

CO No	Statement
I15P408.1	Understand what is internet of things.
I15P408.2	Understand architecture and design of IoT.
I15P408.3	Describe the objects connected in IoT.
I15P408.4	Understand the underlying Technologies.
I15P408.5	Understand the platforms in IoT.

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I15P408.6	Understand cloud interface to IoT.

Department of Information Technoloy, Course Name: Social Media Analytics, A.Y 2019-20	
CO No	Statement
I15P409.1	Understand the basics of Social Media Analytics
I15P409.2	Explain the significance of Data mining in Social media.
I15P409.3	Demonstrate the algorithms used for text mining.
I15P409.4	Apply network measures for social media data.
I15P409.5	Explain Behavior Analytics techniques used for social media data
I15P409.6	Apply social media analytics for Face book and Twitter kind of applications.

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Department of Electronics and Telecommunication Engineering

2.6.1
List of PO, PSO, PEO, CO

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Jagtap

Dr. S. K. Jagtap
HOD (E&TC)

Head
Dept. of Electronics &
Telecommunication Engineering
Smt. Kashibai Navale College
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PUNE-411 041
DEPARTMENT OF E & TC ENGINEERING
Criterion No.: 2.6.1
Academic Year 2018-19

Program Outcomes:

Engineering Graduates will be able to:

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

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

3. **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.

4. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the

5. **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

6. **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

7. **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

8. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of

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

10. **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.

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

12. **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.

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PUNE-411 041
DEPARTMENT OF E & TC ENGINEERING
Criterion No.: 2.6.1
Academic Year 2018-19

Program Educational Outcomes:

Graduates will be able to

1. Apply concepts of mathematics, science and engineering for design - development of creative interdisciplinary frameworks for advancement of the society.

2. Demonstrate quantifiable advancement in the careers they decide to seek after.

3. Adopt life-long learning with high morals to outshine in the volatile economic and technological environment.

Jagtap

Dr. S.K. Jagtap
HOD (E &TC)

Head
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Smt. Kashibai Navale College of Engineering
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SINHGAD TECHNICAL EDUCATION SOCIETY'S
SMT. KASHIBAI NAVALE COLLEGE OF ENGINEERING,
PUNE-411 041
DEPARTMENT OF E & TC ENGINEERING
Criterion No.: 2.6.1
Academic Year 2018-19

Program Specific Outcomes:

PSOs are the statement that describe what a graduate of specific program should be able to do -

PSO1 To design and Implement Modern Electronic Systems utilizing knowledge of Embedded Systems, VLSI and Signal Processing

PSO2 Identify and apply appropriate Modern tools for the design and implementation of communication using IoT, AI and Robotics

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DEPARTMENT OF E & TC ENGINEERING
Criterion No.: 2.6.1
LIST OF COURSE OUTCOMES IN ACADEMIC YEAR 2018-19

Course Outcomes for Second Year First Semester Course (2015 Pattern)	
Department: Electronics & Telecommunication, Course Name:Signals and Systems (204181)	
CO No.	**Statement**
CO1	Understand mathematical description and representation of continuous and discrete time signals and systems.
CO2	Develop input output relationship for linear shift invariant systems and understand the convolution operator for continuous and discrete time systems.
CO3	Understand and resolve the signals in frequency domain using Fourier series and Fourier transforms.
CO4	Understand the limitations of Fourier transform and need for Laplace transform and develop the ability to analyze the system in s- domain
CO5	Understand the basic concept of probability, random variables & random signals and develop the ability to find correlation, CDF, PDF and probability of a given event.
Department: Electronics & Telecommunication, Course Name:Electronic Devices and Circuits (204182)	
CO No.	**Statement**
CO1	Comply and verify parameters after exciting devices by any stated approach.
CO2	Discuss, examine and enforce circuit and test the realization
CO3	Define, outline, build and test small signal model of FET and MOSFET.
CO4	Define, illustrate and validate performance of FET at low frequency.
CO5	Outline, design and implement adjustable voltage regulator circuit electronic applications.
Department: Electronics & Telecommunication, Course Name:Electrical Circuits and Machines (204183)	
CO No.	**Statement**
CO1	Analyze the simple DC and AC circuit with circuit simplification techniques and Network Theorems.
CO2	Select the proper type of the transformer.
CO3	Explain construction, working and applications of DC Machines / Single Phase & Three Phase AC Motors
CO4	Classify motors and prefer appropriate electrical motor for given application.
Department: Electronics & Telecommunication, Course Name:Data Structures and Algorithms (204184)	
CO No.	**Statement**
CO1	Recall fundamentals of procedure-oriented programming and understand the computational efficiency of the principal algorithms such as sorting & searching.
CO2	Implement different searching and sorting methods.
CO3	Compare & use concepts of stack & queue for various applications.
CO4	Explain how arrays, linked structures are represented in memory and use them in algorithms.
CO5	Demonstrate various terminologies and traversals of trees and apply them for various applications.
CO6	Classify various terminologies and traversals of graphs and use them for various applications.

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Department: Electronics & Telecommunication, Course Name:Digital Electronics (204185)	
CO No.	**Statement**
CO1	Explain the basic logic gates and various reduction techniques of digital logic circuit in detail.
CO2	Design and identify complex examples of combinational circuits (Adders and their use as a Subtractor and sequential circuits (Shift Registers Counters).
CO3	Explain, identify state machines (FSM, ASM) and design, implement state machines and realize sequential circuits.
CO4	Explain, compare and classify digital logic families, PLDs and semiconductor memories.
CO5	Design and implement hardware circuits to test performance and application.
CO6	Describe the architecture and use of microcontrollers for basic operations and write simple assembly/C programs using 8051 microcontrollers.
Department: Electronics & Telecommunication, Course Name:Electronic Measuring Instruments and Tools(204186)	
CO No.	**Statement**
CO1	Understand fundamental of various electrical measurements
CO2	Understand and describe specifications, features and capabilities of electronic instruments.
CO3	From the specifications of instrument and select an appropriate instrument for given measurement.
CO4	Carry out required measurement using various instruments under different setups

Course Outcomes for Second Year Second Semester Course (2015 Pattern)

Department: Electronics & Telecommunication, Course Name:Engineering Mathematics III (207005)	
CO No.	**Statement**
CO1	Solve higher order linear differential equations using appropriate techniques for modelling, analysing electrical circuits and control systems.
CO2	Solve problems related to Fourier transform, Z-transform and applications to Communication systems and Signal processing.
CO3	Evaluate Interpolating polynomials, numerically differentiate and integrate functions, numerical solutions of differential equations using single step and multi-step iterative methods used in modern scientific computing.
CO4	Represent vector differentiation, analyse the vector fields and apply to Electro-Magnetic fields.
CO5	Solve problems related to vector integration by Green's theorem, Stokes theorem and Gauss Divergence theorem which gives relations between line, surface and Volume Integrals and apply it to Electro- Magnetic fields?
CO6	Analyze conformal mappings, transformations and perform contour integration of complex functions in the study of electrostatics and signal processing.
Department: Electronics & Telecommunication, Course Name:Integrated Circuits (204187)	
CO No.	**Statement**
CO1	Understand the characteristics of IC and Op-Amp and identify the internal structure.
CO2	Understand and identify various manufacturing techniques.
CO3	Derive and determine various performances based parameters and their significance for Op-Amp.
CO4	Comply and verify parameters referring data sheet.
CO5	Analyze and identify the closed loop stability considerations and I/O limitations.
CO6	Analyze and identify linear and nonlinear applications of Op-Amp.

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Department: Electronics & Telecommunication, Course Name:Control Systems (204188)	
CO No.	**Statement**
CO1	Develop mathematical model of physical systems and also evaluate Transfer Function of System by Block Diagram Reduction and Signal Flow Graph techniques.
CO2	Evaluate Time Domain response of first and second order system for Standard test signals.
CO3	Apply concept of Stability to analyse system using Routh criteria and Root Locus.
CO4	Analyze Frequency Response of system using Bode plots and Nyquist Criteria.
CO5	Express the system equations in state variable form.
CO6	Apply concepts of Digital Control System, PID controller and PLC in control system applications.
Department: Electronics & Telecommunication, Course Name:Analog Communication (204189)	
CO No.	**Statement**
CO1	Summarize generation of various types of Amplitude Modulation schemes and draw time domain and frequency domain waveforms related to them.
CO2	Describe superheterodyne receiver for AM demodulation and understand various properties like sensitivity, selectivity, fidelity.
CO3	Discuss generation of Frequency and Phase Modulation schemes and draw time domain and frequency domain waveforms related to them.
CO4	Describe superheterodyne receiver for FM demodulation and compare it with AM receiver
CO5	Calculate noise voltage, signal to noise ratio, noise figure and noise temperature for single and cascaded stages in a communication system.
CO6	Differentiate analog pulse modulation techniques like PAM, PWM, PPM and digital modulation technique like PCM.
Department: Electronics & Telecommunication, Course Name:Object Oriented Programming (204190)	
CO No.	**Statement**
CO1	Explain the principles of object oriented programming and basics of C++ programing language.
CO2	Summarize the concepts of classes, objects, constructors, destructors and operators used for overloading concepts and concept of inheritance.
CO3	Describe the fundamental concepts in Java programming.
CO4	Apply concept of classes, objects and various methods in java programming.
CO5	Differentiate the basic concepts of Inheritance, Packages and Interfaces in java.
CO6	Illustrate the concept of multithreading, Exception handling and difference between applet and applications using Java programs.
Department: Electronics & Telecommunication, Course Name:Employability Skill Development (204191)	
CO No.	**Statement**
CO1	Solve the arithmetic and calculate LCM, HCF
CO2	Describe Bloom taxonomy and analyze the strength and weakness also improve weakness
CO3	Develop effective communication skills and problem solving abilities in order to fetch employability opportunities and further success in the workplace
CO4	write the paragraph, story and letter also solve real problem using problem solving
CO5	Construct the team and identify and solve the problem
CO6	Represent and judge themselves

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Course Outcomes for Third Year First Semester Course (2015 Pattern)	
Department: E &TC Engineering. Course Name: Digital Communication (304181)	
CO No.	**Statement**
CO1	Describe various building blocks of digital communication systems and the signal flow with different waveform coding techniques.
CO2	Analyze the performance of baseband digital transmission and draw various data formats.
CO3	Describe various random processes and mean, autocorrelation, cross correlation, probability density functions related to it.
CO4	Explain time and frequency domain analysis of the signals in a digital communication system
CO5	Analyze the performance of pass band digital communication system in terms of error rate and spectral efficiency and sketch their waveforms.
CO6	Understand working of spread spectrum communication system and its performance
Department: E &TC Engineering. Course Name: Digital Signal Processing (304182)	
CO No.	**Statement**
CO1	Define, classify and discuss various types of signals, analyse signals and apply mathematical concept for signal processing.
CO2	Analyze the discrete time signals and system using different transform domain techniques.
CO3	Design & implement various filters for filtering different real world signals.
CO4	Apply DSP in different real world signal processing applications.
Department: E &TC Engineering. Course Name: Electromagnetics (304183)	
CO No.	**Statement**
CO1	Apply basic mathematical concepts related to electromagnetic vector fields.
CO2	Apply the principles of electrostatics to the solutions of problems relating to electric field and electric potential, boundary conditions and electric energy density.
CO3	Apply the principles of magneto statics to the solutions of problems relating to magnetic field and magnetic potential, boundary conditions and magnetic energy density.
CO4	Analyze time varying fields using the concepts related to Faraday's law, induced emf and Maxwell's equations.
CO5	Analyze transmission line problems using Smith Chart.
CO6	Apply Maxwell's equations to solve problems related to uniform plane wave propagation.
Department: E &TC Engineering. Course Name: Microcontrollers (304184)	
CO No.	**Statement**
CO1	Describe 8-bit Microcontroller Architecture of 8051.
CO2	Explain programming in assembly language for 8051 and to study various software and hardware tools for developing applications.
CO3	Explain interfacing of real world peripheral devices.
CO4	Describe PIC18FXX Microcontroller Architecture.
CO5	Explain interfacing of real world peripheral devices using Embedded C.
CO6	Explain interfacing of real world peripheral devices using different communication protocol

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Department: E &TC Engineering. Course Name: Mechatronics (304185)	
CO No.	**Statement**
CO1	Describe key elements of the mechatronics system and its representation in terms of block diagram.
CO2	Identify basic principles of Sensors and Transducers.
CO3	Classify various types of mechatronics system components and its applications.
CO4	Describe case study of the mechatronics system.
CO5	Identify Electrical Actuators, Electron-mechanical actuators
CO6	Describe case study of the mechatronics system.

Department: E &TC Engineering. Course Name: Signal Processing and Communication Lab (304191)	
CO No.	**Statement**
CO1	Visualize and practically implement various baseband and passband modulation techniques.
CO2	Analyze various aspects related to Spread Spectrum Techniques
CO3	Simulate performance parameters of baseband and passband modulation techniques using MATLAB.
CO4	Understand the digital signal processing, sampling and aliasing.
CO5	Analyze various properties of DFT.
CO6	Apply different window methods to realize IIR filter design.

Department: E &TC Engineering. Course Name: Microcontrollers and Mechatronics Lab (304192)	
CO No.	**Statement**
CO1	Explain programming in assembly language for 8051 and Explain interfacing of real world peripheral device.
CO2	Explain interfacing of real world peripheral devices using Embedded C for PIC18FXX Microcontroller
CO3	Explain interfacing of real world peripheral devices using different communication protocol.
CO4	Understand the key elements of Mechatronics design process and the basic concepts of engineering system with dynamic response of the system.
CO5	Realize the concepts of real time interfacing and data acquisition and discuss the operating principles of hydraulic and Pneumatic systems.
CO6	Understanding the concepts of design of Mechatronics system through case studies.

Department: E &TC Engineering. Course Name: Electronics System Design (304193)	
CO No.	**Statement**
CO1	Assess the fundamental steps and working principles of electronics devices to build electronics systems.
CO2	Understand datasheets and select suitable components and devices.
CO3	Implement prototype of Data Acquisition system by selecting proper transducer and signal conditioning circuit.
CO4	Develop an electronic system/sub-system and verify its performance by simulating the same.
CO5	Customized an EDA tool for circuit schematic and simulation.
CO6	Construct, accomplish the database and query handling using suitable tools.

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Course Outcomes for Third Year Second Semester Course (2015 Pattern)	
Department: E &TC Engineering. Course Name: Power Electronics (304186)	
CO No.	**Statement**
CO1	Design and implement a triggering / gate drive circuit for a power device.
CO2	Understand and analyze different phase controlled converters
CO3	Construct the design and control of rectifier and inverter circuits.
CO4	Experiment the working of DC-DC converters and AC voltage controllers.
CO5	Explain the working of resonant circuits and design protection circuits used in power electronic applications.
CO6	Examine different special motor drives for various industrial applications.
Department: E &TC Engineering. Course Name: Information Theory Coding and Communication Networks (304187)	
CO No.	**Statement**
CO1	Perform information analysis and design of different source coding technique for data compression.
CO2	Explain different channel coding theorems for communication system and Analyze the performance of error control codes.
CO3	Design a channel coding scheme in communication system.
CO4	Design of encoding and decoding circuits for channel performance improvement against burst error.
CO5	Apply and define fundamental principles of data communication and its components.
CO6	Understand flow and error control techniques in communication networks.
Department: E &TC Engineering. Course Name: Business Management (304188)	
CO No.	**Statement**
CO1	Grasp the fundamentals of management as a function and put it into use.
CO2	Understand the importance of quality in a business and the various philosophies & tools on quality
CO3	Demonstrate knowledge of the financial position of an organization and its use along the project management life cycle.
CO4	Illustrate the importance of human resource and the various stages a employee has to be managed through case studies
CO5	Explain the concept of entrepreneurship, demonstrate the various activities to be carried out for entrepreneurship and the support available to encourage entrepreneurship.
CO6	Outline the role of marketing and examining the various traditional and modern marketing techniques.
Department: E &TC Engineering. Course Name: Advanced Processors (304189)	
CO No.	**Statement**
CO1	Describe the features, advantages of ARM 7, ARM 9 & ARM11.
CO2	Describe the ARM 7 microprocessor architectures and its features.
CO3	Design and Interface the advanced peripherals to ARM based microcontroller.
CO4	Design embedded system with available resources.
CO5	Describe the C67X processors architecture and its features.
CO6	Apply DSP Processors and resources for signal processing applications.

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Department: E &TC Engineering. Course Name: System Programming and Operating Systems (304190)	
CO No.	**Statement**
CO1	Establish the awareness of different components of Systems Programming.
CO2	Analyze and investigate the different implementation techniques of system programming operating system abstractions.
CO3	Demonstrate and interpret different OS functions, process management policies and scheduling of processes by CPU.
CO4	Discover the requirement for process synchronization and deadlock.
CO5	Understand the Memory management systems and its allocation policies, Virtual Memory and Paging systems.
CO6	Develop knowledge of file management techniques, various I/O devices and scheduling algorithms.
Department: E &TC Engineering. Course Name: Power and ITCT Lab (304194)	
CO No.	**Statement**
CO1	Understand the characteristics of different power electronic devices.
CO2	Discuss, analyse different controlled converters.
CO3	Implementation of various power electronics applications.
CO4	Discuss, distinguish and interpret entropies and mutual information for Noise free, Error free, Binary Symmetric and Noisy Channel
CO5	Discuss, analyse and interpret Shannon-Fano, Huffman, Linear Block, Cyclic, Convolutional, BCH-RS Coding and decoding
CO6	Discuss networking components and LAN and simulate ARQ techniques.
Department: E &TC Engineering. Course Name: Advanced Processors and System Programming Lab (304195)	
CO No.	**Statement**
CO1	Understand and interpret basics of LPC2148 also interfacing of LPC2148 with display, GSM.
CO2	Analyze the concepts of finding current location latitude and longitude values with the help of GPS also demonstrate the concept of ADC.
CO3	Examine interfacing of SD card to LPC 2148 using SPI also interfacing of EEPROM to PLC2148 using I2C protocol.
CO4	Understand and interpret the basics of the Linux operating system using various functions.
CO5	Describe and design various components of system software.
CO6	Demonstrate and implement various process and memory management algorithms.
Department: E &TC Engineering. Course Name: Employability Skills and Mini Project (304196)	
CO No.	**Statement**
CO1	Understand, plan and execute a Mini Project with team.
CO2	Implement electronic hardware by learning PCB artwork design, soldering techniques, testing and troubleshooting etc.
CO3	Prepare a technical report based on the Mini project.
CO4	Deliver technical seminar based on the Mini Project work carried out.

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Course Outcomes for Fourth Year First Semester Course (2015 Pattern)	
Department: E &TC Engineering. Course Name: VLSI Design and Technology (404181)	
CO No.	**Statement**
CO1	Write effective HDL coding for digital design.
CO2	Apply knowledge of real time issues in digital design.
CO3	Model digital circuit with HDL, simulate, synthesize and prototype in PLDs.
CO4	Design CMOS circuits for basic digital circuits and specified applications.
CO5	Analyze various issues and constraints in design of an ASIC.
CO6	Apply knowledge of testability in design and build self-test circuit.
Department: E &TC Engineering. Course Name: Computer Networks and Security (404182)	
CO No.	**Statement**
CO1	Compare different types of network; network Topology, different network devices.
CO2	Understand TCP/IP protocol suite.
CO3	Compare and Understand IPv4 and IPv6 IP addressing.
CO4	Apply basic knowledge of installing and configuring networking applications.
CO5	Apply a basic knowledge of network security.
Department: E &TC Engineering. Course Name: Radiation and Microwave Techniques (404183)	
CO No.	**Statement**
CO1	Distinguish various performance parameters of radiating elements.
CO2	Define, analyse, and classify radiating elements and arrays.
CO3	Discuss, apply waveguide fundamentals in design of transmission lines.
CO4	Design and set up a system consisting of various passive microwave components.
CO5	Apply and analyse tube based and solid state active devices along with their application.
CO6	Define and measure performance parameters of microwave components.
Department: E &TC Engineering. Course Name: Digital Image and Video Processing (404184)	
CO No.	**Statement**
CO1	Develop and implement basic mathematical operations on digital images (2-D) and using fundamental concepts of Digital Image Processing with basic relationship of pixels.
CO2	Investigate image enhancement techniques and restoration problems.
CO3	Apply and classify various 2-D data compression techniques for 2-D digital images.
CO4	Categorize and design image processing techniques for segmentation and Morphological operators.
CO5	Interpret objects and regions of the image with appropriate representation techniques.
CO6	Explore video signal representation and different algorithms for video processing.

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Department: E &TC Engineering. Course Name: Embedded Systems and RTOS (404184)	
CO No.	**Statement**
CO1	Identify design metrics of embedded systems to design real time applications.
CO2	Explain the concept of Real Time Operating Systems in embedded applications.
CO3	Summarize concepts of µC/OS RTOS.
CO4	Select and make use of modern architecture for embedded system design.
CO5	Select Linux for embedded system development.
CO6	Develop an embedded product using an open source platform.
Department: E &TC Engineering. Course Name: Artificial Intelligence (404185A)	
CO No.	**Statement**
CO1	Describe the modern view of AI as the study of agents that receive precepts from the Environment and perform actions.
CO2	Demonstrate awareness of informed search and exploration methods.
CO3	Explain about AI techniques for knowledge representation, planning and uncertainty Management.
CO4	Develop knowledge of decision making and learning methods.
CO5	Design and develop different pattern recognition and expert system algorithms for various applications.
CO6	Outline the fundamentals of Natural Language Processing.
Department: E &TC Engineering. Course Name: Electronic Product Design (404185B)	
CO No.	**Statement**
CO1	Familiar with various stages of Electronic Product Design.
CO2	Understand different considerations of analog, digital and mixed circuit design.
CO3	Familiar with different considerations of software design and testing methods.
CO4	Get acquainted with methods of PCB design and different tools.
CO5	Understand the importance of product test and test specification.
CO6	Get acquainted with the process and importance of documentation.
Department: E &TC Engineering. Course Name: Lab Practice – I (CNS + RMT) (404186)	
CO No.	**Statement**
CO1	Select a suitable LAN topology for the given network.
CO2	Identify a given class of IP address.
CO3	Understand simulation of different application layer protocols in Cisco Packet Tracer.
CO4	Differentiate various antenna and antenna array by calculating performance parameters
CO5	Design and set up a system consisting of various passive, active microwave components.
CO6	Measure performance parameter of microwave components.

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Department: E &TC Engineering. Course Name: Lab Practice – II (VLSI + Elec – I (DIVP) (404187)	
CO No.	**Statement**
CO1	Model various combinational and sequential circuits using HDL and simulate using EDA tool.
CO2	Design and implement a Digital system on an FPGA board.
CO3	Design and implementation of CMOS Digital Circuit Layout using EDA tool.
CO4	Understand fundamentals operation of Digital Image and its process
CO5	Asses the different types of image enhancement techniques for the perfection of pictographic information for human perceptions
CO6	Understand the concepts of image segmentation, compression and recognition techniques to remove redundancy pixel transmit the image/Video using less bandwidth and object detection.

Department: E &TC Engineering. Course Name: Lab Practice – II (VLSI + Elec – I (ES & RTOS) (404187)	
CO No.	**Statement**
CO1	Model various combinational and sequential circuits using HDL and simulate using EDA tool.
CO2	Design and implement a Digital system on an FPGA board.
CO3	Design and implementation of CMOS Digital Circuit Layout using EDA tool.
CO4	Explain task controlling procedures
CO5	Perform Interfacing with peripheral devices
CO6	Implement controller programming platforms

Department: E &TC Engineering. Course Name: Project Stage - I (404188)	
CO No.	**Statement**
CO1	Apply their acquired skills to define problem statements and objectives.
CO2	Paraphrase abstract and synopsis for selected problems.
CO3	Analyze related research work and summarize in the form of literature survey.
CO4	Demonstrate their knowledge of technological tools and techniques for planning and execution of project.

Course Outcomes for Fourth Year Second Semester Course (2015 Pattern)

Department: E &TC Engineering. Course Name: Mobile Communication (404189)	
CO No.	**Statement**
CO1	Describe how wireless networks are penetrating our lives for data, multimedia and voice transmission.
CO2	Analyze different traffic model to predict and measure the propagation loss.
CO3	Understand basic concepts of cellular system, wireless propagation and the techniques used to maximize the capacity of cellular network.
CO4	Understand the detailed Architecture of GSM with the call establishment process.
CO5	Evaluate the performance of CDMA and GSM system.
CO6	Get the overview of LTE architecture, and opportunities and requirements in 5G networks.

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Department: E &TC Engineering. Course Name: Broadband Communication Systems (404190)	
CO No.	**Statement**
CO1	Select various components such as optical source, detector and fiber of Optical Communication system.
CO2	Demonstrate Link power budget and Rise Time Budget by proper selection of components and check its viability.
CO3	Identify state of the art active and passive WDM components.
CO4	Analyze Orbital parameters of Satellite Orbits.
CO5	Determine various subsystems in Satellite Communication.
CO6	Design Uplink and Downlink Satellite System.

Department: E &TC Engineering. Course Name: Machine Learning (404191)	
CO No.	**Statement**
CO1	Differentiate between various learning approaches and illustrate the steps involved in designing a different machine learning algorithm.
CO2	Demonstrate the application of supervised learning algorithms like regression and classification for solving real world problems.
CO3	Develop unsupervised learning algorithms to solve complex problems with an understanding of the trade-offs involved.
CO4	Analyze basic concepts of neural networks and different learning mechanisms for societal applications.
CO5	Investigate various neural network algorithms to solve real world problems.
CO6	Formulate deep learning algorithms such as Convolutional Neural Networks (CNN's) for image recognition applications.

Department: E &TC Engineering. Course Name: Audio Video Processing (404191)	
CO No.	**Statement**
CO1	Analyze different parameters of color television system.
CO2	Study and understand various HDTV standards and Digital TV broadcasting systems.
CO3	Illustrate different video, audio and image compressing techniques.
CO4	Understand Audio systems and PA systems.
CO5	Understand various acoustic systems.

Department: E &TC Engineering. Course Name: Robotics (404192)	
CO No.	**Statement**
CO1	Familiar with the history, concept development and key components of robotics technologies.
CO2	Understand mathematical manipulations of spatial coordinate representation and transformation.
CO3	Solve basic robot forward and inverse kinematic problems.
CO4	Understand and able to solve basic robotic dynamics, path planning and control problems.
CO5	Get acquainted with advanced robotic techniques.
CO6	Acquire basic knowledge of developing and building a robot.

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Department: E &TC Engineering. Course Name: Wireless Sensor Networks (404192)	
CO No.	**Statement**
CO1	Describe, distinguish & interpret various concepts and terminologies used in WSN.
CO2	Classify and summarize use of various radio communication and link management in WSN.
CO3	Define and compare various wireless standards and protocols associated with WSN.
CO4	Recognize and illustrate importance of localization and routing techniques used in WSN.
CO5	Understand and discuss techniques of data aggregation and importance of security in WSN.
CO6	Analyze, compare and examine the issues involved in design and deployment of WSN.
Department: E &TC Engineering. Course Name: Biomedical Electronics (404192)	
CO No.	**Statement**
CO1	Model the physiology of the biomedical system.
CO2	Understand functioning of heart; principle and working of Biomedical Instruments for cardiovascular system with various sources of bio- signal distortions and its remedial techniques.
CO3	Describe the structure of the nervous system and analyse EEG signals for disease detection like Epilepsy and Sleep apnea.
CO4	Select appropriate filters like Active, Wiener and Adaptive Filters for artifact removal in ECG signal.
CO5	Analyze ECG signals and apply knowledge of electronics engineering for noise removal and highlight the features.
CO6	Discuss the application of Electronics in diagnostics and therapeutic areas.
Department: E &TC Engineering. Course Name: Lab Practice –III (MCS + BCS) (404193)	
CO No.	**Statement**
CO1	Understand and perform practical based on telephone switching.
CO2	Analyze and perform experiment on telecommunication traffic.
CO3	Understand and simulate wireless channel model.
CO4	Identify various components such as optical source, detector and Fiber of Optical Communication system
CO5	Determine Power budget and Time budget analysis of optical fiber system.
CO6	Design an AUDIO-VIDEO satellite link between Transmitter and Receiver and transmit three separate signals (Audio, Video, and Tone) simultaneously through satellite Link.
Department: E &TC Engineering. Course Name: Lab Practice –IV Machine Learning) (404194)	
CO No.	**Statement**
CO1	Understand the fundamental theory and concepts of neural networks.
CO2	Apply different neural network architectures and algorithms to solve real time problems such as classification and regression.
CO3	Develop and characterize various machine learning algorithms such as supervised, unsupervised to solve real-life problems such as classification and regression.
CO4	Understand the fundamental concept of deep learning architecture and algorithm such as convolutional neural networks

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Department: E &TC Engineering. Course Name: Lab Practice –IV(Audio Video Engineering) (404194)	
CO No.	**Statement**
CO1	Understand the various concepts, terminologies and working of television systems.
CO2	Study and understand various audio and video formats, compression techniques.
CO3	Illustrate different audio systems and PA systems.
Department: E &TC Engineering. Course Name: Project Stage –II (404195)	
CO No.	**Statement**
CO1	Design solution for the problem defined.
CO2	Execute the project to find a solution which is ethical and professional.
CO3	Prepare a detailed report of work carried in the process of execution of the project.
CO4	Demonstrate oral, written and technical skills acquired during the process of completion of the project.

Jagtap

Dr. S.K. Jagtap
HOD (E &TC)

Head
Dept. of Electronics &
Telecommunication Engineering
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Program Outcomes:	
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, 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 Teamwork 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 (LLL) in the broadest context of technological change.
	Program Specific Outcomes (PSO):
PSO1	Core Competence in Mechanical Engineering : Student will be able to comprehend, synthesize and analyse the problems in the field of Thermal engineering, Design engineering, Manufacturing engineering and Mechatronics.
PSO2	Competence in Computational Tools : Student will be able to apply the knowledge of mechanical engineering software tools for solving engineering problems for developing products & Processes related to mechanical & alligned engineering feilds.
	Program Educational Objctives (PEOs):
PEO 1	Core Competence in Mechanical Engineering: Employable in core mechanical industries, multidisciplinary sectors like government organizations, software industries, practice entrepreneurship and pursue higher education.
PEO 2	Innovation and Research: Able to solve complex mechanical engineering problems through innovation and research.
PEO 3	Professionalism and Ethics: Able to practice professionalism as a team or an individual considering ethics, social and environmental responsibility

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HoD, Department of Mechanical Engineering.

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CO No	Statement
Department of Mechanical Engineering, Course Name: Engineering Mathematics -III (M15P201), A.Y 2018-19	
M15P201.1	Solve higher order linear differential equations and apply to modeling and analyzing mass spring systems.
M15P201.2	Apply Laplace transform and Fourier transform techniques to solve differential equationsi nvo ved in Vibration theory, Heat transfer and related engineering applications
M15P201.3	Apply statistical methods like correlation, regression analysis in analyzing, interpretinge xper mental data .
M15P201.4	Apply probability theory in testing and quality control.
M15P201.5	Perform Vector differentiation & integration, analyze the vector fields and APPLY to fluidf low problems
M15P201.6	Solve various partial differential equations such as wave equation, one and two dimensional heat flow equations.
Department of Mechanical Engineering, Course Name: Manufacturing Process -I (M15P202), A.Y 2018-19	
M15P202.1	DIFERENTIATE various Casting process and ANALYZE moulds used for sand casting process
M15P202.2	Identify,Differentiate metal forming process & estimate dimension of die used for open die forging.
M15P202.3	Understand, differentiate and compare different plastic moulding technique.
M15P202.4	IDENTIFY various metal joining techniques.
M15P202.5	Identify various sheet metal process and analyze progressive and drawing dies.
M15P202.6	Understand the construction of centre lathe, various attachments of the machine and various operations performed using the lathe
Department of Mechanical Engineering, Course Name: Computer Aided Machine Drawing(M15P203), A.Y 2018-19	
M15P203.1	Understand the importance of CAD in the light of allied technologies such as CAM, CAE, FEA, CFD and PLM
M15P203.2	Draw 2D sketching using parametric technology
M15P203.3	Draw 3D machine components modeling using parametric feature-based modeling
M15P203.4	Create 3D assemblies that represent static or dynamic Mechanical Systems
M15P203.5	Understand and impliment Geometric Dimensioning and Tolerancing
M15P203.6	Communicate between Design and Manufacturing using 2D drawings

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Department of Mechanical Engineering, Course Name: Thermodynamics (M15P204), A.Y 2018-19	
M15P204.1	Understand and apply laws of thermodynamics to various processes and thermodynamic systems
M15P204.2	Apply the concept of Entropy and determine thermodynamic properties for various ideal gas processes.
M15P204.3	Estimate performance of various Thermodynamic cycles and availability in each case.
M15P204.4	Estimate the quality of steam and performance of vapour cycle.
M15P204.5	Evaluate the performance of steam generators.
M15P204.6	Demonstrate Psychrometric processes using psychrometric chart.

Department of Mechanical Engineering, Course Name: Material Science (M15P205), A.Y 2018-19	
M15P205.1	Demonstrate the basic concept and properties of Material.
M15P205.2	Demonstrate and apply fundamental material/metallurgical theories behind material processing.
M15P205.3	Evaluate material properties through experimentation and analyze and interpret results.
M15P205.4	Define and analyze engineering problems related to corrosion and achieving a practical solution.
M15P205.5	Recognize how surfaces of the materials can be strengthened using various surface modification techniques.
M15P205.6	Select proper metal, alloys, nonmetal and powder metallurgical component for specific

Department of Mechanical Engineering, Course Name: Strength of Materials (M15P206), A.Y 2018-19	
M15P206.1	ANALYSE various types of stresses and strain developed on determinate and indeterminate members.
M15P206.2	CONSTRUCT shear force and bending moment diagram for various types of transverse loading and support.
M15P206.3	EVALUATE bending stress and shear stress distribution in machine elements
M15P206.4	DETERMINE slope and deflection of beam and EVALUATE strain energy stored due to various types of load.
M15P206.5	CALCULATE torsional shear stress developed in shaft and buckling of column.
M15P206.6	APPLY the concept of principal stresses and theories of failure to determine stresses.

Department of Mechanical Engineering, Course Name: Audit Course -I (M15P207), A.Y 2018-19	
M15P207.1	Generate awareness about number of people dyeing every year in road accidents, traffic rules and characteristics of accident.
M15P207.2	Understand the importance of multidisciplinary approach to planning for traffic safety and rehabilitation
M15P207.3	Gain information and knowledge about people responsible for accidents and their duties
M15P207.4	Understand 5 P's of road safety education

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Department of Mechanical Engineering, Course Name: Fluid Mechanics (M15P208), A.Y 2018-19	
M15P208.1	DETERMINE various properties of fluid
M15P208.2	APPLY the laws of fluid statics and concepts of buoyancy
M15P208.3	IDENTIFY types of fluid flow and terms associated in fluid kinematics
M15P208.4	UNDERSTAND and APPLY principles of fluid dynamics to laminar flow
M15P208.5	ESTIMATE friction and minor losses in internal flows and UNDERSTAND the concept of boundary layer formation over an external surface
M15P208.6	CONSTRUCT mathematical correlation considering dimensionless parameters, also ABLE to predict the performance of prototype using model laws
Department of Mechanical Engineering, Course Name: Soft Skills (M15P209), A.Y 2018-19	
M15P209.1	Understand about SWOT analysis & identify their Strenghts,Weakness,Opportunity & Threats
M15P209.2	understand the differnce between listening & Hearing
M15P209.3	Improve presentation &speaking skills
M15P209.4	write their resume
M15P209.5	Apply businees etiquette for right attitudinal behavioural change
M15P209.6	Communicate effectively in a group with help of social media
Department of Mechanical Engineering, Course Name: Theory of Machines -I (M15P210), A.Y 2018-19	
M15P210.1	IDENTIFY mechanisms in real life applications.
M15P210.2	PERFORM kinematic analysis of simple mechanisms.
M15P210.3	PERFORM static and dynamic force analysis of slider crank mechanism.
M15P210.4	DETERMINE moment of inertia of rigid bodies experimentally
M15P210.5	ANALYZE velocity and acceleration of mechanisms by vector and graphical methods
Department of Mechanical Engineering, Course Name: Engineering Metallurgy (M15P211), A.Y 2018-19	
M15P211.1	UNDERSTAND the basic concept of Engineering Metallurgy and construct Equilibrium diagrams.
M15P211.2	PREPARE the specimen for Metallography and analyze microstructures for ferrous and nonferrous metals for Industrial applications.
M15P211.3	COMPARE various types of steels and alloys for its applications.
M15P211.4	IDENTIFY the suitable heat treatment methods for different types of steels.
M15P211.5	DIFFERENTIATE various specific grades of steels and modern materials for engineering practices.
M15P211.6	CLASSIFY the various Nonferrous metals and their alloys for industrial applications.

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Department of Mec al Engineering, Course Name: Applied Thermodynamics (M15P212), A.Y 8-19	
M15P212.1	Classify various types of Engines, Compare Air standard, Fuel Air and Actual cycles and identify various losses in real cycles.
M15P212.2	Understand fundametales of petrol engine including Theory of Carburetion, Stages of Combustion in S. I. Engines and Theory of Detonation, and factors affecting detonation
M15P212.3	Understand fundametales of petrol engine including Fuel Supply system, Types of Injectors and Injection Pumps,Comparison of SI and CI Combustion and Knocking and Factors affecting, Criteria for good combus
M15P212.4	Investigate performance parameters of I. C. Engines
M15P212.5	Describe construction and working of various I. C. Engine systems also various harmful gases emitted from exhaust and different devices to control pollution and emission norms for pollution control
M15P212.6	Describe construction, working of various types of reciprocating and rotary compressors with performance calculations of positive displacement compressors
Department of Mechanical Engineering, Course Name: Electrical & Electronics Engineering (M15P213), A.Y 2018-19	
M15P213.1	Explain the operation of DC motor ,its speed control methods and braking
M15P213.2	Describe the operation of Induction Motor and its speed control methods.
M15P213.3	Select sutaible special purpose motor and its industrial applications.
M15P213.4	Compare between microprocessor and microcontroller & apply programming concept.
M15P213.5	Understand Interfacing of Peripheral output devices
M15P213.6	Devlop interfacing of different types of sensors and other hardware devices with Atmega328p based Arduino board.
Department of Mechanical Engineering, Course Name: Machine Shop -I (M15P214), A.Y 2018-19	
M15P214.1	Manufacture spur gear on milling machine using indexing head
M15P214.2	Perform surface grinding using table grinder
M15P214.3	Prepare sheet metal component involving metal forming operations
M15P214.4	Produce component using injection type plastic moulding machine
Course Outcome For TE Sem-I Course 2015 Pattern	
Department of Mechanical Engineering, Course Name: Design of Machine Elements -I (M15P301), A.Y 2018-19	
M15P301.1	Design the cotter joints, knuckle joints, levers and component subjected to eccentric loading.
M15P301.2	Design shafts,keys and couplings under static load conditions
M15P301.3	Analyze different stresses in power screws and apply those in the procedure to design screw jack
M15P301.4	Evaluate dimensions of machine components under fluctuating load condition
M15P301.5	Evaluate and interpret the stress developed in welded and threaded joints
M15P301.6	Apply the design and development procedure for different types of springs
Department of Mechanical Engineering, Course Name: Heat Transfer (M15P302), A.Y 2018-19	

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M15P302.1	Analyze the various modes of heat transfer and implement basic heat conduction equations for steady one dimensional thermal system.
M15P302.2	Apply general heat conduction equation to thermal systems with internal heat generation & evaluate heat transfer through extended surfaces
M15P302.3	Validate lumped system analysis for transient heat conduction and identify insulating materials
M15P302.4	Analyze the heat transfer rate in natural and forced convection and evaluate through experimental investigation
M15P302.5	Estimating heat transfer by radiation between objects with different geometries
M15P302.6	Analyze the heat transfer equipments and estimate their performance
Department of Mechanical Engineering, Course Name: Theory of Machines -II (M15P303), A.Y 2018-19	
M15P303.1	Understand fundamental of gear which will be the prerequisite for gear design.
M15P303.2	Perform force analysis of Spur, Helical , Bevel , worm & Worm Gear
M15P303.3	Analyze speed & torque in epi-cyclic gear train which will help in gear design
M15P303.4	Design cam profile with particular follower motion & understand cam jump phenomenon , advance cam curves
M15P303.5	Synthesize a four bar mechanism with analytical & graphical methods
M15P303.6	Analyze the gyroscopic couple or its effect for stabilization of ship, aeroplane , Four wheeler vehicle & they will also choose appropriate drive for given application.
Department of Mechanical Engineering, Course Name: Turbo Machines (M15P304), A.Y 2018-19	
M15P304.1	Know the basic principles, governing equations and applications of turbo Machines
M15P304.2	Understand construction and working principle of Turbo Machines.
M15P304.3	Design and evaluate different parameters for Turbo Machines.
M15P304.4	Analyse different Turbo Machines.
M15P304.5	Predict performance of different Turbo Machines applying model analysis.
M15P304.6	Evaluate the performance characteristics of Turbo Machines.

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Department of Mechanical Engineering, Course Name: Turbo Machines (M15P304), A.Y 2018-19	
M15P304.1	Know the basic principles, governing equations and applications of turbo Machines
M15P304.2	Understand construction and working principle of Turbo Machines.
M15P304.3	Design and evaluate different parameters for Turbo Machines.
M15P304.4	Analyse different Turbo Machines.
M15P304.5	Predict performance of different Turbo Machines applying model analysis.
M15P304.6	Evaluate the performance characteristics of Turbo Machines.
Department of Mechanical Engineering, Course Name: Metrology & Quality Controls (M15P305), A.Y 2018-19	
M15P305.1	Select the appropriate measuring instruments (standards), design guages and calibrate measuring instruments.
M15P305.2	Understand the conventional methods of measurements and estimate the different parameters of gear and threads.
M15P305.3	Understand the advanced methods of measurements such as CMM, Machine Vision System, Interferometer and Laser Metrology.
M15P305.4	Associate quality control tools (Techniques) for industrial applications.
M15P305.5	Apply the appropriate statistical tools to investigate and predect the quality of product/process.
M15P305.6	Describe the different techniques in total quality management systems.
Department of Mechanical Engineering, Course Name: Skill Development (M15P306), A.Y 2018-19	
M15P306.1	Assemble the different components such as tail stock, IC engine which are required for shop floor working
M15P306.2	Acquire the knowledge of tool and tackles used in machine assembly shop
M15P306.3	use the Therotical knowledge in practical work
Department of Mechanical Engineering, Course Name: NMAO (M15P307), A.Y 2018-19	
M15P307.1	Implement appropriate numerical methods and solver to evaluate roots of equation. Measure the numerical errors.
M15P307.2	Apply direct and approximate methods to solve linear algebric equations and formulation of algorithms and programs.
M15P307.3	Build solutions for real life problem using optimization techniques.
M15P307.4	Choose and validate appropriate methods to solve initial and boundary value problems in Ordinary Differential Equations and Partial Differential Equatons.
M15P307.5	Apply and validate various techniques for regression analysis and curve fitting.
M15P307.6	Analyze different numerical integration methods.

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CO No	Statement
Department of Mechanical Engineering, Course Name: Design of Machine Elements -II (M15P308), A.Y 2018-19	
M15P308.1	Design Spur, Helical, Bevel and Worm gears and apply it for industrial applications
M15P308.2	Analyze Rolling contact bearing and its selection from manufacturer's Catalogue
M15P308.3	Select belt, rope and chain drive from manufacturer's Catalogue
M15P308.4	Analyze and select sliding contact bearing for industrial applications
Department of Mechanical Engineering, Course Name: Refrigeration & Air Conditioning (M15P309), A.Y 2018-19	
M15P309.1	Know the applications of refrigeration and air conditioning systems and present the properties, applications and environmental issues of different refrigerants.
M15P309.2	Obtain cooling capacity and coefficient of performance by conducting test on vapour compression refrigeration and vapour absorption refrigeration systems.
M15P309.3	Analyze the refrigeration cycles and methods for improving performance of refrigeration systems.
M15P309.4	Understand basic air conditioning processes on psychrometric chart and calculate cooling load for various comfort and industrial air conditioning applications.
M15P309.5	Choose different components of refrigeration and air conditioning systems as per their operating principles and the requirement.
M15P309.6	Select air distribution and air handling systems as per requirement.
Department of Mechanical Engineering, Course Name: Mechatronics (M15P310), A.Y 2018-19	
M15P310.1	Understand principle of sensors, its characteristics and applications in mechatronics system
M15P310.2	Identify key elements of mechatronics system and represention in terms of block diagram
M15P310.3	Sensors and Actuators interfacing with DAQ using appropriate microcontroller
M15P310.4	Develop PLC ladder programming for various control system application.
M15P310.5	System modelling & stability analysis in frequency domain for control system application
M15P310.6	Implementation of PID control on real time systems
Department of Mechanical Engineering, Course Name: Manufacturing Process -II (M15P311), A.Y 2018-19	
M15P311.1	Apply the knowledge of various manufacturing Processes
M15P311.2	Identify various process parameter and their effect on processes
M15P311.3	Figure out application of Modern Machining
M15P311.4	Aapply the knowledge of different advanced machining processes
M15P311.5	Get familiarize with control systems, Manual part programming (plain milling and turning), Subroutine, Canned cycle
M15P311.6	Get the knowledge of Jigs and Fixtures for variety of operations.

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Department of Mechanical Engineering, Course Name: Machine Shop- II (M15P312), A.Y 2018-19	
M15P312.1	Understand and implement process planning sheet of job
M15P312.2	Draft jog and fixture drawing maually
M15P312.3	Excute various opertions on lathe machine to develop proposed mechanical component
Department of Mechanical Engineering, Course Name: Seminar (M15P313), A.Y 2018-19	
M15P313.1	Establish motivation for any topic of interest and develop a thought process for technical presentation
M15P313.2	Organize a detailed literature survey and build a document with respect to technical publications.
M15P313.3	Analysis and comprehension of proof-of-concept and related data.
M15P313.4	Effective presentation and improve soft skills.
M15P313.5	Make use of new and recent technology (e.g. Latex) for creating technical reports
Department of Mechanical Engineering, Course Name: Audit Course -II (M15P314), A.Y 2018-19	
M15P314.1	Appreciate the concept of Entrepreneurship
M15P314.2	Identify Entrepreneurship opportunity .
M15P314.3	Develop winning business plans.
Course Outcome For BE Sem-I Course 2015 Pattern	
Department of Mechanical Engineering, Course Name: Hydraulics & Pneumatics (M15P401), A.Y 2018-19	
CO No	Statement
M15P401.1	Understand working principle of components used in hydraulic & pneumatic systems
M15P401.2	Identify various applications of hydraulic & pneumatic systems
M15P401.3	Selection of appropriate components required for hydraulic and pneumatic systems
M15P401.4	Analyse hydraulic and pneumatic systems for industrial/mobile applications
M15P401.5	Design a system according to the requirements
M15P401.6	Develop and apply knowledge to various applications
Department of Mechanical Engineering, Course Name: CAD / CAM Automation (M15P402), A.Y 2018-19	
M15P402.1	Associate and apply homogeneous transformation matrices for geometrical transformations mapping of 2D CAD entities.
M15P402.2	Estimate analytical and synthetic curve profiles and associate various types of surfaces and solid modeling approaches for part modeling.
M15P402.3	Simulate the structural analysis of simple mechanical elements like bars, beams, trusses, etc. using Finite Element Analysis software like ANSYS and comment on their safety.
M15P402.4	Program CNC code for Turning / Milling operations and simulate tool path using CAM software.

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M15P402.5	Differentiate various additive rapid manufacturing techniques for engineering applications.
M15P402.6	Differentiate roles and components of various industrial automation strategies.
Department of Mechanical Engineering, Course Name: Dynamics of Machinery (M15P403), A.Y 2018-19	
M15P403.1	Understand different methods to determine natural frequency for single DOF undamped & damped free vibratory systems.
M15P403.2	Analyze response of forced vibrations due to harmonic excitation, base excitation and excitation due to unbalanced forces.
M15P403.3	Evaluate natural frequencies, mode shapes for 2 DOF undamped free longitudinal and torsional vibratory systems.
M15P403.4	Apply balancing technique for static and dynamic balancing of multi cylinder inline and radial engines.
M15P403.5	Understand uses of vibration measuring instruments for industrial / real life applications along with suitable method for vibration control.
M15P403.6	Analyze noise measurement & noise reduction techniques for industry and day today life problems.
Department of Mechanical Engineering, Course Name: Elective -I Finite Element (M15P 404A), A.Y 2018-19	
M15P404A.1	Understand basic fundamentals of finite element model using different approaches.
M15P404A.2	Apply FEA technique to solve problems on bar, beams and truss for calculating displacement, stresses and reaction.
M15P404A.3	Evaluate stresses and displacements of 2D problems by using FEA.
M15P404A.4	Implement the concept of isoparametric Elements, Co-ordinate Mapping & Numerical Integration in FEA.
M15P404A.5	Formulate the Finite Element model and Implement it to solve one dimensional heat transfer problem.
M15P404A.6	Apply lumped and mass system methods and investigate dynamic behavior for bar, truss and beam element.
Department of Mechanical Engineering, Course Name: Elective -I Computational Fluid Dynamics (M15P 404B), A.Y 2018-19	
M15P404B.1	Students should be able to model fluid / heat transfer problems and apply fundamental conservation principles
M15P404B.2	Students should be able to do discretize the governing equations by Finite Difference Method and Finite volume Method.
M15P404B.3	Students should be able to develop programming skills by in-house code development for conduction, convection and fluid dynamics problems.
M15P404B.4	Students should be able to solve basic convection and diffusion equations and understands the role in fluid flow and heat transfer.
M15P404B.5	To prepare the students for research leading to higher studies.
M15P404B.6	To prepare the students for career in CAE industry using software tools.
Department of Mechanical Engineering, Course Name: Elective -I Heating Ventilation & Air Conditioning (M15P 404C), A.Y 2018-19	
M15P404C.1	Evaluate the performance parameters of trans-critical & ejector refrigeration systems
M15P404C.2	Estimate thermal performance of compressor, evaporator, condenser and cooling tower.
M15P404C.3	Analyze refrigerant piping design, capacity & safety controls and balancing of vapour compressor system.
M15P404C.4	Estimate heat transmission through building walls using CLTD and decrement factor &time lag methods with energy-efficient and cost-effective measures for building envelope.

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M15P404C.5	Recognise working of types of desiccant, evaporative, thermal storage, radiant cooling, clean room and heat pump air-conditioning systems.
M15P404C.6	Evaluate working of types of desiccant, evaporative, thermal storage, radiant cooling, clean room and heat pump air-conditioning systems.
Department of Mechanical Engineering, Course Name: Elective -II Automobile Engineering (M15P 405A), A.Y 2018-19	
M15P405A.1	Understanding the automobile vehicle and it's layout. Demonstrate Automobile Transmission system like clutch, gear box, etc
M15P405A.2	Demonstrate Automobile control system like Axle, steering, suspension, wheels and tyres with it's construction and working.
M15P405A.3	Demonstrate system like Suspension and Brakes with its Contruction and working principle
M15P405A.4	Demonstrate of vehicle performance and safety of vehicle based on various road conditions
M15P405A.5	Demonstrate electrical system like lighting, starting charging with its Contruction and working principle. also demonstrate Automobile maintenance
M15P405A.6	Demonstrate the Automobile system like Electrical and hybrid vehicles with their construction and working. Environment importance to use this vehicles and future scope.
Department of Mechanical Engineering, Course Name: Elective -II Operational Research (M15P 405B), A.Y 2018-19	
M15P405B.1	Apply the knowledge of LPP and decision theory to solve the problems related to top level management.
M15P405B.2	Optimize the available resources with the help of transportation and assignment models.
M15P405B.3	Select the optimal strategies in conflicting situations and solve simple problems of replacement.
M15P405B.4	Solve, analyze and optimize the simple problems of CPM and PERT by using project management techniques.
M15P405B.5	Improve the decision making and also critical thinking related to sequencing as well as queuing models.
M15P405B.6	Optimize multi stage decision making environments.
Department of Mechanical Engineering, Course Name: Elective -II Energy Audit & Management (M15P 405A), A.Y 2018-19	
M15P405C.1	Identify the demand supply gap of energy in Indian scenario
M15P405C.2	Carry out energy audit of an industry/Organization.
M15P405C.3	Draw the energy flow diagram of an industry and identify the energy wasted or a waste stream.
M15P405C.4	Select appropriate energy conservation method to reduce the wastage of energy.
M15P405C.5	Evaluate the techno economic feasibility of the energy conservation technique adopted.
M15P405C.6	Select appropriate cogeneration technique suitable for organization
Department of Mechanical Engineering, Course Name: Project -I (M15P 406), A.Y 2018-19	
M15P406.1	Students will be able to find out the gap between existing mechanical systems and develop new creative new mechanical system.
M15P406.2	Students will be able to learn about the literature review.
M15P406.3	Students will be able to get the experience to handle various tools, tackles and machines.
Course Outcome For BE Year Sem-II Course 2015 Pattern	

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Department of Mechanical Engineering, Course Name: Energy Engineering /Power Plant Engineering (M15P407), A.Y 2018-19	
M15P407.1	Describe present Energy generation scenario and Analyze the improved Rankine cycle with reheat and regenration, Cogeneration cycle .
M15P407.2	Analyze the steam condensers, recognize the an environmental impacts of thermal power plant and method to control the same
M15P407.3	Interpret the hydrograph and Analyze the flow duration curve
M15P407.4	Analyze Diesel Engine power plant & Gas turbine power cycle.
M15P407.5	Explain the fundamentals of non-conventional power plants
M15P407.6	Select power generation Equipment & determine depreciation cost.
Department of Mechanical Engineering, Course Name: Mechanical System Design (M15P 408), A.Y 2018-19	
M15P408.1	Design and model machine tool gear boxes for stated specifications
M15P408.2	Apply the statistical considerations in design to analyze the defects and failure modes in industrial products.
M15P408.3	Design Belt Conveyor System for Material Handling applications
M15P408.4	Design and model cylinders and pressure vessels for engineering applications
M15P408.5	Design I.C. engine components for stated specifications
M15P408.6	Apply appropriate optimum design principles to mechanical components.
Department of Mechanical Engineering, Course Name: Elective -III Tribology (M15P 409A), A.Y 2018-19	
M15P409A.1	Know the significance of role of tribology in Industry.
M15P409A.2	know the the basic concepts of friction and wear mechanism and their measurement along with lubrication methods.
M15P409A.3	Analyze the performance Hydrodynamic Bearings analytically.
M15P409A.4	Analyze the performance Hydrostatic Bearings analytically.
M15P409A.5	Know the mechanism of Elastohydrodynamic bearing and get the knowledge of advanced lubrication methods.
M15P409A.6	Apply the principles surface engineering in different applications of tribology.
Department of Mechanical Engineering, Course Name: Elective -III Industrial Engineering (M15P 409B), A.Y 2018-19	
M15P409B.1	Apply the Industrial Engineering concept in the industrial environment.
M15P409B.2	Manage and implement different concepts involved in methods study and understanding of work content in different situations
M15P409B.3	Undertake small case study based project works regarding work measurement and time study.
M15P409B.4	Planning and controlling of production system and use of modern forecasting and mangement techniques for different types of industries Apply inventory models and techniques to create and recommend optimum
M15P409B.5	Develop capability in integrating knowledge of design along with other aspects of value addition in the conceptualization and manufacturing stage of various products.
M15P409B.6	Identify various cost accounting and financial management practices widely applied in industries.

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Department of Mechanical Engineering, Course Name: Elective -III Robotics (M15P 409C), A.Y 2018-19	
M15P409C.1	Identify different type of robot configuration and design gripper
M15P409C.2	select necessary Sensors, Drives and Control systems for Robot
M15P409C.3	Calculate forward and inverse kinematics and velocity in robotic systems by representing DH parameters
M15P409C.4	Plan trajectory for desired motion using trajectory planning tools for robot
M15P409C.5	Understand machine vision and select appropriate robot programming for given application
M15P409C.6	Understand Artificial intelligence, IoT, machine learning, and select simulation for robot configuration
Department of Mechanical Engineering, Course Name: Elective -IV Advanced Manufacturing Processes (M15P 410A), A.Y 2018-19	
M15P410A.1	Classify and analyze special forming processes
M15P410A.2	Analyze and identify applicability of advanced joining processes
M15P410A.3	Understand and analyze the basic mechanisms of hybrid non-conventional machining techniques
M15P410A.4	Select appropriate micro and nano fabrication techniques for engineering applications.
M15P410A.5	apply various additive manufacturing technology for product development in industrial applications
M15P410A.6	Compare various material characterization techniques used to analyze effects of chemical composition, crystal structure, topography etc. of specimens.
Department of Mechanical Engineering, Course Name: Elective -IV Product Design & Development (M15P 410A), A.Y 2018-19	
M15P410B.1	On completion of the course, Students will be able to understand essential factors for product design.

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M15P410B.2	On completion of the course, Students will be able to design product as per customer needs and satisfaction
M15P410B.3	On completion of the course, Students will be able to understand Processes and concepts during product development On completion of the course,
M15P410B.4	On completion of the course, Students will be able to understand methods and processes of Forward and Reverse engineering
M15P410B.5	On completion of the course, students will be able to carry various design processes as DFA, DFMEA, design for safety
M15P410B.6	On completion of the course, students will be able to understand the product life cycle and product data management
Department of Mechanical Engineering, Course Name: Project -II (M15P 411), A.Y 2018-19	
M15P411.1	Design and develope manufacturing set up /simulate various mechanical systems using various manufacturing processes / softwares
M15P411.2	Evaluate the solution to a problem defined on the basis of research gap
M15P411.3	Formulate a dissertation report
2012 Pattern	
Course Outcome For Last Year Sem-I Course	
Department of Mechanical Engineering, Course Name: Refrigeration and Air Conditioning-302049 (M12P1), A.Y 2018-19	
M12P1.1	Understand the fundamental principles and applications of refrigeration and air conditioning system
M12P1.2	Obtain cooling capacity and coefficient of performance by conducting test on vapor compression refrigeration systems
M12P1.3	Present the properties, applications and environmental issues of different refrigerants
M12P1.4	Calculate cooling load for air conditioning systems used for various applications
M12P1.5	Operate and analyze the refrigeration and air conditioning systems.
M12P1.6	Design and select the duct for air distribution system
Department of Mechanical Engineering, Course Name: Hydraulics and Pneumatics (M12P2), A.Y 2018-19	
M12P2.1	Understand working principle of components used in hydraulic & pneumatic systems
M12P2.2	Identify various applications of hydraulic & pneumatic systems
M12P2.3	Selection of appropriate components required for hydraulic and pneumatic systems
M12P2.4	Analyse hydraulic and pneumatic systems for industrial/mobile applications
M12P2.5	Design a system according to the requirements
M12P2.6	Develop and apply knowledge to various applications

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SINHGAD TECHNICAL EDUCATION SOCIETY'S

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DEPARTMENT OF ENGINEERING SCIENCE

Criterion No.: 2.6.1

List of CO of All Cources for A.Y. 2018-19

Course	Co with Statements
107001	**Engineering Mathematics-1**
107001.1	System of linear equations arising in all engineering fields using matrix methods,satability of engg. Systems where eigenvalus & eigenvectors are essential.
107001.2	Algebraic and trancedental equations
107001.3	Successive differentiation and series
107001.4	Expansion of functions and differential calculus
107001.5	Introduction to partila derivatives
107001.6	To apply the concept of jacobian to find partial derivative of implicit function and functional dependence. use of partial derivatives in estimating errors and approximations and finding extreme values of function.

Course	Co with Statements
107002	**Engineering Physics**
107002.1	Develop understanding of interference, diffraction ; connect it to few engineering applications.
107002.2	Learn basics of acoustics, ultrasonics and their use in some applications of sound engineering
107002.3	Learn basics of lasers and polarisation and their use in some applications
107002.4	Understand theory of semiconductors and their applications in some semiconductor devices.
107002.5	Understand concepts and principles in quantum mechanics. Relate them to some applications.
107002.6	Summarize basics of superconductivity and nanotechnology. Explore few of their properties and technological applications.

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Subject	Enginerring Graphics-I
SUBJECT CODE	102006
CODE	Co with Statements
102006.1	Draw the fundamental engineering objects using basic rules and able to construct the simple geometries.
102006.2	Draw the projection of points, lines and planes
102006.3	To draw, understand and explain projection of solids resting on HP
102006.4	Sketch the conic sections, special curves, and draw orthographic views from pictorial views and models.
102006.5	Apply the concept of orthographic projection of an object to draw several 2D views and its sectional views for visualizing the physical state of the object.
102006.6	Apply the visualization skill to draw a simple isometric projection from given orthographic views precisely using drawing equipment.

Subject	Basic Electrical Engineering
SUBJECT CODE	103004
CODE	Co with Statements
103004.1	Evaluate work, power, and energy relations for various system and basic concepts of electrical engineering
103004.2	Differentiate between electrical and magnetic circuits and derive mathematical relation for self and mutual inductance along with coupling effect.
103004.3	Demonstrate the operation of single phase transformer and calculate efficiency and regulation at different loading conditions . Calculate series, parallel and composite capacitor.
103004.4	Calculate characteristics parameters of alternating quantity and phasor arithmetic for pure resistive, capacitive and inductive circuit.
103004.5	Relate phase and line electrical quantities in polyphase networks. Derive expression for impedance, current, power in series and parallel RLC circuit with AC supply along with phasor diagram.
103004.6	Apply and analyze the resistive circuits using star-delta conversion KVL, KCL and different network theorems under DC supply.

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Subject	Basic Civil & Environmental Engg.
SUBJECT CODE	101005
CODE	Co with Statements
101005.1	Describe basic area of Civil Engg and their use in interdisciplinary projects.
101005.2	Identify construction materials, explain types of construction and difference between substructure & superstructure.
101005.3	Learn basics of surveying & levelling & calculate reduced levels.
101005.4	Explain types of ecosystems, enlist natural resources and describe solid waste management.
101005.5	Describe use of building planning principles and building byelaws for building construction.
101005.6	Distinguish and provide examples of conventional and non-conventional energy, have an understanding of environmental pollution.

Subject	Fundamentals of Programming Languages-I
SUBJECT CODE	110003
CODE	Co with Statements
110003.1	Define and generalize problem solving aspects and various program design tools.
110003.2	Relate and manipulate basics of Programming language in 'C'.
110003.3	Apply and develop programming using Decision Control Structures and Pointers in 'C' .
110003.4	Evaluate and develop programming using Arrays , Functions and Strings in 'C' .

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Subject	Workshop
SUBJECT CODE	111007
CODE	Co with Statements
111007.1	Familiar with safety norms to prevent any mishap in workshop.
111007.2	Able to handle appropriate hand tool, cutting tool and machine tools to manufacture a job.
111007.3	Able to understand the construction, working and functions of machine tools and their parts.
111007.4	Able to know simple operations (Turning and Facing) on a centre lathe.

Subject	Engineering Mathematics - II
SUBJECT CODE	107008
CODE	Co with Statements
107008.1	The effective mathematical tools for solutions of first order differential equations that model physical processes such as Newton's law of cooling, electrical circuit, rectilinear motion, mass spring systems, heat transfer etc.
107008.2	The effective mathematical tools for solutions of first order differential equations that model physical processes such as Newton's law of cooling, electrical circuit, rectilinear motion, mass spring systems, heat transfer etc.
107008.3	Advanced integration techniques such as Reduction formulae, Beta functions, Gamma functions, Differentiation under integral sign and Error functions needed in evaluating multiple integrals and their applications.Fourier series
107008.4	Trace the curve for a given equation and measure arc length of various curves.
107008.5	The concepts of solid geometry using equations of sphere, cone and cylinder in a comprehensive manner.
107008.6	Evaluation of multiple integrals and its application to find area bounded by curves, volume bounded by surfaces, Centre of gravity and Moment of inertia.

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Subject	Engineering Chemistry
SUBJECT CODE	107009
CODE	Co with Statements
107009.1	Apply the different methodologies for analysis of water and techniques involved in softening of water as commodity.
107009.2	Select appropriate electro-technique and method of material analysis.
107009.3	Demonstrate the knowledge of advanced engineering materials for various engineering applications
107009.4	Analyze fuel and suggest use of alternative fuels.
107009.5	An insight into nanao-materials & knowledge of carbon and hydrogen chemistry.
107009.6	Explain causes of corrosion and methods for minimizing corrosion.

Subject	Basic Mechanical Engineering
SUBJECT CODE	102013
CODE	Co with Statements
102013.1	Able to understand the concept of basic mechanical elements & power transmission devices
102013.2	Identify steps in machine design process, various materials, their properties and their applications in human life as well as industrial practices.
102013.3	Discuss several manufacturing processes and identify the suitable process
102013.4	Understand functions and operations of machine tools including milling,grinding and lathe machines
102013.5	Explain basic laws of thermodynamics, heat transfer and their applications, temperature measuring devices.
102013.6	Know the concept of power plant engineering, power producing devices & power absorbing devices.

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Subject	Engineering Mechanics
SUBJECT CODE	101011
CODE	Co with Statements
101011.1	Determine resultant of various force systems.
101011.2	Determine centroid, moment of inertia and solve problems related to friction.
101011.3	Determine reactions of beams, calculate forces in cables using principles of equilibrium.
101011.4	Solve trusses, frames for finding member forces and apply principles of equilibrium to forces in space.
101011.5	Calculate position, velocity and acceleration of particle using principles of kinematics.
101011.6	Calculate position, velocity and acceleration of particle using principles of kinetics and Work, Power, Energy.

Subject	Fundamentals of Programming Languages-II
SUBJECT CODE	110010
CODE	Co with Statements
110010.1	Develope programs using object oriented concepts
110010.2	Design and develop web pages
110010.3	Design and develop mobile application
110010.4	Design and develop simple application using Embedded Programming

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Subject	Basic Electronics Engineering
SUBJECT CODE	104012
CODE	Co with Statements
104012.1	To give knowledge of some basic electronic components and circuits
104012.2	To introduce basics of diode and transistor circuits.
104012.3	To understand working of some IC based circuits.
104012.4	To study logic gates and their usage in digital circuits.
104012.5	To expose the students to working of some power electronic devises, transducers and application of transducers.
104012.6	To introduce basic aspects of electronic communication systems.

Subject	Enginerring Graphics-II
Course	102014
CODE	Co with Statements
102014.1	To draw, understand and explain projection of solids resting on HP
102014.2	To draw, understand the concept of engineering curves
102014.3	To draw, understand development of solids.
102014.4	Apply the concept of orthographic projection of an object to draw several 2D views and its sectional views for visualizing the physical state of the object.
102014.5	Apply the visualization skill to draw a simple isometric projection from given orthographic views precisely using drawing equipment.

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